ABSTRACTS OF THE
47th Annual Meeting of the Society for Epidemiologic Research
June 24-27, 2014

TUESDAY, JUNE 24, 2014

7:00 – 8:30 p.m. **Poster Session 1 (**001-224)

WEDNESDAY, JUNE 25, 2013

10:00 – 11:30 am **Concurrent Contributed Sessions 1 (225-243)**

- ADVANCING METHODOLOGIC THINKING IN STUDIES ON WOMEN'S HEALTH (225-229)
- ENVIRONMENTAL AND OCCUPATIONAL EPIDEMIOLOGY (230-S-233-S)
- METHODS IN INFECTIOUS DISEASE EPIDEMIOLOGY: PROSPECTS AND PRACTICE (234-S – 239-S)
- CURRENT RESEARCH IN LIFECOURSE EPIDEMIOLOGY: MULTIGENERATIONAL, PRENATAL, AND CHILDHOOD INFLUENCES ON HEALTH (240-S—243)

SERdigital Award Winners (E01-E03)
Chairs: Abdul El-Sayed and Dana Pasquale

1:30 - 3:00 pm **Concurrent Contributed Sessions (244-265)**

- FECUNDABILITY: NOVEL METHODS AND FINDINGS (244-248-S)
- MODIFIABLE RISK FACTORS FOR BREAST CANCER: STILL SEARCHING (249-253-S)
- APPLICATIONS OF QUASI-EXPERIMENTAL TOOLS TO ADDRESS CONFOUNDING AND MISSING DATA (254-257-S)
- UNDERSTANDING THE ROLE OF SOCIAL CONTEXT IN POPULATION HEALTH: NOVEL FOCI AND INNOVATIVE APPROACHES (258-261-S)
- LIFESTYLE, CENTRAL ADIPOSITY, AND DIABETES RISK (262-S-265)

Latebreaker Session (L01-L08)
Chair: Polly Marchbanks

3:30—5:00 pm **Symposia (266-271)**

- RECENT DEVELOPMENTS IN CAUSAL MEDIATION ANALYSIS (265)
- THE ROLE OF EPIDEMIOLOGY IN TOBACCO CONTROL AND PRODUCT REGULATION: LOCAL, NATIONAL, AND INTERNATIONAL PERSPECTIVES (267 & 054-S)
- CHALLENGES IN MEASURING FERTILITY POTENTIAL, ITS TEMPORAL AND GEOGRAPHIC VARIATION AND IMPLICATIONS FOR ADULT HEALTH (269)
- WHAT DO WE KNOW AND HOW DO WE KNOW IT? (270)
- OPPORTUNITIES FOR HUMAN MICROBIOME RESEARCH IN EPIDEMIOLOGICAL STUDIES (271)

5:00 – 6:30 p.m. **Poster Session 2 (272-477)**
Latebreaker Posters (L09– L26)

THURSDAY, JUNE 26, 2014

10:00 – 11:30 am **Concurrent Contributed Sessions (478-S-499)**

- AGING IN THE ERA OF MODERN EPIDEMIOLOGY: NEW METHODS AND NEW QUESTIONS IN THE STUDY OF OLDER PEOPLE (478-S-482-S)
- ENVIRONMENT AND LIFESTYLE EFECTS ON MALE AND FEMALE REPRODUCTIVE HEALTH (483-S-487)
- INTERSECTIONS BETWEEN TRADITIONAL EPIDEMIOLOGIC METHODS AND SIMULATION MODELING (488-S-491)
- HEALTH DISPARITIES: THE ROLE OF NEIGHBORHOOD SOCIAL AND ECONOMIC CONDITIONS (492-495-S)
- RISK FACTORS FOR CARDIOVASCULAR DISEASE (496-S-499)

THURSDAY, JUNE 26, 2014, CONTINUED

2:15—3:45 p.m. **MIXED SESSIONS (500-508)**

- DOES GENETICS HAVE A ROLE IN SOCIAL EPIDEMIOLOGY? CONCEPTUAL AND METHODOLOGICAL CHALLENGES (500)
- WEIGHT AND MORTALITY—WHAT ARE THE CONTROVERSIES? (501)
- EMERGING AND CONTROVERSIAL ISSUES IN RADIATION EPIDEMIOLOGY (502)
- DESPERATELY SEEKING VALIDATION: A GUIDE FOR DESIGNING AND USING THE RESULTS OF VALIDATION STUDIES (503)
- GENERALIZABILITY, TRANSPORTABILITY AND REPRESENTATIVENESS: TO WHOM MAY WE INFER INTERNALLY-VALID EFFECTS? (504)
- REPRODUCTIVE FACTORS AND CANCER RISK (505-S –508)

4:15-5:45 p.m. **MIXED SESSIONS (509-530-S)**

- SELECTION BIAS DUE TO LOSS: AN OLD AND OFTEN IGNORED PROBLEM REVISITED (509)
- PREDICTORS OF PROGNOSIS IN WOMEN WITH BREAST CANCER (510-513-S)
- METHODS IN STUDY DESIGN (514-S-517-S)
- FROM MACRO TO MICRO: SOCIAL DRIVERS AND PROMISING RESPONSES TO MENTAL ILLNESS (518-S-522-S)
- SCHOOL, COMMUNITY, AND HEALTH IN LOW AND MIDDLE INCOME COUNTRIES (523-S-525-S&059-S)
- ASPECTS OF TIMING IN PERINATAL AND PEDIATRIC EPIDEMIOLOGIC RESEARCH (526-S-530-S)

5:45-7:00 p.m. **Poster Session 3 (531-S-754-S)**

FRIDAY, JUNE 27, 2014

10:00 – 11:30 am **Symposia 3 (755-758)**

- ADVANCES AND CHALLENGES IN E-EPI (755)
- MISSING INFORMATION IN EPIDEMIOLOGIC RESEARCH: ARE WE MISSING THE POINT (AND INTERVAL ESTIMATES) (756)
- EXPOSURES AND INTERVENTIONS: TOWARD A MORE CONSEQUENTIAL EPIDEMIOLOGY (757)
- EXPOSOME (758)

001

BIRTH WEIGHT AS A PREDICTOR OF GRIP STRENGTH IN THE SEVENTH DECADE OF LIFE. Mark Pearce*, Madeleine Hart, Kay Mann (Newcastle University, Newcastle upon Tyne United Kingdom)

A number of studies have linked low birth weight with reduced hand grip strength, however most studies have measured grip strength during adolescence and not taken into account later potential risk factors. As grip strength is known to decrease with age, but to vary among individuals, this study assessed whether an association between birth weight and grip strength was present at the age of 61-63 years in the Newcastle Thousand Families Study, a birth cohort established in 1947 and followed prospectively. The data available also allows the consideration of later factors and their effect on grip strength. Hand grip strength measures were recorded for 351 of the 1142 original cohort members, born in Newcastle upon Tyne, UK in May and June of 1947 In univariate analysis, birth weight was positively associated with grip strength (co-eff 3.94kg per kg, $p<0.001$). After adjustment, being male (9.9kg higher than in females) and achieved adult height (co-eff 0.30kg per cm) were significantly ($p<0.001$) associated with an increased grip strength. Birth weight (co-eff 1.17kg per kg, $p=0.088$) and achieved education level (increased grip strength in those with university or age 18 school qualifications compared to those with lower levels, overall $p=0.086$) had borderline significance after adjustment. There were no significant associations with other early life factors such as gestational age, socio-economic status (SES) at birth or duration breast-fed, or with later factors such as adult SES, smoking or contemporaneous BMI. Birth weight does appear to have an influence on grip strength much later in life, but the effect is likely to be mediated through its' influence on achieved adult height, rather than a direct effect.

002

BLADDER ANTIMUSCARINICS AND COGNITIVE DECLINE IN ELDERLY PATIENTS ENROLLED IN THE NATIONAL ALZHEIMER'S COORDINATING CENTER COHORT. Daniela Moga*, Erin Abner, Gregory Jicha (Department of Pharmacy Practice and Science, College of Pharmacy and Department of Epidemiology, College of Public Health, University of Kentucky, Lexington United States)

OBJECTIVES: To evaluate the impact of bladder antimuscarinics (BAM) on cognitive function in patients 65 and older enrolled in the National Alzheimer's Coordinating Center (NACC) cohort. **METHODS**: We conducted a retrospective cohort study using data from the NACC Uniform Data Set (2005–2013) for patients 65+ with complete medication information. Patients were excluded in the presence of non Alzheimer's disease dementia. Prevalent and incident users were identified based on self-reported medication use at each study visit. Cognitive function (overall status, attention, language, and executive functioning) was measured based on the extensive information collected yearly for cohort participants. To balance groups at baseline, incident users were matched with up to 4 nonusers using propensity score (PS) methodology. The PS model included demographic characteristics, living situation, center, enrollment and assessment year, body mass index, lifestyle related risk factors, urinary and fecal incontinence status, cognitive status, level of independence, comorbidities, and other medications used. We evaluated the impact of BAM initiation on cognitive change between two consecutive assessments as compared to nonusers. **RESULTS**: Of the 22,625 NACC participants 65 and older, 744 were incident and 1278 were prevalent BAM users. Our PS matched sample included 672 incident users and 2504 nonusers. 10.27% of the BAM users, as compared to 7.63% of the nonusers, showed cognitive decline ($p=0.03$). Of those with mild cognitive impairment at baseline, 30% of the users as compared to 22% of the nonusers experienced decline to dementia at follow-up (odds ratio 1.53, 95% confidence interval: 1.02-2.31). **CONCLUSION**: Our results show that BAM initiation causes cognitive decline in patients enrolled in the NACC cohort and raise question about their use, especially in those with impaired cognition.

003-S

FROM FORGETFUL TO DISABLED: DOES PHYSICAL INACTIVITY ACCELERATE ONSET OF IADL LIMITATIONS AMONG MEMORY IMPAIRED ADULTS? Pamela Rist*, Jessica Marden, Benjamin Capistrant, Qiong Wu, M. Maria Glymour (Harvard School of Public Health, Boston United States)

Physical inactivity predicts disability in cognitively healthy older adults, but it is not known whether physical inactivity also predicts onset of functional dependence for individuals with memory loss, who are at much higher risk of disability. We examined whether physical inactivity was associated with incident limitations in Instrumental Activities of Daily Living (IADLs) among individuals with impaired memory and whether the association between physical inactivity and IADL limitations was modified by memory. We followed 5219 Health and Retirement Study participants aged 65+ with memory measures and without activity limitations at baseline biennially for 12 years. Memory, based on quartile cutpoints of baseline memory scores, was used to predict IADL limitation count with Poisson regression and inverse probability weights for time-varying confounders and attrition. We estimated relative (risk ratio (RR)) and absolute effects (number of additional limitations) from models including memory, physical inactivity, and interaction terms between memory and physical inactivity. The highest quartile of memory predicted lower risk of IADL limitations (RR=0.23; 95% CI: 0.13-0.41) compared to the lowest quartile of memory functioning. Physical inactivity (RR=1.47; 95% CI: 1.12-1.95) in the prior wave predicted incident IADL limitations among those with low memory functioning. The interaction between physical inactivity and memory was not statistically significant ($p=0.06$). On an absolute scale, physical inactivity predicted 0.12 additional incident IADL limitations for those with high memory (p-value=0.01) and also 0.12 additional incident IADL limitations for those with low memory (p-value=0.01). If causal, physical inactivity has similar effects among those with high and low memory functioning; common health behaviors may help maintain functional independence for memory impaired adults.

004

LEUKOCYTE TELOMERE LENGTH AND MORTALITY IN THE NATIONAL HEALTH AND NUTRITION EXAMINATION SURVEY, 1999-2002. Belinda Needham*, David Rehkopf, Nancy Adler, Steven Gregorich, Jue Lin, Elizabeth Blackburn, Elissa Epel (University of Michigan, Ann Arbor United States)

Background: This study examined the association between leukocyte telomere length – a marker of cell aging – and mortality in a nationally representative sample of US adults aged 50-84. Moderating effects of age, sex, race/ethnicity, and education were also examined. **Methods**: Data were from the National Health and Nutrition Examination Survey (NHANES), 1999-2002 (n=3,091). Cox proportional hazards regression was used to estimate the risk of all-cause and cause-specific mortality adjusting for sociodemographic characteristics, smoking, body mass index, and chronic conditions. **Results**: 870 deaths occurred over an average of 9.5 years of follow-up. In the full sample, telomere length was not associated with all-cause mortality, cardiovascular mortality, cancer mortality, or mortality due to diseases other than cardiovascular disease or cancer. Among African-American but not white or Mexican-American respondents, a decrease of 1 kilobase pair in telomere length at baseline was associated with a nearly two-fold increased hazard of cardiovascular mortality (HR: 1.98, 95% CI: 1.26, 3.12). Associations between telomere length and mortality did not vary by age, sex, or education. **Conclusion**s: Telomere length may be a more useful indicator of cardiovascular mortality risk for African-Americans compared to whites and Mexican-Americans. This will be particularly important if telomere length is used in clinical settings.

005-S

POLYPHARMACY AMONG ADULTS AGED 65 AND OLDER IN THE UNITED STATES: 1988-2010. Christina Charlesworth*, Ellen Smit, Michelle Odden (Oregon State University, Corvallis United States)

Polypharmacy is problematic due to complicated dosing schedules, increased costs, and the elevated risk of adverse drug reactions. Older adults, who frequently have multiple comorbid conditions, are especially at risk for adverse consequences of polypharmacy including cognitive and functional impairment. We aim to illustrate trends in prescription medication use over the past 20 years in the U.S., and to describe the characteristics of modern older adults who use 5 or more medications. The present analysis included 13,869 adults age 65 and older in the National Health & Nutrition Examination Study (NHANES), from 1988 to 2010. Prescription medication use was assessed by self-report and verified by interviewers through examination of medication containers; polypharmacy was defined as the use of 5 or more medications. We examined trends across sex and age (65-69, 70-79, 80+ years) strata, and described characteristics of participants on polypharmacy in 2009/2010. All analyses were weighted. In 1988-94, 13.8% of adults age 65 and older took 5 or more medications, whereas in 2009/2010 this had tripled to 39.0%. This increase was consistent across all age and sex strata, although it was most pronounced in males aged 80+ (quadrupling from 12.1% to 49.6%). The largest increase for females was among those age 70-79 (17.0% to 44.6%). Users of 5 or more medications in 2009/2010 were more likely to be age 80 or older and female, and similarly likely to be partnered and have a college degree or higher compared to those on no medications (29.3% vs 13.5%, $p<0.001$; 56.2% vs 48.2%, $p=0.05$; 59.6% vs 67.1%, $p=0.14$; 17.4% vs 25.9%, $p=0.37$, respectively). Use of 5 or more medications increased dramatically among older adults between 1988 and 2010. We will describe further characteristics of this rapidly growing and vulnerable population. Given the risks of polypharmacy, this represents an important public health concern.

006-S

THE STUDY ON GLOBAL AGEING AND ADULT HEALTH (SAGE): DEPRESSION AND BODY COMPOSITION AMONG AGING POPULATIONS. William Olson*, Melissa Liebert, Theresa Gildner, Paul Kowal, Josh Snodgrass (Snodgrass Lab, Eugene United States)

Previous research has documented complex associations between depression and body composition; in some studies, depression increases risk for being underweight, while in other studies it has been linked to obesity. However, the links between depression and body composition remain relatively unexplored among older adults and, additionally, no studies have systematically examined this relationship among populations in non-Western countries. We used Wave 1 data from WHO's Study on global AGEing and adult health (SAGE), a longitudinal study of nationally-representative samples of older adults (>50 years old) in six middle income countries (China, Ghana, India, Mexico, Russian Federation, and South Africa), to examine relationships among body mass index (BMI), waist circumference (WC), and depression (based on a symptom-based algorithm). Results indicate substantial differences in depression prevalence by sex and country, ranging from 1.6% (men in China) to 22.9% (women in Mexico). Variation by sex and country was also evident in prevalence of obesity (from 4.3% among Indian men to 52.7% in South African women) and underweight (0.5% in Mexican women to 40.3% in Indian men). Multiple regression analyses were used to examine the relationship between body composition measures and depression classification while controlling for key covariates such as age, smoking, drinking, marital status, and income. With all countries combined, depression was negatively related to BMI levels for males ($P=0.018$). Among older South African women, depression was positively associated with BMI ($P=0.003$); otherwise, the lack of a significant relationship between depression and body composition variables in the individual SAGE countries suggests that depression is not a major driver of body composition among older adults. Support: NIH NIA Interagency Agreement YA1323-08-CN-0020 with WHO; grant NIH R01-AG034479; University of Oregon

007-S

USE OF ELECTRONIC MEDICAL RECORDS AND HEALTH RISK ASSESSMENTS TO UNDERSTAND SEDENTARY TIME IN OLDER ADULTS. Nancy Gell, Dori Rosenberg*, Lou Grothaus, David Arterburn (Group Health Research Institute, Seattle United States)

Background: Previous studies have shown higher rates of sedentary time in older adults as compared to all other age groups. However, little is known about associations between sedentary time, common health conditions, obesity, and health care costs. The purpose of this study was to use electronic medical records (EMR) to describe these relationships in older adults. **Methods**: Data was obtained from self-reported health risk assessments and EMR of 3967 adult members of an integrated health care system (10% of eligible members age 65 and older). Measures included sedentary time and physical activity levels as assessed by the International Physical Activity Questionnaire, BMI as calculated from the most recently measured height and weight, ICD-9 codes for cardiovascular disease, osteoarthritis, and diabetes, and total healthcare costs. Analyses included regression models adjusting for age, race/ethnicity, BMI, diet and physical activity. **Results**: Participants with diabetes (14% of the sample) had higher sedentary time compared to those without (6.4 hours/day vs. 6.0 hours/day, $p=0.01$). Obese participants had higher sedentary time (6.8 hours/day) compared to overweight (6.1 hours/day, $p=0.001$) and normal weight (5.7 hours/day, $p<0.001$) older adults. There was no significant difference in self-reported sitting time for those with osteoarthritis or cardiovascular disease compared to those without. Total healthcare costs were $139 higher for each additional hour of sitting ($p = .03$). **Conclusion**s: Self-reported sedentary time was associated with obesity, diabetes, and higher total healthcare costs after adjusting for demographics, health conditions, and health behaviors. The findings support combined use of self-reported health behaviors and EMR data to better understand associations between health behaviors and modifiable health outcomes.

008

IS SPOUSAL CAREGIVING ASSOCIATED WITH PHYSICAL ACTIVITY PREVALENCE? EVIDENCE FROM THE HEALTH AND RETIREMENT STUDY. Benjamin Capistrant* (University of Minnesota, Minneapolis United States)

Although caring for a disabled spouse may affect a caregiver's health via stress or indirectly via reduced time for leisure physical activity (PA), it is not well understood how spousal caregiving is associated with PA prevalence and intensity in generalizable samples. We used Health and Retirement Study cohort data from 2004-2012 to examine how spousal caregiving dynamics were associated with PA prevalence among 11,476 married adults aged 50+. Exposures were caregiving prevalence (any/none), intensity (0 [reference], 1-13, 14+ hours/week), and duration (prevalence at two consecutive biennial waves). PA prevalence was dichotomized as daily/weekly vs. monthly/never [reference] of low, moderate, vigorous intensity PA, respectively. Modification by care recipient dementia status (top quartile of imputed dementia probability score) was also tested. Generalized estimating equations were fit with Poisson regression models to assess how caregiving exposure in one wave (e.g., 2004) was associated with PA prevalence at the next (e.g., 2006). In models adjusted for caregiver demographics, socioeconomic status, caregiver and care recipient health conditions/behaviors, respectively, caregiving prevalence was associated with an increased risk ratios of low (Risk Ratio (RR):1.19, 95% Confidence Interval (CI): 1.15, 1.24) and moderate PA (RR: 1.14, 95% CI: 1.09, 1.19), but not vigorous PA (RR: 1.04, 95% CI: 0.95, 1.14). There were no statistically significant differences in risk ratios of PA prevalence by caregiving intensity or duration. There was no evidence of modification by care recipient dementia probability score. Caregiving can be physically demanding and may thus increase PA, especially activities of daily living that include low and moderately intensive PA tasks; vigorous PA may be sensitive to time demands. In sum, caregiving is associated with higher levels of low and moderate, but not vigorous, physical activity.

009

OBJECTIVELY MEASURED PHYSICAL ACTIVITY AMONG OLDER ADULTS IN AN URBAN SETTING IN INDIA: RESULTS OF A STUDY ON GLOBAL AGEING AND ADULT HEALTH (SAGE) SUB-STUDY. Josh Snodgrass*, Melissa Liebert, Tara Cepon-Robins, Arvind Mathur, Paul Kowal, Somnath Chatterji (University of Oregon, Eugene United States)

Technological advances in accelerometry have provided researchers with a powerful tool with which to objectively measure energy expenditure and document patterns of physical activity in epidemiological studies. However, accelerometry has been underutilized in the study of physical activity among older adults, especially outside of the United States and Europe. Consequently, it is unknown whether the marked age-related decline in physical activity seen in high income countries is as pronounced among older adults in lower income nations that often have considerably different lifestyles. Furthermore, the accurate assessment of physical activity is essential to understanding the increasing global prevalence of obesity and associated chronic conditions, and for designing effective public health interventions. The present research among 200 older adults (49-90 years old; 128 women, 72 men) in an urban setting in India--a sub-study of WHO's Study on global AGEing and adult health (SAGE)--combines 7 consecutive days of ActiGraph GT3X accelerometry with anthropometric and sociodemographic data in order to: 1) compare average activity levels obtained through different monitoring durations; 2) consider physical activity patterns by age and sex; and, 3) evaluate links between physical activity and sociodemographic and anthropometric measures. **Results** reveal overall extremely low activity levels, with significantly lower activity energy expenditure (AEE) in women compared to men ($p<0.05$). Lower AEEs and activity counts were seen in older ages; age was negatively correlated with AEE in both men ($p<0.01$) and women ($p<0.001$). Finally, women who were more socially integrated had greater AEE ($p<0.01$). This study illustrates the utility of accelerometry for quantifying activity levels in older adult and aging populations. Support: NIH NIA Interagency Agreement YA1323-08-CN-0020; grant NIH R01-AG034479; University of Oregon

010-S

PHYSICAL ACTIVITY, FUNCTIONAL ABILITIES, AND HEALTH: RESULTS OF A WHO SAGE SUB-STUDY AMONG OLDER ADULTS IN AN URBAN SETTING IN INDIA. Tyler Barrett*, Melissa Liebert, Tara Cepon-Robins, Arvind Mathur, Paul Kowal, J. Josh Snodgrass (University of Oregon, Eugene United States)

Recent research suggests that decreased physical activity in old age is detrimental to health, yet few studies have examined the relationships among physical activity, functional abilities, and health among older adults in non-Western settings. Furthermore, much of the existing research on this topic has relied on self-report activity data; however, these activity estimates have major limitations, especially among older adults. The current study examines associations between measures of physical activity using seven consecutive days of ActiGraph GT3X accelerometry (total daily energy expenditure [TDEE; kcal/day], physical activity level [PAL], daily average activity count [AC], and activity energy expenditure [AEE; kcal/day]), physical function (grip strength, timed walk, daily average sit time, and average sleep time), and self-reported health conditions (diabetes, hypertension, arthritis, and depression) among 200 older adults in an urban setting in India as part of a sub-study of the World Health Organization's Study on global AGEing and adult health (SAGE). Key findings among women (controlled for age) include associations between activity variables and performance measures, including a significant negative correlation between PAL and walking speed ($p<0.05$) and a significant positive correlation between AC and grip strength ($p<0.01$). Women diagnosed with hypertension had significantly lower PAL ($p<0.05$) and AC ($p<0.05$) than women without hypertension. Surprisingly, physical activity was not significantly associated with functional or health measures for men. This study documented relationships among physical activity, function, and health among older women, thereby supporting the use of physical activity intervention as a means for prolonging functional abilities and reducing chronic disease burden in older ages. Support: NIH NIA Interagency Agreement YA1323-08-CN-0020; and grant NIH R01-AG034479

011-S

A PROSPECTIVE ASSESSMENT OF CARDIAC BIOMARKERS FOR HEMODYNAMIC STRESS AND NECROSIS AND THE RISK OF FALLS AMONG OLDER PEOPLE. Dhayana Dallmeier*, Jochen Klenk, Raphael S. Peter, Michael Denkinger, Richard Peter, Kilian Rapp, Wolfgang Koenig, Dietrich Rothenbacher (University of Ulm, Ulm Germany)

Falls, the leading cause of fatal and non-fatal injuries in older people, are known to be related to a complex interaction of risk factors. We examined if cardiac biomarkers for hemodynamic stress and necrosis are associated with falls in older people. N-terminal pro Brain Natriuretic Peptide (NT-proBNP), high sensitive (hs) cardiac troponin T (cTnT) and I (cTnI) were measured at baseline in a cohort of community-dwelling adults ≥ 65 years. Falls were assessed prospectively in a falls calendar during one year follow-up. We used Cox proportional hazard models to evaluate the association of each biomarker with the incidence of the first fall adjusting for age, sex, body mass index, blood pressure, kidney function, cardiovascular and neurological diseases, diabetes, cognitive status, use of walking aid, living alone, season at time of interview, use of antihypertensive, psycholeptic, and psychoanaleptic medications. Among 1327 participants differences in the distribution of cTn were seen across sexes. Only 1.9% women had hs-cTnI ≥ 30 ng/L versus 4.6% men. Hs-cTnT was undetectable in 61.8% women and 29.5% men, while 22.5% men and only 6.5% women had hs-cTnT ≥ 14 ng/L. During follow-up (median 370 days) 430 subjects reported at least one fall. We detected effect modification of the association by sex for all biomarkers. In men a one unit increment of log-transformed hs-cTnI was associated with 27% increased risk for a fall (Hazard Ratio (HR) 1.27, 95% confidence interval (CI) 1.05 -1.54). Men with hs-cTnT ≥ 14 ng/L had a 56% increased risk (HR 1.56, 95% CI 1.00-2.42) compared to those with undetectable hs-cTnT levels. cTn were not associated with falls among women. There was no association between NT-proBNP and the risk of fall. Our data show that cTn are significantly associated with the incidence of falls during one year follow -up in older men independently of cardiovascular disease and known risk factors.

012-S

VALIDATION OF SELF-REPORTED HYPERCHOLESTEROLEMIA ACCOUNTING FOR LIPID-CONTROLLING DRUG USE. Michael Passarelli*, Carolyn Rutter, Michael Rosenfeld, Andrea Burnett-Hartman, Stephen Schwartz, Polly Newcomb (Fred Hutchinson Cancer Research Center, Seattle United States)

Despite rigorous clinical guidelines for cholesterol management, what constitutes hypercholesterolemia (HC) is subject to physician and patient interpretation, making self-report vulnerable to misclassification in epidemiologic studies. Numeric cholesterol estimates are rarely self-reported, but study participants can report a physician diagnosis of HC, use of lipid-controlling drugs, or both. Classification of those who report HC not requiring drugs can be particularly problematic: these individuals may have lipid levels approaching those recommended for drug therapy, or be controlling their elevated cholesterol through diet and lifestyle. Grouping them with those who report not having HC can decrease sensitivity and increase specificity of self-report relative to a given gold standard of HC status, but it is unclear by how much in practice. We conducted a validation study among 2,367 enrollees, ages 20-79, of Group Health (GH), a large healthcare system in Seattle. An interview was conducted between 1998-2007 covering common disease risk factors. For each participant, we identified the highest low-density lipoprotein (LDL) measurement (zenith) from at most 20 years prior to interview using GH's database of lab results. The adjusted mean zenith LDL was 128 mg/dL 95% confidence interval (123-132) for those who did not report HC, 135 (131-140) for those who reported HC not requiring drugs, and 173 (167-178) for those who reported drug-treated HC. When grouping those who reported HC not requiring drugs with those who reported drug-treated HC, self-report had 83% (79-86) sensitivity and 70% (67-73) specificity compared to dichotomizing zenith LDL at 160 mg/dL. When grouped with those who reported not having HC, self -report had 57% (53-62) sensitivity and 83% (81-85) specificity. Our results provide guidance to investigators on classifying those who report HC not requiring lipid-controlling drugs.

013

WALKING SPEED MODIFIES THE ASSOCIATION BETWEEN DIASTOLIC BLOOD PRESSURE AND OUTCOMES: THE HEALTH, AGING, AND BODY COMPOSITION STUDY. Michelle Odden*, Chenkai Wu, Michael Shlipak, Tamara Harris, William Applegate, Bruce Psaty, Anne Newman, Carmen Peralta (Oregon State University, Corvallis United States)

How to systematically identify older adults in whom low levels of blood pressure (BP) may be a risk factor for adverse health outcomes has not been established. We have previously shown that slow walking speed identifies a group of older adults in whom lower BP appears to be associated with a higher risk of mortality. We aimed to examine the relationships among walking speed, diastolic BP, and outcomes in the Health, Aging, and Body Composition Study, a prospective cohort of 3,075 well-functioning black and white adults age 70 and older, recruited from Pittsburgh, Pennsylvania, and Memphis, Tennessee in 1997-1998. Walking speed was assessed over a 20 meter walk test in 2,669 participants; 205 (7.7%) were slow walkers (<1.0 m/s). Over an average of 10 years of follow up, 317 participants had a myocardial infarction (MI), 298 had a stroke, and 1,128 died. Among fast walkers diastolic BP >80mmHg (vs. <80) was associated with higher incidence of MI, stroke, and mortality: 13.3 vs. 11.5, 13.5 vs. 10.0, and 42.3 vs 39.0 per 1000 person-years, respectively. In contrast, among slow walkers, diastolic BP >80mmHg was associated with lower rates of MI, stroke, and mortality: 13.2 vs. 13.7, 10.7 vs. 20.1, and 48.3 vs. 66.7. These different associations of diastolic BP by walking speed persisted after multivariable adjustment for demographics and physiologic measures. The hazard ratios per 10 mmHg higher DBP in fast vs. slow walkers were 1.00 (95% confidence interval: 0.89, 1.13)) vs. 0.82 (0.54, 1.25) for MI; 1.25 (1.11, 1.42) vs. 0.89 (0.64, 1.25) for stroke; and 1.04 (0.98, 1.11) vs. 0.75 (0.62, 0.90) for mortality. P-values for interaction were 0.73, 0.09, and 0.005 respectively. In older adults with slower walking speed, lower DBP may be a risk factor for adverse health outcomes and mortality.

014-S

ASSOCIATION BETWEEN EXPOSURE TO SECONDHAND SMOKE AND TELOMERE LENGTH: CROSS-SECTIONAL STUDY OF 1,433 NON-SMOKERS. Liya Lu*, Cathy Johnman, Lianne McGlynn, Daniel Mackay, Paul Shiels, Jill Pell (Institute of Health and Wellbeing, University of Glasgow, Glasgow United Kingdom)

Background: Secondhand smoke (SHS) is an important risk factor for many age-related diseases. Many studies have demonstrated an association between active smoking and telomere length attrition. In contrast, whether SHS accelerates telomere attrition with age is unknown. The aim of this study was to examine the association between SHS exposure and leukocyte telomere length attrition per annum among adult non-smokers. **Methods**: We undertook a cross-sectional study of the association between self-reported levels of SHS exposure and telomere length shortening per annum on a subgroup of 1,779 individuals from the Scottish Family Health Study chosen as part of a study on biomarkers of aging. Inclusion was restricted to non-smokers aged ≥ 18 years who had provided blood samples for telomere analysis. Linear regression models were used to relate telomere T/S ratio to age. **Results**: Of the 1,433 eligible participants, 779 (54.4%) reported no SHS exposure, 495 (34.5%) low exposure (1-19 hours per week), 29 (2.0%) high exposure (≥20 hours per week). In the univariate linear regression analyses, relative telomere T/S ratio declined with increasing year of age in all exposure groups. Telomere length decreased more rapidly with increasing age among those with high exposure to SHS when compared with both those with no exposure to SHS (p=0.047) and those with low exposure to SHS (p=0.047). **Conclusion**: Our findings suggested that high SHS exposure may speed up normal biological aging. Further studies on relevant mechanisms should be conducted and efforts on protecting the public from SHS exposure should be strengthened.

015-S

CADMIUM AND LEAD EXPOSURE AND RISK OF AGE-RELATED CATARACT IN US ADULTS: THE NATIONAL HEALTH AND NUTRITION EXAM SURVEY. Weiye Wang*, Sung Kyun Park (University of Michigan, School of Public Health, Ann Arbor United States)

Objective: Age-related cataract is a major cause of visual dysfunction and the leading cause of blindness. Elevated levels of cadmium and lead were found in lens of cataract patients, especially those who smoke, suggesting that lead and cadmium may play a role in the risk of cataract. The purpose of this study is to investigate the associations between blood lead, blood cadmium and urinary cadmium and the risk of age-related cataract. **Methods**: This was a cross-sectional study with a sample of 9524 individuals aged 50 years and older with blood lead and cadmium levels and a subgroup of 3100 individuals with urinary cadmium levels, from the National Health and Nutrition Examination Surveys (NHANES) from 1999 to 2008. Participants were counted to have cataract if they had cataract surgery before, according to the NHANES' Vision Examination. Odds ratios (ORs), 95% confidence intervals (CIs), and percent-changes were calculated to assess the association between lead and cadmium exposures with cataract, by using logistic regression models. **Results**: There were 1687 cases of cataract (weighted-prevalence = 14.17%). After adjusting for age, race/ethnicity, gender, education, diabetes mellitus (DM) and body mass index (BMI), subjects in the highest quintile of urinary cadmium had a 2.5 times higher odds of cataract compared with those in the lowest quintile (OR: 2.52; 95%CI: 1.56, 4.09), and there was a significant linear trend across quintiles (p-value = 0.002). The significant association remained even after further adjusting for smoking-related variables and antioxidant vitamin intakes (OR: 2.02; 95%CI: 1.08, 3.77; p-value = 0.047). We found no associations between blood cadmium and blood lead and age-related cataract. **Conclusion**s: These results suggest that long-term environmental cadmium exposure may be an important risk factor for age-related cataract.

017

A COMPREHENSIVE MODEL OF COLORECTAL CANCER BY RISK FACTOR STATUS AND SUB-SITE USING DATA FROM THE NURSES' HEALTH STUDY. Esther Wei*, Graham Colditz, Edward Giovannucci, Kana Wu, Charles Fuchs, Meir Stampfer, Bernard Rosner (California Pacific Medical Center Research Institute, San Francisco United States)

We expanded our colon cancer risk model among 92,369 women from the Nurses' Health Study to evaluate sub-site differences (proximal colon: n=821; distal colon: n=521; rectum: n=376). We performed competing risks regression and tested sub-sites for statistical heterogeneity. Age, family history, smoking, body mass index, and height were significantly associated with colon cancer, and aspirin use, calcium intake, screening, physical activity, and current use of post-menopausal hormones (PMH) were inversely related. Past PMH use, intake of red meat and alcohol were not significantly associated with colon cancer. Folate was associated with a lower risk of rectal cancer (Relative Risk (RR) rectal=0.40, p=0.01). Processed meat was suggestively associated with a higher risk of distal cancer (RRdistal=1.30, p=0.06) but not with proximal cancer (RRproximal= 0.95, p=0.70). Smoking was associated with both colon (RRcolon=1.30) and rectal cancer (RRrectal=1.30). However, the association was stronger for proximal (RRproximal=1.45) versus distal colon cancer (RRdistal=1.09; pproximal vs. distal =0.03). We also observed a significant trend of risk for smoking from the cecum (RRcecum= 1.54) to the proximal (RRproximal excluding cecum=1.41) to the distal colon (RRdistal=1.09; ptrend=0.001). These findings support the possibility that for some risk factors there is a risk differential from proximal to distal colon, and an etiologically distinct risk factor profile for rectal cancer.

018-S

ALCOHOL, SMOKING AND NON-HODGKIN LYMPHOMA IN TWINS. Amie Hwang*, Yang Yu, Ann Hamilton, Dennis Deapen, Bharat Nathwani, Thomas Mack, Wendy Cozen (University of Southern California, Los Angeles United States)

Non-Hodgkin lymphoma (NHL) is among the top 10 most common cancers and has a 62% and 54% 5-and 10-year relative survival, respectively. The etiology is complex and not completely understood. There is some suggestion that alcohol in moderation may be protective, but this finding is not consistent across studies. Over 10 studies have examined the effect of cigarette smoking on NHL risk and the results are inconsistent. These exposures are correlated with socioeconomic status and genetics and therefore subject to confounding. Twin pairs discordant for developing NHL offer an ideal population in which to study the effect of tobacco and alcohol consumption on risk. Questionnaires were completed and returned by at least one member of 196 twin pairs in whom one twin was diagnosed with NHL (response rate 70%). Diagnoses were confirmed by histology review. The kappa statistic was used to assess reliability of the response between members of double-respondent twin pairs. Matched conditional logistic regression was used to compute the odds ratios (ORs) and 95% confidence intervals (CIs). Relatively greater consumption of wine was associated with a decreased risk of NHL (OR=0.4, 95% CI= 0.2, 0.8), however no significant association was observed for other types of alcohol. Risk of NHL decreased with increasing number of drinks consumed per day (p=0.03) or week (p=0.05). Smoking was not associated consistently with NHL risk. However, relatively higher exposure to second hand smoke was associated with increased risk of NHL (OR=1.6, 95% CI=1.1, 2.3). The effect estimate for second hand smoking was higher among smokers than non-smokers, although the association was not significant. We conclude that a previously reported inverse association between wine drinking and NHL was confirmed in twins, suggesting that the association is not due to confounding since twins are well matched on genetic and early life factors.

019

CANCERS WITH INCREASING INCIDENCE TRENDS AMONG YOUNG ADULTS IN THE UNITED STATES. Edgar Simard*, Rebecca Siegel, Erin Hulland, Ahmedin Jemal (American Cancer Society, Atlanta United States)

Overall trends in cancer incidence rates are driven largely by rates among the elderly. However, emerging trends in young adults may provide an earlier reflection of changes in risk factors for people of all ages and inform cancer control programs. Using population-based cancer registry data assembled by the North American Association of Central Cancer Registries covering 85% of the U.S. population, the authors examined trends in cancer incidence rates from 2001-2010 for adults aged 20-49 years. Rates were calculated by race/ethnicity for white, black, Asian/Pacific Islander (API), American Indian/Alaska Native (AI/AN), and Hispanic men and women. Rates were directly age-standardized to the 2000 U.S. standard population and 10-year trends were evaluated via the average annual percentage change from log-linear Poisson regression. Colorectal cancer rates increased significantly among white men (1.4%) and women (1.2%) and AI/AN men (5.6%). Pancreatic cancer rates increased significantly among white men and women, black women and API men only. Oral cavity cancers also significantly increased among white men and women and among black and API men only. Among women, breast cancer rates increased among blacks (0.4%) and endometrial cancer rates increased among whites and blacks (both 1.9%). In contrast, kidney and renal pelvis cancer rates significantly increased in all racial/ethnic groups of men and women by more than 2% per year. Similarly, thyroid cancer incidence rates increased significantly for all men and women except AI/ANs. A number of cancers with increasing incidence trends among young adults are obesity-associated (pancreas, kidney and renal pelvis, endometrium) suggesting the need to reduce obesity in early adulthood as a cancer prevention strategy. For oral cavity cancers human papillomavirus infection is an important exposure preventable through vaccination.

020

DIETARY FIBER AND COLORECTAL CANCER RISK IN WOMEN VERSUS MEN: THE MULTIETHNIC COHORT. Song-Yi Park*, Lynne Wilkens, Brian Henderson, Loic Le Marchand (University of Hawaii, Honolulu United States)

In the Multiethnic Cohort Study, we previously found that dietary fiber was inversely associated with colorectal cancer risk in men, but adjustment for potential confounders including hormone replacement therapy (HRT) use weakened the inverse association in women. To further investigate these relationships with a longer surveillance and additional cases, we analyzed data from 168,325 participants with a total of 4,088 incident cases during a mean follow-up period of 14.8 years. In multivariable-adjusted Cox proportional hazards models, the inverse association between dietary fiber and colorectal cancer risk remained stronger in men (RR = 0.68; 95% CI: 0.57-0.82, highest vs. lowest quintile; p for trend <0.001) than in women (RR = 0.79; 95% CI: 0.65-0.95; p for trend = 0.012; p for heterogeneity between sexes = 0.023). Compared to women who had ever used HRT, HRT never users had a higher risk of colorectal cancer (RR = 1.19: 95% CI: 1.08-1.30). The inverse association of fiber intake with colorectal cancer was statistically significant in HRT never users (RR = 0.72; 95% CI: 0.56-0.93; p for trend = 0.012), but not in ever users (RR = 0.91; 95% CI: 0.68-1.22; p for trend = 0.34; p for heterogeneity between HRT never and ever users = 0.12). However, higher intake of dietary fiber among HRT never users did not decrease the colorectal cancer risk below that for HRT ever users: RRs were 1.12 (95% CI: 0.98-1.28), 1.12 (95% CI: 0.98-1.29), 1.24 (95% CI: 1.08-1.43), and 1.38 (95% CI: 1.18-1.16) for the highest to the lowest quartile of dietary fiber in HRT never users, compared to HRT ever users. These findings suggest that dietary fiber is associated with a lower risk of colorectal cancer in men and women, but does not provide additional protection against colorectal cancer beyond the effect of HRT use in women.

021-S

ENDOMETRIAL CARCINOMA STAGE AND MORTALITY IN RELATION TO FALLOPIAN TUBE LIGATION. Ashley Felix*, Louise Brinton, D. Scott McMeekin, William Creasman, David Mutch, David Cohn, Joan Walker, Richard Moore, Levi Downs, Robert Soslow, Richard Zaino, Mark Sherman (National Cancer Institute, Bethesda United States)

Background: Tumor stage is a key consideration in determining the treatment and prognosis of endometrial carcinoma (EC) patients. ECs may metastasize via lymphatics, blood vessels or invasion through the uterine wall and serosa. In addition, data suggest that ECs may exfoliate cells through the fallopian tubes into the peritoneal cavity, but the clinical importance of this mechanism is unknown. Given that tubal ligation (TL) should inhibit transtubal spread of ECs, we tested the hypothesis that TL is inversely associated with stage and mortality by analyzing data from the Gynecologic Oncology Group trial-210. **Methods**: TL status and EC risk factors were assessed prior to treatment via self-administered questionnaire. Tumor characteristics were available from pathology reports and central review. Multivariable adjusted odds ratios (ORs) and 95% confidence intervals (CIs) for the association between TL and stage were estimated overall and by histologic subtype with logistic regression. Cox proportional hazards regression with adjustment for covariates was used to examine associations between TL and all-cause mortality. **Results**: Our analysis included 4,467 ECs, of which 27.6% reported a previous TL. Among all cases, TL was inversely associated with advanced stage (stages III and IV vs. stages I and II OR=0.63, 95% CI=0.52-0.75) and within histologic subtypes. TL was associated with lower all-cause mortality among serous [hazard ratio (HR)= 0.67, 95% CI=0.49-0.91], carcinosarcoma (HR=0.64, 95% CI=0.42-0.97), and clear cell cases (HR=0.34, 95% CI=0.13-0.93) in models unadjusted for stage; however, once we accounted for stage, the survival advantage was eliminated. **Conclusion**s: Our analysis demonstrates that EC patients who have undergone TL have lower mortality secondary to lower stage at presentation.

022

INCIDENCE OF EXOCRINE AND ENDOCRINE PANCREATIC CANCERS IN THE UNITED STATES, 2001-2010. Mary Elizabeth O'Neil*, S. Jane Henley, A. Blythe Ryerson (Centers for Disease Control and Prevention, Atlanta United States)

Background: Pancreatic cancer has two histological types, each of which has distinct biological characteristics, clinical presentations and natural histories. Regional population-based estimates during 1977–2005 showed a decrease in exocrine pancreatic cancer incidence and an increase in endocrine pancreatic cancer incidence; however, US population-based incidence by histology has not yet been reported. **Methods**: We used National Program for Cancer Registries (NPCR) and Surveillance, Epidemiology and End Results Program (SEER) data to calculate age-adjusted incidence rates and annual percent change (APC) of exocrine and endocrine pancreatic cancers from 2001 through 2010. **Results**: An average of 8.7 exocrine cases and 0.4 endocrine cases per 100,000 persons were diagnosed annually and incidence increased over this period for exocrine (APC=1.6%) and endocrine (APC=6.0%) types. Both histologic types increased for most sub-sites including the head, body, and tail. Males had 30% higher rates of exocrine and endocrine pancreas cancer incidence than females, but exocrine pancreatic cancer incidence increased more among females (APC=1.8%) than males (APC=1.3%). Exocrine pancreatic cancer incidence was highest among black males (rate=12.0 cases per 100,000) and black females (rate=9.9) and endocrine pancreas cancer incidence was highest (rate=0.5) among black males, white males, and black females. **Conclusion**s: Increases in pancreatic cancer incidence may be attributable to advances in diagnostic procedures, changes in tumor classification or changes in risk factors such as obesity. Ongoing, national surveillance of pancreatic cancer by histologic type may provide insight into the etiology of pancreatic cancer.

023-S

INVASIVE VERSUS NONINVASIVE MELANOMA: ARE THERE CLUES ABOUT SMOKING AND DRINKING RELATIONSHIPS? H. Nicole Tran*, Natalia Udaltsova, Yan Li, Arthur Klatsky (Kaiser Permanente Medical Care Program, Oakland United States)

We previously presented data showing higher melanoma risk in alcohol drinkers and lower risk in smokers. To explore these associations, we studied separately risk factors for invasive (INV) and noninvasive (NON-INV) melanoma. We studied incidence through 2008 in a multiethnic cohort of 124,192 persons who supplied baseline data in 1978-1985. Self-classified ethnicity yielded 56% whites, 27% blacks, 5% Hispanics, 11% Asians. Cox models adjusted for 7 covariates estimated hazard ratios (HR) and 95% confidence intervals (CI). Melanoma was diagnosed in 1,164 persons: 681 INV, 483 NON-INV. Three traits were stronger predictors of NON-INV vs INV, with these HRs (CIs): 1) Age (x 10 years), NON-INV=1.5 (1.4-1.6); INV=1.3 (1.2-1.3); 2) College graduation (vs no college), NON-INV=1.6 (1.6-2.9); INV=1.2 (1.0-1.4), and 3) Alcohol intake (vs none) (a) 1-2 drinks/day, NON-INV=3.1 (1.7-5.7); INV=1.5 (1.0-2.2); (b) ≥3 drinks/day, NON-INV=4.1 (2.2-7.8), INV=1.5 (1.0-2.3). Concordant relationships were found for 3 statistically significant predictors (sex, race/ethnicity, smoking) and 2 unrelated covariates (body mass index, marital status). Compared to whites, each other race/ethnicity group (blacks, Hispanics, Asians and each Asian subgroup [Chinese, Japanese, Filipino, South Asians]) had markedly lower HRs (<0.1, $p<0.001$). Smoking (≥1 pack per day vs never) had these HRs (CIs): NON-INV=0.6 (0.4-1.0, p=0.02); INV=0.6 (0.5-0.9, p=0.004). Assuming higher risk of NON-INV vs INV melanoma represents earlier diagnosis, we hypothesize that disparities represent confounded associations for NON-INV (age, alcohol, and education) while concordant risk factors (sex, race/ethnicity, smoking) might reflect etiologic relationships. Elucidating mechanisms for the inverse association of smoking to melanoma risk should aid understanding of pathogenesis pathways and hopefully lead to targeted therapy options.

024-S

LYCOPENE INTAKE AND RISK OF PROSTATE CANCER BY TMPRSS2:ERG SUBTYPE. Rebecca E. Graff*, Andreas Pettersson, Rosina T. Lis, Jennifer R. Rider, Michelangelo Fiorentino, Allison Meisner, Stephen Finn, Stacey A. Kenfield, Massimo Loda, Edward L. Giovannucci, Bernard Rosner, Lorelei A. Mucci (Harvard School of Public Health, Boston United States)

Background: It has become increasingly evident that prostate cancer is a heterogeneous disease, but risk factors for distinct molecular subtypes have not yet been evaluated. Because of their antioxidant properties, lycopene and tomato sauce in particular may be differentially associated with prostate cancer subgroups defined by the presence or absence of the *TMPRSS2:ERG* fusion. **Methods**: We examined the association between dietary lycopene and tomato sauce intake and risk of prostate cancer according to *TMPRSS2:ERG* subtype using a prospective cohort of 46,719 men from the Health Professionals Follow-up Study. We utilized competing risks models to calculate hazard ratios (HRs) and 95 percent confidence intervals (CIs) for the development of fusion-positive disease and, separately, fusion-negative disease. We implemented inverse probability weighting to account for fusion status having only been evaluated in men treated with radical prostatectomy, and not with other therapies. **Results**: During the course of follow-up, 4,604 men were diagnosed with prostate cancer, among whom 738 were assayed for *TMPRSS2:ERG* status. Increasing cumulative average updated lycopene intake was associated with a decreased risk of fusion-positive prostate cancer (top vs. bottom quintile multivariate HR: 0.61, 95% CI: 0.41-0.91, P_{trend}: 0.007) but not with fusion-negative prostate cancer (HR: 0.91, 95% CI: 0.60-1.38, P_{trend}: 0.30). The *P* value for heterogeneity across the estimates was 0.42, Results across subtypes were similarly distinct for tomato sauce intake with a *P* value for heterogeneity of 0.08. Application of inverse probability weights did not materially change the results. **Conclusion**s: Our results support the hypothesis that prostate cancers positive for the *TMPRSS2:ERG* fusion may be etiologically distinct from cancers negative for the fusion.

025-S

MORTALITY OF TESTICULAR CANCER IN EAST AND WEST GERMANY 20 YEARS AFTER REUNIFICATION: A GAP NOT CLOSED YET. Carsten Rusner*, Freddie Bray, Joannie Lortet-Tieulent, Andreas Stang (Martin-Luther-Universität Halle-Wittenberg, Institut für Klinische Epidemiologie, Halle Germany)

The decline of testicular cancer mortality in East Germany started in the 1980s, about 10 years later than that recorded in West Germany. Even in the beginning of the 2000s mortality rate was higher in East than West Germany despite comparable incidence rates of testicular cancer. We aimed to provide up-to-date time trends of testicular cancer mortality rates in East and West Germany. Mortality data from East Germany (1971-2010) and West Germany (1954-2010) were provided by the Federal Bureau of Statistics. We estimated age-specific and age-standardized mortality rates using the World Standard Population. Despite declining trend in the 2000s the mortality rates of testicular cancer remained higher in East Germany than West Germany. These rates were 5.5 and 2.6 per million person-years in 2010, respectively. A comparison between East and West Germany for the most recent period (2006-2010) reveals that the age-standardized mortality rate in East Germany is 72% (95%CI: 40-111%) higher than in West Germany. In absolute terms, this corresponds to 80 excess deaths among men in East compared to West Germany from 2006 through 2010. Age-specific mortality trends by period and birth cohort showed that the mortality decline was larger among younger (15-44) than elderly men. The comparison of factors that potentially affect the mortality rate of testicular cancer reveals that the incidence of testicular cancer is nearly identical in East and West Germany. Furthermore, stage at diagnosis and features of the ambulatory and hospital health care are very similar. It remains unclear and even enigmatic why this mortality difference continues even than 20 years after the reunification of East and West Germany and the early adaptation of the West German health care system in East Germany.

026-S

RISK FACTORS FOR YOUNG-ONSET BREAST CANCER. Katie M O'Brien*, Jenny Sun, Dale P Sandler, Lisa A DeRoo, Clarice R Weinberg (National Institute of Environmental Health Sciences, Research Triangle Park United States)

Young-onset breast cancers tend to be more aggressive that later onset tumors, and there may be age-related etiologic discrepancies. Risk factors for ductal carcinomas in situ (DCIS) and invasive breast cancer may also differ, as some factors may specifically promote malignant transformation. We explored possible risk factors for young-onset DCIS and invasive breast cancer in the Two Sister Study (2008-2010), a sister-matched case-control study of young-onset (<50) breast cancer involving 1419 cases (1185 invasive, 218 DCIS) and 1669 controls. We estimated relative risks for invasive and DCIS cancer separately and also compared associations using case-only analyses. Young-onset invasive breast cancer was less common among women with early menopause (<45) versus premenopausal women and among women with premenopausal hysterectomy with retained ovarian tissue. Late menarche, early age at first pregnancy, obesity, and alcohol consumption were also inversely associated with invasive disease. Increased parity was inversely associated with young-onset DCIS (odds ratio [OR]=0.51; 95% confidence interval [CI]: 0.26-0.97 for =3 versus 1 birth) but positively associated with young-onset invasive breast cancer (OR=1.31, 95% CI: 1.00, 1.72). Case-only analysis of etiologic heterogeneity also suggested an increased relative risk of invasive versus DCIS for higher parity (OR=1.44, 95% CI: 0.79, 2.61 for >3 versus 1). We identified several risk factors for young-onset invasive breast cancer, but found few differences in associations with young-onset DCIS versus invasive breast cancer.

027-S

RISK MODELS FOR PREDICTION OF ESOPHAGEAL ADENOCARCINOMA IN PATIENTS WITH BARRETT'S ESOPHAGUS. Aaron Thrift*, Lynn Onstad, Patricia Blount, Brian Reid, Thomas Vaughan (Fred Hutchinson Cancer Research Center, Seattle United States)

Background: Current clinical practice aims to identify persons with underlying Barrett's esophagus (BE) from among those with frequent reflux symptoms, and to follow and treat them before they develop esophageal adenocarcinoma (EA). However, these approaches have proven costly and ineffective. Risk stratification may offer a method for identifying which patients with BE are more (or less) likely to develop EA. **Aim**: We aimed to develop risk models and clinical prediction tools to discriminate between i) the subset of patients with BE at high risk of EA who should be part of a program of surveillance and intensive cancer prevention, and ii) the vast majority for whom surveillance will neither lengthen nor improve their quality of life. **Methods**: Risk models were derived using epidemiologic data and serum measures from a prospective cohort of 397 persons with BE. We used backwards stepwise regression and retained variables with $p<0.20$ in the final models. Models were internally validated using the area under the ROC curve (AUC) to quantify predictive (discriminatory) performance. **Results**: After backwards stepwise regression, the final model built on questionnaire data retained terms for age, sex, NSAID use and pack-years of smoking exposure. The model performed well in predicting risk of progressing to EA at five years of follow-up (AUC=0.71; 95%CI 0.63-0.80). With serum measures (CRP, SEPP and log HOMA) added to this basic model, the AUC increased to 0.76 (95%CI 0.67-0.85). A model for men only (with terms for age, waist circumference, NSAID use, pack-years, CRP, SEPP, log HOMA, and leptin) showed a higher discrimination (AUC=0.78, 95%CI 0.69-0.87). **Conclusion**: BE patients at high risk of EA can be identified accurately using an empirical risk tool comprising questionnaire data and serum measures.

028-S

SECOND MALIGNANT NEOPLASMS IN SURVIVORS OF CHILDHOOD CANCER. Ben Cannon*, Ray Merrill, Brandon Ault, Arielle Sloan (Brigham Young University, Provo United States)

Individuals who survive a first primary cancer in childhood are at increased risk of a second malignant neoplasm. This study updates a previous long-term report with 10 additional years of data to verify and add to existing knowledge about subsequent primary cancer risk. Analyses are based on a cohort of 40,337 children two-month survivors of cancer diagnosed from 1973 to 2010 in the Surveillance, Epidemiology, and End Results program and followed for an average of 17.6 years. Follow-up identified 1,081 second malignant neoplasms, which denoted a 4.2-fold increase in incidence compared with the general population (O/E=4.2, 95% CI=4.0-4.5). Increased risk of subsequent cancer was observed for several cancer sites. The most common second malignant neoplasms involved leukemia and thyroid tumors, followed by malignant tumors of the CNS, bone and joint, kidney, and female breast. Unique to this study, children with a first primary Hodgkin lymphoma were also at increased risk for cancers of the esophagus, cecum, corpus uteri, and kidney; children with a first primary CNS were also at increased risk for salivary gland tumors; children with a first primary bone tumor were at increased risk for cancers of the oral cavity and pharynx, respiratory system, and soft tissue; children with a first primary soft tissue tumor were at increased risk for kidney carcinoma and lymphatic and hematopoietic diseases; children with a first primary germ cell tumor were at increased risk for cancers of the CNS and lymphatic and hematopoietic diseases; and children with a first thyroid tumor were at increased risk for cancers of the salivary gland and kidney. Risk of a second malignant neoplasm was significantly greater for children whose initial treatment included radiotherapy. The increased risk and latency periods for second malignant cancer among childhood cancer patients depends on the cancer type, treatment, and other factors.

029

SEXUAL BEHAVIOUR AND HEAD AND NECK CANCERS: A SYSTEMATIC REVIEW AND META-ANALYSIS. Nada J Farsi, Mariam El-Zein, Heidi Gaied, Yuan-Chin Amy Lee, Mia Hashibe, Belinda Nicolau, Marie-Claude Rousseau* (INRS-Institut Armand-Frappier, Laval Canada)

Sexually transmitted human papillomaviruses (HPV) have been recently associated with head and neck cancers (H&NC). The most plausible source of HPV transmission to the upper aerodigestive tract is through sexual contact. This systematic review and meta-analysis of epidemiological studies on the association between sexual behaviour and H&NC risk included 20 case-control studies published until October 2011. Indicators of sexual behaviour considered included number of sexual partners (19 studies), oral sex practice (17 studies), number of oral sex partners (5 studies), and age at first intercourse (6 studies). Pooled odds ratios (OR) and 95% confidence intervals (CI) were estimated using fixed and random effects models for each indicator, contrasting either 'highest' to 'lowest' or 'ever' vs. 'never' categories. There was no evidence of publication bias. Using random effects models, the overall ORs for H&NC were 1.29 (95% CI: 1.02-1.63) for number of sexual partners, 1.09 (95% CI: 0.88-1.35) for oral sex practice, 1.69 (95% CI: 1.00-2.84) for number of oral sex partners, and 1.40 (95% CI: 0.71-2.79) for age at first intercourse, with moderate or high degrees of heterogeneity. No increased H&NC risk was observed when restricting analyses to studies adjusting for age, sex, smoking and alcohol consumption. In 3 studies adjusted for HPV, number of sexual partners was not related to H&NC. Subgroup analyses by other methodological aspects (study quality, country, year of publication) were conducted. Our findings highlight that associations between sexual behaviour and H&NC might be attributed in part to confounding effects of sociodemographic and behavioural factors, but also suggest a potential role of HPV.

030

SURVIVAL AFTER COLORECTAL CANCER ACCORDING TO FAMILY HISTORY OF DISEASE. Amanda Phipps*, Dennis Ahnen, Polly Newcomb (Fred Hutchinson Cancer Research Center, Seattle United States)

BACKGROUND. Individuals with a family history of colorectal cancer (CRC) in first-degree relatives have an increased risk of CRC themselves. CRC cases with a family history are, however, more likely to have tumors that exhibit microsatellite instability (MSI), which is associated with a favorable prognosis. We evaluated the relationship between CRC family history and CRC survival accounting for MSI status. **METHODS**. Men and women diagnosed with incident CRC between 1997-2007 were identified from population-based cancer registries in the United States, Canada, and Australia and enrolled in the Colon Cancer Family Registry (N=5375). Interview data were collected on CRC risk factors and family history, and participants were followed for changes in vital status. Tumor specimens were tested for MSI. Cox regression was used to assess the association between all-cause mortality and CRC family history, overall and by MSI status. Analyses were adjusted for study site, age and year of diagnosis, sex, MSI, tumor site, smoking history, screening history, and body mass index. **RESULTS**. Cases with a history of CRC in first-degree relatives (17%) had a later average age at diagnosis and were more likely to have MSI-high tumors in the proximal colon than cases with no such family history ($p<0.01$). Overall, having a CRC family history was not associated with all-cause mortality [hazard ratio (HR)=1.01, 95% confidence interval: 0.88-1.17]. Associations were similarly null when stratified by MSI status (HR=1.00 and HR=1.04 in MSI-high and microsatellite stable cases, respectively). **CONCLUSIONS**. Despite differences in the tumor profile of CRC patients with versus without a CRC family history, having a family history of CRC does not appear to be related to survival after CRC diagnosis.

031-S

SYSTEMIC GLUCOCORTICOIDS AND EARLY-ONSET BASAL CELL CARCINOMA. Jose Ramon Troche*, Leah Ferrucci, Brenda Cartmel, David Leffell, Allen Bale, Susan Mayne (Yale School of Public Health, New Haven United States)

Background: Chronic immunosuppressive medication use is associated with non-melanoma skin cancer in some patient populations (e.g. transplant recipients). With widespread use of low-potency, low-dose immunosuppressives, particularly glucocorticoids, there is interest in whether low-level exposure also increases skin cancer risk. Few epidemiologic studies have examined this association in general population samples, with mixed findings. **Methods**: We evaluated systemic glucocorticoid use and early-onset basal cell carcinoma (BCC) in the Yale Study of Skin Health, a case-control study conducted in Connecticut (364 cases, 379 controls). During an in-person interview, participants reported glucocorticoid use, including medical indication and duration of use. Odds ratios (OR) and 95% confidence intervals (CI) were calculated using multivariate unconditional logistic regression. **Results**: 36.5% of cases and 40.4% of controls used glucocorticoids; prednisone (53.8%) and cortisone (22.0%) were most common. The most frequently reported medical indications for glucocorticoid use were poison ivy/oak/sumac (28.5%), respiratory (20.9%), and other skin conditions (19.1%). There was no association between ever use of glucocorticoids (OR=0.81, 95% CI=0.58-1.14) or duration of use (30+ days vs. none OR=0.70, 95% CI=0.38-1.30) and BCC. In an exploratory analysis incorporating estimated dose and intensity with reported duration, there was also no evidence of an association. **Conclusion**: Our findings do not support an etiologic role for glucocorticoid use in early-onset BCC. Longer duration or higher cumulative exposure to glucocorticoids may contribute to BCC risk, but we found no evidence of an association in a young, healthy population.

032-S

QUANTIFICATION OF THE SMOKING-ASSOCIATED RISK OF TOTAL AND SITE-SPECIFIC CANCER INCIDENCE AND MORTALITY WITH RATE ADVANCEMENT PERIODS: RESULTS FROM THE CHANCES CONSORTIUM. José Manuel Ordóñez-Mena*, Hermann Brenner, on behalf of the CHANCES consortium (German Cancer Research Center, Division of Clinical Epidemiology and Aging Research, Heidelberg Germany)

BACKGROUND: Even though the detrimental impact of smoking has been established since several decades, the smoking epidemic is ongoing in many parts of the world. One reason for the lack of progress in the fight against the smoking epidemic might be the difficulty of risk communication. Risk advancement periods (RAPs) have been proposed as an alternative measure to enhance quantification and communication of risk factor impact on the occurrence of chronic age-related diseases. OBJECTIVE: To estimate for the first time RAPs for baseline smoking status and time since cessation for cancers that were found to be associated with smoking in older men and women. **DESIGN**: 110,632 participants from 6 cohort studies from the Consortium on Health and Aging (CHANCES) were included: ESTHER (Germany), TROMSO (Norway), SENECA (across Europe), PRIME-Belfast (Northern Ireland), Swedish Mammography Cohort and Cohort of Swedish Men. We used Cox multivariate models to estimate RAPs and meta-analysis with random effects models to pool estimates. **RESULTS**: During a mean 12.65 years of follow-up, 17213 participants (mean age 60 years) developed and 7869 died from cancer. Smoking status was significantly associated with total and lung cancer incidence and mortality, and colorectal, gastric, pancreatic, head and neck cancer incidence. RAPs for total cancer incidence and mortality for current versus never smokers were 8.74 and 10.50 years, respectively. Similarly, time since cessation was inversely associated with the same cancer outcomes. **CONCLUSIONS**: Preliminary results from the CHANCES consortium suggest that, even at old age, being smoker considerably advances the risk of developing cancer as compared to never smokers. Nevertheless, time since cessation is still relevant at old age and can have an impact in reducing the risk of cancer.

033-S

SECOND PRIMARY CANCERS AMONG FEMALE BREAST CANCER SURVIVORS BY HORMONE RECEPTOR STATUS FROM 1992-2010. Sabah M. Quraishi*, Christopher I. Li (University of Washington Department of Epidemiology, Seattle United States)

Incidence rates of 2nd primary cancers following a 1st primary breast cancer may differ according to hormone receptor type given differences in etiology and treatment across estrogen (ER) and progesterone (PR) receptor subtypes. These differences have not been well characterized, thus the purpose of this study was to compare rates of 2nd primary cancers across breast cancer subtypes. Rates of 2nd primary cancers among those with a 1st primary for ER+PR+, ER+PR-, and ER-PR- breast cancer were extracted from the Surveillance, Epidemiology, and End Results Program (SEER) population-based cancer registry for 1992-2010. Standardized Incidence Ratios (SIRs) were calculated by cancer site. Statistically significant SIRs of 1.2, 1.2, and 1.5 for any 2nd primary cancer and 1.4, 1.3, and 2.2 for 2nd primary breast cancer were observed following ER+PR+, ER+PR-, and ER-PR-, respectively. Myeloid and monocytic leukemia was among the highest increased risk (ER+PR+, 2.0; ER+PR-, 1.5; ER-PR-, 3.4). Also observed were 1.6, 1.3, and 1.4 fold risk for endometrial and 0.5, 0.6, and 0.6 decreased risk for cervical cancers with ER+PR+, ER+PR-, and ER-PR-, respectively. Thyroid cancers had increased risks with all subtypes (ER+PR+, 1.4; ER-PR-, 1.3), but was not significant for ER+PR-. While certain 2nd primary cancers have similar risks across subtypes, others vary. Ovarian cancer risk was increased with ER-PR- (SIR=2.1). A 1.7 fold risk for bone and joint cancers was observed with ER+PR+. Stomach cancer had a 1.4 fold risk with ER+PR-. Among lymphatic and hematopoietic cancers, decreased risks of 0.6 for lymphocytic leukemia and 0.7 for Hodgkin lymphoma were observed with ER-PR- and ER+PR+, respectively. Additional studies examining how risk factors and treatments influence these rates may provide clinically useful information that could impact management and follow-up of the growing population of breast cancer survivors.

034

ADULT PHYSICAL ACTIVITY AND SUBSEQUENT RISK OF BREAST CANCER BY MOLECULAR SUBTYPE IN THE NURSES' HEALTH STUDY. A Heather Eliassen*, Renee T. Fortner, Laura C. Collins, Susan E. Hankinson, Rulla M. Tamimi (Brigham and Women's Hospital and Harvard Medical School, Boston United States)

Physical activity is beneficial for many reasons and evidence is fairly consistent for an inverse association with risk of breast cancer among postmenopausal women. Whether the association varies by molecular subtype of the tumor has not been investigated. We conducted a prospective analysis in the Nurses' Health Study (NHS) cohort. Amount and type of physical activity was queried every 2-4 years starting in 1986 and activity was summarized as hours of metabolic equivalent task values (MET-h). This analysis included 2046 invasive breast cancer cases diagnosed 1986-2006 for whom we were able to obtain archived breast cancer tissue specimens. Tissue microarrays were constructed, and slides were immunostained for estrogen receptor (ER), progesterone receptor (PR), human epidermal growth factor receptor 2 (HER2), cytokeratin 5/6 (CK5/6), and epidermal growth factor receptor (EGFR). Using immunostain results and histologic grade, cases were grouped into molecular subtypes. We used Cox proportional hazards models, adjusting for age, follow-up period, and several breast cancer risk factors, to calculate relative risks (RR) and 95% confidence intervals (CI). Compared to <3 MET-h/wk (<1h/wk walking), women engaged in higher amounts of physical activity (≥27 MET-h/wk, approximately 1h/day brisk walking) had a 15% reduced risk of luminal A tumors (N=1231 cases, RR (95% CI)=0.85 (0.72-1.02), p-trend=0.05). Although not statistically significant, an association of similar magnitude was observed for the luminal B subtype (N=456 cases, 0.89 (0.67-1.19), p-trend=0.40). A suggestively stronger association was observed for the HER2 subtype (N=123 cases) (0.60 (0.34-1.03), p-trend=0.08). No significant association was observed for the basal-like subtype (N=177 cases). These results suggest the association between physical activity and breast cancer risk may vary by molecular subtype.

035-S

ASSOCIATIONS BETWEEN OBJECTIVELY-ASSESSED SEDENTARY TIME AND MODERATE-VIGOROUS INTENSITY PHYSICAL ACTIVITY AND OBESITY AMONG BREAST CANCER SURVIVORS. Terry Boyle*, Jeff Vallance, Brigid Lynch (British Columbia Cancer Research Centre, Vancouver Canada)

Background: Associations between physical activity, sedentary behaviour and obesity among cancer survivors have largely relied on self-reported estimates of these exposures. We investigated the cross-sectional associations between objectively-assessed sedentary time and moderate- to vigorous-intensity physical activity (MVPA) and obesity (waist circumference and body mass index (BMI)) among breast cancer survivors. **Methods**: Breast cancer survivors (n=255; response rate=48%; mean age=60 years; mean time since diagnosis=2.9 years) in Western Australia in 2013 wore an Actigraph® GT3X+ accelerometer for 7 consecutive days and completed a self-administered questionnaire. Participants were asked to self-report their height, weight and waist circumference. Accelerometer data were summarised using Freedson cutpoints (60 second epochs) and standardised according to daily wear time. Total minutes per day of MVPA was categorised into tertiles (<20, 20-34.9, ≥35 minutes), as was total hours per day of sedentary time (<7.75, 7.75-8.74, ≥8.75 hours). Linear regression was used to estimate the associations between MVPA, sedentary time and waist circumference and BMI, after adjusting for potential confounders. **Results**: Increasing amounts of MVPA were associated with lower waist circumference and lower BMI. Compared with participants in the lowest tertile of MVPA, the waist circumference of those in the second and third tertiles of MVPA was 3.3cm lower (95% Confidence Interval (CI)= -6.9cm to 0.3cm) and 5.9cm lower (95% CI = -9.6cm to -2.1cm) respectively, while BMI was 2.0 units (95% CI = -3.9 to -0.1) and 2.8 units (95% CI = -4.7 to -0.9) lower in the second and third tertiles respectively. Sedentary time was not significantly associated with waist circumference or BMI. **Conclusion**: Higher levels of MVPA were associated with lower waist circumference and lower BMI in this sample of breast cancer survivors.

036-S

ASSOCIATIONS BETWEEN OBJECTIVELY-ASSESSED SEDENTARY TIME AND MODERATE-VIGOROUS INTENSITY PHYSICAL ACTIVITY AND SLEEP QUALITY AND DURATION AMONG BREAST CANCER SURVIVORS. Terry Boyle*, Brigid Lynch, Jeff Vallance (British Columbia Cancer Research Centre, Vancouver Canada)

Background: Sleep disturbances are a frequently reported side-effect of breast cancer treatment. Some studies have shown a link between self-reported physical activity and better sleep outcomes; how sedentary behaviour affects sleep in this population is unknown. We investigated the associations between objectively-assessed sedentary time, moderate- to vigorous-intensity physical activity (MVPA) and sleep quality and duration among breast cancer survivors. **Methods**: 255 breast cancer survivors (mean age=60 years; mean time since diagnosis=2.9 years) took part in a cross-sectional study in Western Australia in 2013 (48% response rate). Participants wore an Actigraph® GT3X+ accelerometer for 7 consecutive days and completed a self-administered questionnaire. Sleep quality and duration were measured using the Pittsburgh Sleep Quality Index. Sleep quality was classified as good or poor, while sleep duration was categorised as fewer than 7 hours or 7 or more hours. Accelerometer data were summarised using Freedson cutpoints (60 second epochs) and standardised according to daily wear time. Tertiles of MVPA (<20, 20-34.9, ≥35 minutes) and sedentary time (<7.75, 7.75-8.74, ≥8.75 hours) were created. Modified Poisson regression estimated the associations between sedentary time, MVPA and sleep quality and duration, after adjusting for potential confounders. **Results**: 53% of the participants had poor sleep quality and 36% slept fewer than 7 hours per night. Participants in the highest tertile of sedentary time were 1.5 times more likely to sleep fewer than 7 hours per night than those in the lowest tertile (Risk Ratio=1.50, 95% Confidence Interval=1.00-2.26). MVPA was not significantly associated with sleep duration. Neither sedentary time nor MVPA were associated with sleep quality. **Conclusion**: Longer periods of sedentary time may reduce sleep duration, which could plausibly contribute to poorer health outcomes.

038-S

WHEN LESS IS MORE: UNDERSTANDING FACTORS INFLUENCING PATIENT ATTITUDES AND BEHAVIOR WHEN CERVICAL CANCER SCREENING GUIDELINES RECOMMEND LESS SCREENING. Michelle Silver*, Anne Rositch, Anne Burke, Ray Viscidi, Patti Gravitt (Johns Hopkins School of Public Health, Baltimore United States)

Background: Cervical cancer screening guidelines were updated in 2012 to recommend routine screening every 3 years, but evidence suggests that patients and providers alike are resistant to less frequent Pap smear screening strategies. The goal of this study was to explore patient-specific factors associated with reluctance to accept increased screening intervals. **Methods**: Data was collected from 550 women age 35-60 who completed the 2-year HPV in Perimenopause (HIP) study and was analyzed using Poisson regression with robust error variance to estimate prevalence ratios (PR) and 95% confidence intervals (CI). **Results**: Only 56% of women were aware there had been a change in guidelines, 78% of women believed that cervical cancer screening should be performed at least once per year, and 45% of women were not willing to reduce the frequency of screening to every 3 years even if recommended by her provider. Also, only 25% were willing to extend screening to every 5 years following a negative HPV/Pap test—the preferred method in the new guidelines. Women who believed they should have a Pap every two years or less often were nearly twice as likely to be willing to extend their screening interval than women who believed Pap smears should be annually or more often [(PR(95%CI): 1.8 (1.6-2.1)]. Women who ever had an abnormal Pap smear in their life (46%) were 20% less likely to accept an extended screening interval even with their physician's recommendation [0.80 (0.68-0.94)]. **Conclusion**: Evidence-based recommendations are valuable only if broadly implemented in routine practice. Understanding perceptions and acceptance of screening recommendations are thus critical but understudied parameters required for effective translation. Identification of factors associated with reluctance to comply with recommendations is a first step to development of interventions to ensure broad acceptance of evidence-based guidelines.

039

INTERACTION OF DIABETES AND OBESITY IN POSTMENOPAUSAL BREAST CANCER RISK AMONG WHITE AND BLACK WOMEN IN THE SOUTHERN COMMUNITY COHORT STUDY. Maureen Sanderson*, Loren Lipworth, David Shen-Miller, Kyle Williams, Wei Zheng, Margaret Hargreaves, William Blot (Meharry Medical College, Nashville United States)

Meta-analyses of the association between diabetes and postmenopausal breast cancer among white women have reported summary relative risks [RR] of about 1.2. The only related study among black women reported a RR of 0.9. We conducted a case-control study nested in the prospective Southern Community Cohort Study to examine whether diabetes was associated with subsequent breast cancer among postmenopausal white and black women and whether obesity modified this effect. Women with incident breast cancer were identified through linkage with state cancer registries and the National Death Index (165 white, 405 black cases). Four controls were matched to each case on race, age and enrollment site (660 white, 1616 black controls). Data on diabetes diagnoses were obtained through baseline and follow-up surveys. After adjustment for income, diabetic women whose highest lifetime body mass index (BMI) was <30kg/m2 were at slightly increased breast cancer risk (odds ratio [OR] 1.4, 95% confidence interval [CI] 0.7-3.1) relative to non-diabetic women with a BMI<30kg/m2; however, diabetic women whose maximum BMI was ≥30 were at reduced risk (OR 0.8, 95% CI 0.6-1.1) compared with non-diabetic obese women (p for interaction=0.28). Results were similar across race. The exclusion of women whose diabetes and breast cancer diagnoses were within 1 year of each other yielded virtually identical results. We were unable to examine a potential effect of metformin use due to its low prevalence. The non-significant reduction in postmenopausal breast cancer risk associated with diabetes among obese women has not been previously reported. Confirmation of our findings in larger studies may assist in elucidating the role of obesity in the growth factor and insulin signaling pathways in breast cancer.

041-S

RACIAL DISPARITIES IN BREAST CANCER DIAGNOSIS AND TREATMENT BY HORMONE RECEPTOR AND HER2 STATUS. Lu Chen*, Christopher Li (University of Washington, Department of Epidemiology, Seattle United States)

Background: African American and Hispanic women are more likely to be diagnosed with aggressive forms of breast cancer. However, racial/ethnic disparities within each subtype of breast cancer have not been well documented. **Methods**: Using data from 18 SEER cancer registries, we identified 48,442 women aged 20 years or older, first diagnosed with invasive breast cancer in 2010, and with known stage, hormone receptor (HR) and HER2 status. Guideline concordant primary treatment was defined as having total mastectomy or partial mastectomy plus radiation for patients with stage I/II cancer. Polynomial logistic regression was used to evaluate associations between race/ethnicity and cancer stage and receipt of guideline concordant primary treatment stratified by joint HR and HER2 status. **Results**: Overall, Black, Hispanic white, and American Indian/Alaska Native women were 1.3-2.7 times more likely to be diagnosed at stage II-IV breast cancer compared to Non-Hispanic Whites (NHW). Black women experienced statistically significant 40-80% elevations in risks of stage IV HR+/HER2-, HR+/HER2+, HR-/HER2- (triple-negative), and HR-/HER2+ cancers. Hispanic white women had 50-60% elevations in risks of stage III cancers across these four subtypes. Blacks and Hispanic whites were 20-30% more likely than NHWs to receive non-guideline concordant primary treatment for breast cancer overall. Treatment disparity was seen among Black women across all four subtypes. **Conclusion**: Black and Hispanic white women are more likely to be diagnosed with aggressive forms of breast cancers at an advanced stage and not to receive guideline concordant primary treatment. Ongoing efforts aimed at reducing racial/ethnic disparities in breast cancer related to both early detection and treatment are needed across all breast cancer subtypes.

042

USE OF AMNIOTIC TISSUE FOR DIABETIC FOOT ULCERS THERAPY: AN EVIDENCE REVIEW. Mary C. Bocox*, Liana R. Merz (BJC HealthCare, St. Louis United States)

Background: Human amniotic tissue has many characteristics beneficial to wound healing: provides a matrix for cellular migration and proliferation, promotes increased wound healing, is non-immunogenic, reduces inflammation and scar tissue, antibacterial properties, reduces pain at the site of application, provides a natural biological barrier, and contains essential growth factors and cytokines. **Methods**: A rapid evidence assessment was completed to determine the effectiveness using human amniotic tissue products for diabetic ulcerations of the lower extremities. Searches were performed using Medline, Cochrane, CINAHL, and Google. As research testing the use of human amniotic tissue for foot wounds is relatively recent, a systematic review of the evidence identified only one randomized controlled trial (RCT) and 5 observational studies. **Results**: The RCT testing the effectiveness of dehydrated amniotic membrane (dHAM) found the dHAM group had higher healing rates than those receiving standard care (SOC). Among patients that healed, dHAM patients had a 50% faster healing rate. Four observational studies testing dHAM compared to SOC were identified. Each observational study found success with dHAM not only in both faster healing rates than SOC and in complete wound healing. **Conclusion**: These small moderate to low quality studies revealed strong positive wound healing results as compared to standard wound care, yet there is no direct evidence that human amniotic tissue products are more effective than other advanced therapies. Therefore, the current body of evidence is insufficient to assess the balance of benefits or harms for amniotic tissue products. Early research resulted in improved patient outcomes, but additional randomized controlled trials comparing other advanced therapies such as wound grafts are needed to fully assess the effectiveness of the amniotic tissue products.

043

COGNITIVE FUNCTION IN DIABETIC AND NON-DIABETIC MIDDLE-AGE AND OLDER ADULTS FROM CHINA, GHANA, INDIA, MEXICO, RUSSIA AND SOUTH AFRICA: IMPLICATIONS FOR FUNCTIONING AT OLDER AGES. Nadia Minicuci*, Elizabeth Thiele, Barbara Corso, Joel Negin, Paul Kowal (National Research Council, Neuroscience Institute, PADOVA Italy)

It is known that cognitive function decreases with age and that diabetes can play a role in the intensification of this relationship. We investigated the possible interaction of age and self-reported diagnosis of diabetes mellitus (DM) on cognitive function in 43,872 subjects from six middle income countries. The data used are from WHO's Study on global AGEing and adult health and are nationally representative of: China, Ghana, India, Mexico, Russia and South Africa. Subjects were categorized into four groups based on age and diabetes status: 18-49 no DM; 18-49 DM; 50+ no DM; and, 50+ DM. Cognitive function was based on a composite score derived from verbal fluency, verbal recall, and forward and backward digit span tests. The overall DM prevalence was 3.4%: highest in Mexico at 9.8% and lowest in Ghana at 2.1%. Diabetic adults in Mexico Russia and South Africa had lower cognition scores than those without DM (p-values: 0.0027, 0.0002 and 0.0211, respectively). In China and Ghana, the difference was not statistically significant, whereas in India, DM subjects had a higher score than non-DM subjects (p =0.0095). In all countries, the cognition score decreased significantly with age (p <0.0001). Country-specific multivariate models performed to assess the relationship between cognitive score and the four age-disease groups, confirmed the effect of increasing age on cognition score for all countries (p <0.005) and the effect of DM on cognition score for Russia and South Africa. Models were adjusted by socio-demographic, lifestyle, biological risk factors and mobility proxies. We furthermore included gait speed in the model and slower speed was found to be statistically positively associated with cognition score in all countries but China and Ghana. This study confirmed a significant association between age and cognitive function, while DM is associated with cognition in only some countries.

044

EVALUATION OF CARDIO-ANKLE VASCULAR INDEX IN ASSOCIATION WITH DIABETES MELLITUS AMONG JAPANESE URBAN WORKERS AND THEIR FAMILIES. Mitusko Nakata*, Tsukasa Namekata, Kenji Suzuki, Chikao Arai, Kohji Shirai (Pacific Rim Disease Prevention Center, Seattle United States)

Purpose: The purpose of this cross-sectional study was to evaluate the strength of the association of cardio-ankle vascular index (CAVI) with diabetes mellitus and then determine the cut-off value of CAVI by the receiver operation characteristic (ROC) curve. **Methods**: Subjects were 33022 Japanese urban workers and their families 40 years of age and over who participated in cardiovascular screening in Japan. CAVI was measured based on the pulse wave velocity propagated on the arteries from the heart to the ankle using VaSera VS-1000 (Fukuda Denshi Co., Tokyo). For each gender, stepwise logistic regressions were performed to obtain two prediction models of diabetes mellitus (one including CAVI as a covariate and another without CAVI) including age, body mass index and systolic blood pressure as additional covariates. Using separate data set from the one used in logistic regression, ROC curves were estimated for both prediction models with CAVI and without CAVI. Also, ROC curves using only CAVI as a covariate were drawn for each gender. Area under the curve (AUC) of each ROC curve was calculated to compare the validity of models. **Results**: When drawing ROC curve with a single covariate, CAVI, sums of sensitivity and specificity were maximized at the CAVI value of 8.55 (Sensitivity 0.58, Specificity 0.66) for males, and 8.45 (Sensitivity 0.56, Specificity 0.70) for females. The AUC of ROC curves were 0.684 for male, and 0.661 for female. When drawing ROC curve using prediction models obtained from multivariate logistic regression, with an inclusion of CAVI, the AUC of ROC curve improved from 0.769 to 0.784 for males, and from 0.666 to 0.700 for females. **Conclusion**: The result of ROC curve estimation shows the strong association of CAVI with diabetes mellitus, suggesting that CAVI may be used as a predictor of diabetes mellitus along with other risk factors.

045

THE IMPACT OF SITTING ON TYPE 2 DIABETES AND MORTALITY. Calpurnyia Roberts*, Stella Yi, Donna Eisenhower (New York City Department of Health and Mental Hygiene, New York United States)

Self-reported sitting time adversely impacts health, independent of physical activity. However, few studies have assessed the influence of objective measures of sitting time on chronic health conditions or mortality. The population attributable fractions (PAFs) of sitting time on type 2 diabetes, coronary heart disease (CHD) mortality, and all-cause mortality were estimated using the prevalence of self-reported sitting and accelerometer assessed sedentary time from the Physical Activity and Transit Survey 2010-11 (a representative, population-based study of New York City residents), and adjusted relative risks from meta-analyses. In 3,906 non-institutionalized adults, and a subsample (n = 679) who also wore an accelerometer for at least four days for = 10 hours, the prevalence of sitting >8 hours/day varied between self-report and accelerometer (33.8% vs. 57.5%, respectively). In the overall NYC population, using accelerometer data, it was estimated that 10.9% (95% CI: 9.07, 12.65) of diabetes cases, 23.7% of CHD deaths (95% CI: 21.9, 25.5) and 21.3% (95% CI: 19.5, 23.1) of all deaths could be averted if sitting time was reduced to lower levels (~<4 hours/day). The PAFs calculated from self-reported data were approximately half of the values estimated from accelerometer data (5.62%, 15.4%, and 13.7% for diabetes prevalence, CHD- and all-cause mortality, respectively). These results were consistent across different age groups, sex, race/ethnicity, and poverty levels. Thus, self-reported sitting time produced conservative estimates that underestimate the impact on type 2 diabetes and mortality. Inclusion of objective measures of sedentary behavior is warranted in order to improve quantifying the risk of sitting time.

047

MOBILE HEALTH CONSIDERATIONS FOR PERSONS WITH DIABETES: A HEALTH LITERACY PERSPECTIVE. Mark Macek* (University of Maryland School of Dentistry, Baltimore United States)

Objectives: Mobile health, or the use of mobile devices within medicine and public health, has grown in popularity during the last decade. Health communication researchers suggest that mobile health technology and text messaging may play an important role in bringing clear and easily understood information to patients with limited health literacy skills who must manage their chronic diseases. The purpose of this investigation was to determine the extent to which U.S. adults with diabetes, particularly those with limited health literacy skills, might be a reasonable audience for mobile health tools. **Methods**: Data (n= 16,383) from the 2012 National Health Interview Survey were analyzed using SAS and SUDAAN statistical software. The main outcome variable described how exclusively cellular telephones were used by individuals or family members. Self-reported diabetes status was the primary descriptive variable. Covariates included age, sex, race/ethnicity, education, poverty status, and geographic region. Analyses were limited to persons aged 18 years or older. **Results**: In the United States, 3.3 million (22.6%) adults with diabetes reported receiving "all or almost all" calls on a cellular telephone. Adults with diabetes were significantly less likely (crude OR=0.60; 95%CI=0.52-0.68) to use cellular telephones exclusively than were those without diabetes. However, this association became non-significant (adjusted OR=0.92; 95%CI=0.78-1.08) after controlling for covariates. For the subgroup of adults with diabetes, only age and sex were significantly associated with exclusive cellular telephone use. **Conclusion**: Among adults with diabetes, those presumed to have lower levels of health literacy and, by extension, those who would most likely benefit from mobile health technology and/or text messages, were no more likely to exclusively use cellular telephones than were those presumed to have higher levels of health literacy. Among diabetics, only men and adults younger than 65 years were more likely to exclusively use cellular telephones. Researchers and healthcare providers may wish to consider these findings when designing mobile health tools for diabetic adults with limited health literacy skills.

048-S

ESTABLISHING A TB DIABETES COHORT IN A DEVELOPING COUNTRY: EXPERIENCES AND CHALLENGES OF THE DIABETES-TUBERCULOSIS TREATMENT OUTCOME STUDY. Fatima Mukhtar*, Zahid Ahmad Butt (Health Services Academy, Islamabad,, Pakistan)

Introduction: With 382 million diabetics worldwide in 2013 and estimated to rise to 600 million by 2030, there is a resurgence of interest in the dual epidemic of diabetes mellitus and tuberculosis (TB). Pakistan has a high burden of TB and a rapidly growing population of diabetics. This prospective cohort study is undertaken at a tertiary care hospital in Lahore to estimate the risk of adverse outcomes in diabetic patients who are being treated for TB. The experiences and challenges of setting up the TB diabetes cohort in a resource constraint setting are described with the aim of sharing it with others trying to work on similar cohorts. **Methods**: Recruitment of 600 adult pulmonary TB patients began in October 2013. Patients fulfilling the inclusion criteria and volunteering to participate are enrolled. Diabetic status of patients is ascertained by random and fasting blood glucose tests. The cohort will be followed up at 2, 5 and 6 months to determine treatment outcomes. **Results**: A total of 368 adult pulmonary TB patients have been recruited of which, known diabetics are 46 (12.5%) and 10 (2.7%) are newly diagnosed diabetics. The challenges encountered were ascertaining patients' prior intake of anti-TB medication, hesitance of patients to sign the informed consent forms, obtaining the contact details of the patients, ensuring patients' accompanying relatives remain unaware of their disease status and ensuring patients reach the facility for follow up. The study found it beneficial to have both a male and a female data collector, have a 24 hour helpline for patients, a referral system for medical conditions and to send out follow up reminders through telephone calls rather than short messaging service. **Conclusion**: Researchers conducting cohort studies in a developing country like Pakistan need to keep in perspective the low literacy level and issues related to rampant poverty when establishing a cohort.

049-S

C-REACTIVE PROTEIN, DEPRESSIVE SYMPTOMS, AND INCIDENCE OF DIABETES: RESULTS FROM THE ENGLISH LONGITUDINAL STUDY OF AGEING (ELSA). Bonnie Au*, Kimberley Smith, Norbert Schmitz (Douglas Institute McGill University, Montreal, Quebec Canada)

Background: Depressive symptoms are associated with increased risk of diabetes. Inflammatory mechanisms have been suggested to be involved in depression and diabetes. Specifically, increased levels of C-reactive protein (CRP), a biomarker for inflammation, is associated with depression and have also been linked to risk of developing diabetes. Objective: To assess the association of both CRP and depressive symptomatology with diabetes incidence in a representative sample of English people ≥ 50 years old. **Methods**: Participants were 5475 community-dwelling men and women without diabetes from the English Longitudinal Study of Ageing (ELSA). Wave 2 of ELSA was used as baseline (first assessment of CRP), with assessment of diabetes incidence at waves 3, 4, and 5. Elevated depressive symptoms were based on a score ≥ 4 using the 8-item Center for Epidemiologic Studies Depression (CES-D) scale, and high CRP level was defined as > 3 mg/L. Diabetes incidence was indicated by self-reported doctor diagnosis. Association of diabetes incidence with baseline CRP and depressive symptom groups was examined using multivariate logistic regression adjusted for socio-demographic, lifestyle, and clinical variables. **Results**: Compared to participants with normal CRP levels and low depressive symptoms, those with both high CRP and elevated depressive symptoms were more likely to develop diabetes over six years of follow-up [adjusted odds ratio (aOR): 1.85, 95% Confidence Interval (CI): 1.06-3.23]. Individuals with high CRP and low depressive symptoms (aOR: 1.20, 95% CI: 0.84-1.71) and those with normal CRP and elevated depressive symptoms (aOR: 1.52, 95% CI: 0.85-2.70) were not associated with diabetes incidence. **Conclusion**: People with both high CRP and elevated depressive symptoms are more likely to develop diabetes. Further research is needed to investigate the pathways between high CRP and depression to diabetes.

050

INCREASED RISK OF DIABETES IN MEN AND WOMEN WITH SELF-PERCEIVED CHRONIC STRESS INDEPENDENT OF BODY WEIGHT. Yue Chen*, Lingjia Qian, Wanghong Xu (University of Ottawa, Ottawa Canada)

To determine the association between chronic stress and diabetes, we studied 81,833 Canadians aged 40 years or more who participated in a national survey conducted in 2007-2008. A questionnaire covered the information on self-perceived lifetime stress and diabetes. Logistic regression model was used to examine the association between chronic stress and diabetes before and after adjustment for covariates. Population weight and average design effect were used to account for complex survey design. The crude prevalence of self-reported diabetes was 9.6% in Canadian aged 40 years or more (men: 10.8%; women: 8.5%). One fifth of the Canadians reported ever having severe stress. People who reported being severely stressed had an increased risk of diabetes (adjusted OR: 1.22, 95% CI: 1.14, 1.31), and the association was significant for both men (adjusted OR: 1.26, 95% CI: 1.15, 1.38) and women (adjusted OR: 1.18; 95% CI: 1.07, 1.31). The association estimates changed little before and after body mass index and lifestyle factors were taken into consideration. Lifetime stress was associated with an increased risk of diabetes, which was independent of relative body weight.

051

RATIONALE, DESIGN, AND METHOD OF THE DIABETES & WOMEN'S HEALTH STUDY-A STUDY OF LONG-TERM HEALTH IMPLICATIONS OF GLUCOSE INTOLERANCE IN PREGNANCY AND THEIR DETERMINANTS. Cuilin Zhang*, Frank Hu, Edwina Yeung, Wei Bao, James Mills, Michele Kiely (NICHD/National Institutes of Health, Bethesda United States)

Women who develop gestational diabetes mellitus (GDM) or impaired glucose intolerance during pregnancy are at substantially increased risk for type 2 diabetes (T2DM) and comorbidities in the years following pregnancy. Little is known about the role of genetic factors and their interactions with environmental factors in determining the transition from GDM to overt T2DM. Further, few studies have followed through later adulthood for the development of T2DM and co-morbidities. These critical data gaps serve as the impetus for this Diabetes & Women's Health study with the overall goal of investigating genetic factors and their interactions with risk factors amenable to clinical or public health interventions in relation to the transition of GDM to T2DM. To efficiently achieve the research goal, we are applying a hybrid design enrolling and collecting data longitudinally from approximately 4,000 women with a medical history of GDM in two existing prospective cohort studies, the Nurses' Health Study II and the Danish National Birth Cohort. Women who had a medical history of GDM in one or more of their pregnancies are eligible for recruitment into the present study. After enrollment, we follow study participants for an additional two years to collect updated information on major clinical and environmental factors that may predict T2DM risk as well as biospecimens to measure genetic, epigenetic and biochemical markers implicated in the glucose metabolism. Newly collected data will be appended to the relevant existing data for the creation of a new database inclusive of genetic, epigenetic and environmental data to address the study aims. Findings from the study are critical for the development of targeted and more effective strategies to prevent T2DM and its complications in this high risk population.

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SHIFT WORK AND INCIDENT DIABETES IN THE BLACK WOMENS HEALTH STUDY. Varsha Vimalananda, Julie R. Palmer, Hanna Gerlovin, Lauren A. Wise, James Rosenzweig, Lynn Rosenberg, Edward A. Ruiz-Narvaez* (Slone Epidemiology Center at Boston University, Boston United States)

Shift work may increase risk of type 2 diabetes (T2DM) through unhealthy lifestyle behaviors and altered energy metabolism. A positive association was observed in the Nurses' Health Study, but there are no such reports from studies of African American women, who have a disproportionately high incidence of T2DM. We examined the relation of shift work to incident T2DM in the Black Women's Health Study, an ongoing prospective cohort study initiated in 1995. We used Cox proportional hazard models to estimate hazard ratios (HRs) and 95% confidence intervals (CIs) for T2DM across duration of shift work (never, 1-2 yrs, 3-9 yrs, 10-19 yrs, 20+ yrs). A basic multivariable model adjusted for age, time period, family history of diabetes, and education. We added lifestyle factors (smoking, alcohol drinking, exercise, caloric intake) to test the hypothesis that shift work affects risk of T2DM through lifestyle behaviors. We then further adjusted for body mass index (BMI). Questions on shift work were asked in 2005. The analysis included the 27,127 women who had never been diagnosed with T2DM as of 2005 and completed that questionnaire. During 6 years of follow-up (2005-2011) there were 1498 cases of incident diabetes. Relative to never shift work, HRs (95% CI) of T2DM for shift work 1-2, 3-9, 10-19, and 20+ yrs were 1.23 (1.09-1.40), 1.29 (1.11-1.51), 1.52 (1.21-1.91), and 1.76 (1.27-2.46), respectively. After adjustment for lifestyle factors, the respective HRs decreased to 1.17 (1.03-1.33), 1.21 (1.03-1.41), 1.37 (1.09 -1.72), and 1.58 (1.13-2.21). Further adjustment for BMI attenuated the HRs to 1.11 (0.98-1.26), 1.12 (0.95-1.30), 1.19 (0.95-1.50), and 1.47 (1.05-2.05). Long durations of shift work seem to be associated with an increased risk of incident diabetes among African American women. Our results suggest that the association may be mediated in part, but not entirely, through lifestyle factors and BMI.

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CIGARETTE SMOKING AMONG FOREIGN-BORN CAMBODIAN AMERICAN ADULTS. Robert Friis*, Che Wankie*, Claire Garrido-Ortega, Alan Safer, Paula Griego, Mohammed Forouzesh, Kirsten Trefflich, Kimthai Kuoch (California State University, Long Beach, Long Beach United States)

Tobacco use is one of the main risk factors for a number of chronic diseases, including cancer, lung diseases, and cardiovascular diseases. The World Health Organization reported prevalence of tobacco smoking among adults in Cambodia was 19.5% (male = 39.1%, female = 3.4%) in 2011. Some studies have shown high smoking prevalence rates among Cambodian males of up to 65% in urban areas and 86% in rural areas in Cambodia. These high prevalence rates have been attributed to factors such as use of smoking as an appetite suppressant in work camps during the Khmer Rouge genocide or as predisposing factors associated with cultural and traditional practices. It is uncertain if these Cambodian American immigrants maintained their smoking habits in the United States. In this updated analysis, the smoking prevalence was examined using a stratified random cross-sectional study of 922 foreign born Cambodian Americans who immigrated when there were aged 18 years or older and reside in Long Beach, California. The prevalence of current smokers was 12.1%; the sex-specific prevalence of smoking was 25.3% for men and 3.7% for women, $\chi 2(1, N = 922) = 96.0$, $p < 0.001$. The mean age was 57.9 years (Standard Deviation = 14.0 years). A multivariate logistic regression analysis examined predictors of current-smoking status. The odds of being a current smoker were 15.85 times (95% Confidence Interval = 8.78, 28.60) higher among men than among women. Education, employment, and marital status were statistically significant predictors of status as a current smoker. We concluded that current smokers tended to be unmarried Cambodian American men; who have less than a high school education; and were unemployed. We postulate that the decrease in smoking among Cambodian American adults is a result of stricter anti-tobacco use policies in California.

054-S

TRENDS IN TOBACCO SMOKING CESSATION IN HIGH INCOME COUNTRIES, 1985-2010. David Phillips*, Marie Ng, Martin Tobias (Institute for Health Metrics and Evaluation, University of Washington, Seattle United States)

Introduction: Although the prevalence of cigarette smoking has been declining worldwide for decades, progress has varied by country. Tobacco control requires a fuller understanding of the dynamics of the tobacco epidemic, beyond merely trends in prevalence. Yet there are no cross-country comparable estimates of smoking cessation rates. We employ a time series of smoking prevalence and excess mortality from high income countries to estimate cross-country variation in smoking cessation by age, sex and five-year period, from 1985 to 2010. **Methods**: Smoking cessation among adults aged 35 or more years was estimated using a multi-state transition model in which current smoking prevalence for a cohort is a function of previous smoking prevalence, smoking initiation, excess smoking-attributable mortality, and smoking cessation (i.e. successful long term quitting). Analysis was limited to 33 high income countries with mature tobacco epidemics and regular, high quality national behavioral risk factor surveys. **Results**: Among the selected high-income countries, smoking cessation has increased at an annualized rate of 0.32% per year from 1985 to 2010. In 1985, smoking cessation was estimated at 13.6%; in other words 13.6% of cigarette smokers aged 35 years or older in 1980 had successfully quit by 1985. This rate increased to 14.7% in 2010. 70-74 year-olds had the highest cessation rate (34.7%) in 2010. Males were more likely to quit than females at all ages and periods; in 2010 the overall male cessation rate (16.1%) was 3.48 percentage points higher than the female rate. **Discussion**: Overall cessation rates have increased over the past 20 years. However, the trend has varied widely both across countries and by age and sex. With a better understanding of whom and how many people are quitting, smoking cessation policies can be properly evaluated, redesigned and targeted toward populations whose progress has been slowest.

055-S

GLOBAL EDUCATIONAL DISPARITIES IN THE ASSOCIATIONS BETWEEN BODY MASS INDEX AND DIABETES MELLITUS IN 49 LOW- AND MIDDLE-INCOME COUNTRIES. Aolin Wang*, Karien Stronks, Onyebuchi A. Arah (Department of Epidemiology, University of California, Los Angeles, Los Angeles United States)

Introduction: Despite the well-established link between body mass index (BMI) and diabetes mellitus (DM), it remains unclear whether this association is more pronounced at certain levels of education. This study assessed the heterogeneity of associations between BMI and DM among people with different educational attainments. **Methods:** Applying multilevel regression methods to the World Health Survey data on 160,381 participants from 49 low- and middle-income countries, we investigated the modifying influence of educational attainment (illiterates, primary school, secondary or high school, or college and beyond) on the associations of DM with different BMI levels (underweight, normal, overweight, obese I, or obese II&III). We quantified both the BMI-DM association at each education level and the joint association of BMI and educational attainment with DM in 22 low-income countries (LICs) and 27 middle-income countries (MICs). **Results**: Higher BMI was associated with higher odds of DM among people with same education level in both LICs and MICs. In the joint association model, we found increasing odds associated with DM as BMI and education level both increased in LICs. The odds of DM observed were slightly larger than what we would expect from the combined separate impact of BMI and educational attainment in these countries. This increasing joint association is largely driven by the contribution of educational attainment across BMI levels, rather than the contribution of BMI across education levels in LICs. Nonetheless, no clear pattern was seen in MICs, as the education-DM association is less prominent, if at all present, in these countries compared to that in LICs. **Conclusions**: There appears to be some heterogeneity in the associations of BMI and educational attainment with DM in LICs not seen in MICs. Future studies are needed to examine this newly found heterogeneity in LICs versus MICs.

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BREASTFEEDING IS ASSOCIATED WITH LOWER RATES OF HOSPITALIZATION AMONG HIV-EXPOSED UNINFECTED INFANTS. Kristjana Ásbjörnsdóttir*, Jennifer Slyker, Elizabeth Maleche-Obimbo, Dalton Wamalwa, Grace John-Stewart (University of Washington, Seattle United States)

Objective: HIV-exposed uninfected (HEU) infants are a growing population with high morbidity and mortality relative to HIV-unexposed infants. We sought to identify predictors of hospitalization among HEU infants in the first year of life. **Design**: Retrospective cohort of HIV-infected mothers and their HEU infants in Nairobi, Kenya, enrolled between 1999-2002 and followed from pregnancy to 1-2 years postpartum. **Methods**: Infants who were HIV-uninfected at birth were followed monthly until last negative HIV test, death, loss to follow-up or study exit at one year of age. Incidence and timing of all-cause and infectious disease hospitalization was assessed using maternal report at monthly visits. Predictors of first all-cause and infectious disease hospitalization were identified using competing risk regression, with HIV acquisition and death as competing risks and robust standard errors. Infants who were ever breastfed were compared to those never breastfed. **Results**: Among 388 infants with 328 child-years of follow-up, 101 hospitalizations were reported [30.8 / 100 child-years, 95% confidence interval (CI) 25.3-37.4). The majority - 75 hospitalizations among 62 infants - were due to one or more infectious causes [23.0/100 child-years, 95% CI 18.4-28.9), primarily pneumonia (n=37), gastroenteritis (n=17) and sepsis (n=14). There was no association between maternal CD4% or HIV log10 viral load at 32 weeks gestation, infant prematurity or low birth weight, or number of siblings in the home and infant hospitalization. Breastfeeding was associated with decreased risk of all cause hospitalization (subhazard ratio (SHR) = 0.41, 95% confidence interval (CI) 0.26-0.64)) and more strongly associated with hospitalization due to infectious disease (SHR=0.33, 95% CI 0.20-0.54). **Conclusion**: Among HEU infants breastfeeding was associated with significantly less hospitalization during the first year of life.

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PATHWAYS TO HEALTH AND WELLBEING – THE SOCIAL NETWORKS OF ORPHANED AND ABANDONED CHILDREN (OAC). Lynne C. Messer*, Kathryn Whetten, Anna Koons (Portland State University, Portland United States)

Background. More than 143 million children (ages 0-17) have been orphaned by the death of one or both parents. These orphans, in addition to the millions abandoned by their parents, are disadvantaged in their educational attainment, employment opportunities and sexual risk. While well-understood that social networks are important during adolescence and early adulthood, how the social networks of OAC contribute to health and HIV-risk trajectories remains unknown. **Methods**. Longitudinal social and sexual network data have been collected from a community-representative sample of approximately 2000 OAC from four countries (Cambodia, Ethiopia, Kenya, Tanzania). Roughly equal proportions of the sample live in family- and institution-based settings. In multilevel linear or logistic fixed slope random intercept models, health and wellbeing outcomes (education participation, employment obtainment and sexual risk-taking) are predicted as a function of social network characteristics. Beta coefficients, odds ratios and 95% confidence intervals are reported. **Results**. Mean age at baseline is 14.1 with approximately 57% of respondents being female. A larger proportion of respondents named multiple alters providing educational support (90%) compared with alters providing employment support (9%). Females reported higher HIV risk behaviors than males at baseline. Network size, strength, type of support provided and alter characteristics varied by residential status (family- versus institution-based). **Discussion**. The long-term goal of this research is to identify key intervenable factors that contribute to OAC disadvantage or resilience, in order to construct viable interventions for promoting OAC health and well-being. The social networks of OAC are a likely intervention-point for remediating the early-life disadvantages experienced by these youth.

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PATTERNS AND DETERMINANTS OF UNDIAGNOSED AND UNTREATED CHRONIC MORBIDITY AMONG ADULTS IN THE LOW-MIDDLE INCOME COUNTRIES: EVIDENCES FROM THE SAGE SURVEY WAVE-I, 2007/10. Perianayagam Arokiasamy*, Uttamacharya, Paul Kowal (International Institute for Population Sciences, Mumbai India)

Using data from the WHO-SAGE Wave-1, 2007/10, this paper investigates the patterns and socioeconomic and demographic correlates of undiagnosed and untreated prevalence of selected chronic diseases namely (arthritis, angina, lung disease, asthma, depression and hypertension) in six SAGE countries. For this, we utilise information from SAGE survey on self reports of diagnosis of the diseases, treatment seeking for the diseases and symptom based assessment of the chronic conditions. We shall use logit models to examine correlates of undiagnosed chronic diseases and heckman selection model to examine correlates of untreated morbidity. Results from preliminary analysis show that hypertension had highest undiagnosed prevalence in all the countries (ranging from 16% in India to 48% in South Africa). Analysis further reveals that hypertension and depression were the diseases with highest untreated proportion in all the countries. The untreated proportion for other diseases is also emerged to be considerably high (often more than 50%) in all the countries.

059-S

HIV- AND TUBERCULOSIS-RELATED PERCEIVED STIGMA IN INDIA: URBAN-RURAL DIFFERENCES IN DESIRE TO KEEP INFECTION SECRET. Shivani Patel*, Matthew Magee, Ameeta Kalokhe, Sophia Hussen (Emory University, Atlanta United States)

Background: Human immunodeficiency virus (HIV) and tuberculosis (TB) are endemic in India with established urban-rural differences in both burden and patient outcomes. Infection-related stigma limits use of testing and treatment and thus contributes to prolonged illness and transmission. We examined the association of urban residence with a composite measure of HIV and TB stigma in a nationally representative, community-based sample. **Methods**: We used data from 135,889 adults aged 15-54 interviewed in the Indian National Family Health Survey III (2005-06). Respondents were asked: "If a member of your family got HIV, would you want it to remain a secret from the neighbours?"; this question was separately asked for TB. We used multinomial logistic regression to model the association (odds ratio [OR]) of urban residence with outcomes of wanting to keep hypothetical infections of HIV only, TB only, or both HIV and TB secret. Analyses accounted for survey design, respondent socio-demographics, region, and state-level knowledge of HIV and TB. **Results**: Respondents were 54.0% women, mean age of 29.9 (SD=9.5) years, and 85.9% had secondary education. Prevalence, % (95% confidence interval [CI]) of wanting to keep infection secret was: 63.8 (62.9-64.9) neither HIV or TB; 18.9 (18.6-19.4) HIV only; 3.9 (3.7-4.1) TB only; and 13.4 (12.7-14.0) both HIV and TB. In adjusted models, urban compared to rural residents were more likely to want to keep HIV infection secret (OR=1.26, 95%CI: 1.11-1.44) and both TB and HIV infection secret (OR=1.27, 95%CI: 1.16-1.37), but not TB infection secret (OR=1.00, 95% CI: 0.88-1.12), relative to wanting to keep neither infection secret. **Conclusion**: HIV and TB infection may be more socially stigmatized in urban areas. Further investigation into the causes and consequences of desire to keep HIV and TB infection secret in urban areas may enhance prevention and treatment efforts.

060-S

THE DUAL BURDEN OF UNDERWEIGHT AND OVERWEIGHT IN URBAN AND RURAL INDIA OVER THE LIFECOURSE. Shivani Patel*, KM Venkat Narayan, Solveig Cunningham (Emory University, Atlanta United States)

Background: Although India is known for its high burden of underweight, there is mounting concern about the emergence of overweight as a threat to population health. We examined the burdens of underweight and overweight over the lifecourse and by urbanization in India. **Methods**: Using objective height and weight data from two nationally representative studies (2004-05; 2005-06), we classified 231,545 individuals aged 0-49 years as underweight or overweight-obese (overweight) based on age-specific WHO guidelines. We estimated the prevalence (%) of underweight and overweight and the prevalence ratio (PR) associated with urban residence separately by age (0-4, 8-11, 15-18, 19-29, 30-39, 40-49) and sex using log binomial regression accounting for study design. **Results**: The overall prevalence (95% confidence interval [CI]) of underweight peaked in the early adulthood age group of 19-29 (male: 34.0 [33.0,35.0]; female: 38.3 [37.5,39.1]), while that of overweight peaked in the oldest age group of 40-49 (male: 15.1 [14.1,16.0]; female: 23.7 [22.6,24.7]). Urban compared with rural residence tended to be inversely associated with underweight (PRs ranging from 0.43 to 0.84 [male] and 0.37 to 1.24 [female]; $p<.01$ for all but ages 8-18 years) and positively associated with overweight (PRs ranging from 1.63 to 4.57 [male] and 1.46 to 3.54 [female]; $p<.01$ for all comparisons). Magnitudes of association of urban residence with overweight were larger than those with underweight at all ages. In urban areas, the prevalence of underweight exceeded overweight until age 29, after which overweight surpassed underweight. In contrast, underweight exceeded overweight at all ages in rural areas. **Conclusion**: We find early evidence of an epidemiologic cross-over from underweight to overweight over the lifecourse in urban India. Population health implications in light of ongoing aging and urbanization should be investigated.

061-S

HIV PREVALENCE AND DETERMINANTS AMONG MEN WHO HAVE SEX WITH MEN AND TRANSGENDER WOMEN IN LIMA, PERU. Elena Cyrus*, Javier Lama, Javier Sanchez, Manuel V. Villaran, Frederick Altice (Asociación Civil Impacta Salud y Educación (IMPACTA), Lima, Peru. Yale University School of Medicine, Section of Infectious Diseases, AIDS Program, Lima Peru)

Background: According to 2010 UNAIDS estimates, the prevalence of HIV in the general Peruvian population is 0.4%. Despite that low prevalence in the general population, the prevalence and risk of infection among MSM and TGW is much higher. **Methods**:5148 MSM TGW were recruited in 2011 for a cross-sectional study to assess sexual risk behavior. Three assays were used chronologically to determine the presence of recent infection versus chronic infection among HIV positive individuals – Standard Determine (Third Generation – antibodies only), "Detuned" Determine, and Western Blot, for confirmation. Covariates were analyzed using multivariate logistic regression. **Results**: 387 (7.5%) participants tested HIV positive. Among MSM who self-reported as heterosexual, 1.6% also identified as transgender. Among MSM who did not self-report as heterosexual, 15.4% also identified as transgender. Among non-transgenders and transgenders who were HIV positive, 15.7% of non-transgenders and 17.9% of transgenders had recent HIV infection (RHV). TGW were more likely to have an alcohol use disorder (AUD) (16.5% vs. 19.1%, p=.08) and to have had syphilis in the past 12 months (6.3% vs. 13.1%, p<.001).**Conclusion**s: Our results confirm that MSM and TGW in Peru are at increased risk for HIV transmission. TGW are at greatest risk AUDs, a known determinant associated with increased risk for HIV transmission, and syphilis, a known comorbidity for HIV infection. Peruvian HIV/STD prevention programs should target both groups, with an emphasis on TGW who can potentially account for over 15% of the MSM population.

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COMPARISON OF THE PHQ-2 AND THE EPDS-B AS SCREENING TOOLS FOR DEPRESSIVE SYMPTOMS AMONG POSTPARTUM WOMEN IN BANGLADESH. Jean Y. Ko*, Benjamin Schwartz, Abu Syed Golam Faruque, Aryeh D. Stein, Sherry L. Farr, Sumon K. Das, Ann DiGirolamo, Patricia M. Dietz, Christine Galavotti (Centers for Disease Control and Prevention, Atlanta United States)

Background: The Patient Health Questionnaire-2 (PHQ-2) is a validated postpartum depression screener in the United States, but not in low-income countries. We compared the PHQ-2 to the validated Bangla version of the Edinburgh Postnatal Depression Scale (EPDS-B). **Methods**: At 9-months postpartum, 692 women participating in a prospective community-based cohort study in rural Bangladesh were administered the 2-item PHQ-2 and 10-item EPDS-B. The PHQ-2 asks about frequency of depressed mood and anhedonia over the past two weeks. The EPDS-B asks about severity of mood and feelings from the previous 7 days. Responses for each item on the questionnaires were scored from 0 to 3. A score of ≥10 on the EPDS-B is indicative of depression. Sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) were calculated using the EPDS-B as the referent. **Results**: Postpartum depression prevalence was 11.7% using EPDS-B. Compared to an EPDS-B≥ 10, a PHQ-2 score of ≥ 2 yielded a sensitivity of 91.4%, specificity of 63.3%, PPV of 24.8%, and NPV of 98.2%, while a PHQ-2 score of ≥3 yielded a sensitivity of 27.1%, specificity of 98.7%, PPV of 73.3%, and NPV of 91.1%. **Conclusion**: The PHQ-2 had high sensitivity, identifying 91% of postpartum women in Bangladesh with depressive symptoms, but resulted in a high percentage of false positives, compared with EPDS-B. Women who screen positive with the PHQ-2 should be evaluated more thoroughly by a health professional or with a more specific screener, which may increase feasibility in limited resource settings.

064-S

ASSOCIATION BETWEEN DIABETES AND DIETARY PATTERNS IN TWO URBAN COMMUNITIES OF NEPAL. Archana Shrestha*, Annette Fitzpatrick, Rajendra Koju, Shiva Gautam, Kenneth J Mukamal, Biraj Man Karmacharya, Akina Shrestha, Chandra Yogal (University of Washington, Seattle United States)

Background: The prevalence of diabetes mellitus is increasing in Nepal. The overall dietary pattern may affect health more than individual foods and nutrients. We investigated the association between dietary patterns and diabetes in two communities located in central Nepal. **Methods**: This is a cross sectional study of 200 Nepalese adults (44% males) 30 years of age or older residing in (Kathmandu (urban capital) and Dhulikhel (suburban town 35 km outside of Kathmandu) in 2009. We selected participants through a cluster random sampling method using voter registration lists. Diabetes was defined as a glycated hemoglobin (A1C) value of 6.5% or higher. We collected dietary data via in-person interview using a food frequency questionnaire. Principal component analysis was applied to extract food patterns from 22 foods or food groups. Multivariate logistic regression evaluated the association between the extracted dietary factors and diabetes. Result: Seven components were derived from the PCA explaining 59% of the total variation in food intake: 1) fruit, dairy products, nuts, caffeine, processed food, fats, and sweets; 2) meat and fish; 3) roots, tubers, pulses, and bread/noodles; 4) cereal and vegetables; 5) deep fried foods, 6) green leafy vegetables; and 7) milk. Component 1 was the most dominant food pattern and explained 22% of the total variance. Each of the remaining six components explained from 7.9% (component 2) to 4.6% (component 7) of the total variability in food intake. Component 4 (cereals and vegetables) was inversely associated with diabetes [Odds ratio (OR): 0.50, 95% Confidence interval (CI): 0.26-0.99, p=0.046]; and Component 5 (deep fried food) was positively associated with diabetes [OR: 2.81, 95% CI: 1.31-6.0, p=0.007]. **Conclusion**: The patterns derived in Nepalese adults suggest that cereal and vegetables may be protective and deep fried foods may be risk factors for diabetes.

065-S

A COMPILATION OF NATIONAL HEALTH ACCOUNTS DATA FROM 1996 TO 2010: A REVIEW AND ASSESSMENT OF COUNTRY-GENERATED NHA DATA. Anthony Bui*, Casey Graves, Annie Haakenstad, Michael Hanlon, Elizabeth Johnson, Rouselle Lavado, Joseph Dieleman (Institute for Health Metrics and Evaluation, Seattle United States)

National Health Accounts (NHAs) are tools that have been designed to allow for systematic, comprehensive, and consistent monitoring of resource flows in a country's health system for a given period of time. Given their importance in the process of improving population health, this paper aims to assess the quality of these data. We conducted a comprehensive search for all country-generated NHA data from 1996 to 2010. We compiled the data along four NHA dimensions: financing source, financing agent, health function, and health provider. We synthesized these data and adjusted entries as necessary to align with System of Health Account guidelines. In total, we collected 2,337 country-year tables across 117 countries for this time period. Our analysis of the aggregated data yielded four main findings. First, many countries still do not produce complete NHA data, which affects our ability to make cross-country health systems comparisons. We observe minor scale-up of NHA production even after efforts to institutionalize NHA production in the early 2000s. Second, of countries that do produce NHA data, several aggregate a large proportion of expenditure into the "not specified by kind" value, which is a result of insufficient documentation. Third, when we focus on the composition of health expenditure over time, some countries report implausible distributions. Fourth, when we focus on the levels of health expenditure over time, some countries report unlikely levels of spending. Both of these issues contribute to unusable NHA data. NHA data could be useful to better assess health system performance, but as seen in existing available data, they are often incomplete and of poor quality. Existing NHA data need to be supplemented with modeling and statistical inference. Better country-supported tracking of health expenditure will support better resource allocation.

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RAW MILK CONSUMPTION IN MEXICAN MIGRANT SENDING COMMUNITIES TO THE USA. Lorena Garcia*, Luz Vera Becerra, Marc Schenker (University of California Davis School of Medicine, Davis United States)

Background Raw milk, leche bronca (RM/LB), ingestion in early childhood has been hypothesized to be protective of allergic diseases such as allergies and asthma. However, adverse infections from RM/LB are well described. Mexican immigrants in the US, have a lower prevalence of asthma and allergies compared to US-born Mexican Americans. We hypothesized that ingestion of RM/LB is common in rural farm communities in Guanajuato, Mexico with high migration to the U.S.A. **Methods** We conducted a cross-sectional study to obtain the prevalence, consumption patterns, and views of RM/LB by residents in two indigent rural communities in the state of Guanajuato, Mexico (n=186, response rate= 100%). In a door-to-door survey, one adult per household was selected to report responses to an interviewer-administered questionnaire. Logistic regression models were used to examine the relationship between raw milk consumption and beliefs. **Results** The overall prevalence of raw milk consumption was 89.8%. Cow milk (98.8%) followed by goat milk (14.5%) were the types of LB/RM most often consumed. Participants were older ($\bar{x}$= 47.9), female (89.8%), and had <12 years education (97.3%). A higher proportion of participants who consumed raw milk on a daily basis did so when they were under the age of 5 (20.7%); in contrast, a higher proportion that consumed raw milk less than once a week did so when they were over the age of 16 (13.4%). For consumers of RM/LB, a higher proportion reported benefits including better nutrition (79.9%) and lower cost (74.4%). RM consumption was associated with a higher prevalence of RM benefits (better taste: odds ratio= 3.05; 95% confidence interval: 1.2, 7.8). **Discussion**: We observed a very high prevalence of RM/LB intake among rural Mexican residents. These findings are of global health importance given the lack of research focusing on raw milk intake patterns on both sides of the border.

067-S

DURATION OF PERTUSSIS IMMUNITY FOLLOWING FIVE DOSES OF DTAP: A SYSTEMATIC REVIEW AND META-ANALYSIS. Ashleigh McGirr*, David Fisman (University of Toronto, Toronto Canada)

Introduction: Despite high levels of immunization coverage, pertussis (whooping cough) incidence is increasing in North America, possibly due to the introduction of safer acellular vaccines, which may have decreased durability of immune response. Decreased duration of immunity would have important implications for the design and evaluation of immunization programs. **Objectives**: We sought to evaluate the duration of protective immunity conferred from a childhood immunization series with five doses of DTaP using a systematic literature review and meta-analytic techniques. **Methods**: We searched Medline and Embase databases for articles published before October 10, 2013 to determine the duration of immunity to pertussis after five doses of DTaP. Study quality was assessed and random effects models were used to pool the study specific odds ratios of pertussis for each year after the fifth dose of DTaP. Meta-regression models were fit to the data to evaluate the relationship between the odds of pertussis and time since fifth dose of DTaP and to estimate the probability of vaccine failure through time. **Results**: Six articles were eligible for inclusion in our review, and five of these were included in the meta-analysis. We found that for every additional year after the fifth dose of DTaP, the odds of pertussis increased by 1.37 times (95%CI: 1.21 – 1.54). We estimate that the mean duration of vaccine-induced immunity to pertussis is approximately seven years following the fifth dose of DTaP, although this estimate is sensitive to baseline vaccine efficacy estimates. **Conclusion**s: While acellular pertussis vaccines are associated with fewer adverse events, the adoption of these vaccines may necessitate an earlier adolescent booster vaccination and repeated boosting strategies to achieve the 'herd effects' necessary to control the spread of pertussis.

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EPIDEMIOLOGY OF POLYMICROBIAL INFECTIONS IN METHICILLIN RESISTANT STAPHYLOCOCCUS AUREUS ASSOCIATED ACUTE BACTERIAL SKIN AND SKIN STRUCTURE INFECTIONS. Richard Evans BS*, Carolyn Archer MS, Matthew Compton, Linda Jaber PharmD, Keith Kaye MD MPH, Michael Rybak PharmD MPH, Susan L. Davis PharmD, Emily T. Martin MPH PhD (Eugene Applebaum College of Pharmacy and Health Sciences, Detroit United States)

Background: The co-existence of multiple bacteria in acute bacterial skin and skin structure infections (ABSSSI), particularly methicillin resistant Staphylococcus aureus (MRSA), can drive the emergence of highly-resistant organisms. We sought to determine the prevalence of bacterial co-colonization in MRSA-associated ABSSSIs (defined as isolation of any organism in addition to MRSA within the same culture) and evaluate the predictors and outcomes of these infections. **Methods**: We conducted a retrospective cohort study of inpatients with MRSA-associated ABSSSIs identified through ICD-9 codes from 2008 to 2012 at two large medical systems in Detroit, Michigan. Demographic and clinical data was collected by chart abstraction. Organisms were determined by clinical culture. Multivariate models predicting co-detection used backwards selection with a criterion of $p<0.05$. Based on this model, ABSSSI class, Charlson score and history of chronic wounds were included in all multivariate analyses of outcomes. **Results**: A total of 195 of 582 patients with MRSA (33.5%) had co-colonizing organisms identified. The two most common co-pathogens were Streptococcus sp. (23%) and Enterococcus sp. (17%, 13% with vancomycin resistance). In a multivariate model of predictors of co-colonization, a Charlson score of 3 or higher, ABSSSI class of 3+, and a history of chronic wounds were associated with co-colonization (OR (95%CI): 2.2 (1.5, 3.3), 2.2 (1.4, 3.3), 1.7 (1.1, 2.5), respectively). Diabetes was not independently associated with co-colonization. Intensive care unit admission and thirty-day hospital readmission were higher in the co-colonized group (OR (95%CI): 1.8 (1.1, 3.0), 1.9 (1.2, 2.9), respectively) and average length of stay was 4.7 days longer (95%CI 2.0-7.5 days). **Discussion**: Co-detection of additional pathogens with MRSA was associated with comorbidity, infection severity, and increased hospital utilization.

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ESTIMATING THE PUBLIC HEALTH BENEFIT DUE TO INFLUENZA VACCINATION AMONG PREGNANT WOMEN AND INFANTS AGED LESS THAN 6 MONTHS. Carrie Reed*, Deliana Kostova, Lyn Finelli, Martin I. Meltzer, Carla Black, Denise Jamieson, Joseph Bresee, Marc Alain Widdowson (Centers for Disease Control and Prevention, Atlanta United States)

Increasing evidence suggests influenza vaccination during pregnancy not only provides protection to pregnant women, who have increased risk of influenza complications, but also to the infant during the first few months of life while too young to receive influenza vaccine. To estimate the impact of influenza vaccination on pregnant women and their infants, we adapted a previously published model to estimate the number of influenza-related hospitalizations, ICU admissions and deaths averted by vaccination. Using data from the United States for 2005–2013, we combined estimates of the monthly influenza disease burden and vaccination coverage among pregnant women with annual estimates of vaccine effectiveness (VE) to calculate the expected rate and number of influenza-related health outcomes that would have occurred in an unvaccinated population. Over the 8 years studied, annual influenza vaccine coverage among pregnant women increased from 27% to 41% and estimates of influenza VE of ranged 42–62% by season. We assumed infants born to vaccinated mothers had 52% protection against influenza based on two published studies. Influenza-associated hospitalization rates varied by season, from 3.0 to 43.0 per 100,000 pregnant women, and 13.5 to 60.6 per 100,000 infants. During this period we estimated that influenza vaccination averted 12.6% of influenza-related outcomes among pregnant women, for a total of 5,542 hospitalizations, 382 ICU admissions, and 56 deaths averted. Prenatal vaccination also averted 7.8% of influenza-related outcomes among infants <6 months, for a total of 4,953 hospitalizations, 629 ICU admissions, and 55 deaths averted. Furthermore, if vaccination coverage among pregnant women had reached the target level of 80%, the number of averted outcomes could have been over two times higher for pregnant women and nearly three times higher for infants. Influenza vaccination provides direct benefits to pregnant women, but when also considering the secondary benefits to their children for the first 6 months, the impact is even greater.

070-S

RISK FACTORS ASSOCIATED WITH LA CROSSE ENCEPHALITIS IN WESTERN NORTH CAROLINA, 2010-2012. John Wallace*, Steven Meshnick, Sheri Denslow, Carl Williams (UNC Gillings School of Global Public Health, Chapel Hill United States)

La Crosse encephalitis (LACE) is the most prevalent mosquito-borne illness in North Carolina (NC), with 7 mountain counties in southwestern NC accounting for over 90% of all cases in NC since 2000. The annual incidence of LACE in NC accounted for 25% of all LACE cases reported to the Centers for Disease Control and Prevention (CDC) from 2008-2012. La Crosse virus is commonly found in rural, wooded areas, where peridomestic environments are conducive to exposure to the primary vector, Aedes triseriatus, but few epidemiologic studies have quantified the association between peridomestic habitat and LACE. A cohort of 501 patients tested for LACE at Mission Hospital in Asheville, NC from 2010-2012 was used to assess the association between LACE and peridomestic and demographic risk factors. Medical charts were reviewed to collect demographics including age, race, gender, and geocoded patient address was used to assess peridomestic risk factors including home type, rural residence, land cover classification around the residence, and number of objects around the home. Log-binomial regression was used to generate risk ratios (RR) and 95% confidence intervals (CI) to quantify the association between LACE and potential risk factors while controlling for effect measure modification and confounding variables. A preliminary analysis of this cohort identified 58 confirmed or probable cases of LACE from 409 patients with successfully geocoded addresses. Controlling for confounding by age, the risk of LACE among those living in forested areas was almost twice the risk of those living in non-forest areas (RR=1.97; 95% CI: 1.12, 3.24), and the risk of LACE was 0.68 times higher for those living in rural versus urban residences (RR=1.68; 95% CI: 1.02, 2.76). The final analysis of these data will be conducted upon the release of the 2011 National Land Cover Dataset in March, 2014.

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SPATIOTEMPORAL PATTERNS OF CUTANEOUS ANTHRAX IN CHINA, 2005–2012. Hailong Sun*, Wenyi Zhang, Liya Wang, Fan Ding (People's Liberation Army Institute of Disease Control and Prevention, Beijing China)

Objective: The aim of the study is to identify nationwide epidemic characteristics and spatiotemporal pattern of cutaneous anthrax (CA) in mainland China during 2005-2012. Specific objectives of the study are to quantify the temporal variation in incidence of CA human cases, to detect high risk spatiotemporal clusters of CA and to provide evidence based preventive suggestions to relevant stakeholders. **Methods**: Human CA cases at the county level in mainland China during 2005-2012 were used to detect and evaluate local high risk spatiotemporal clusters by using spatial scan statistics. We fitted a discrete Poisson Model and used a maximum temporal cluster size of 50% of the study period in the temporal window and the maximum spatial cluster size of 50% of the population at risk in the spatial window by SaTScan. **Results**: Primary cluster with relative risk (RR) of 798 during June 2006-May 2010 covered 19 counties on the border area of three provinces (Sichuan, Gansu, and Qinghai), including the top three counties of reported cases: Zoigee County, Maqu County, and Hongyuan County. Three significant secondary clusters were found in Northeast China with RR of 18, 1007, and 211, during May 2010-October 2012, August 2010, July and August 2011, respectively. Other secondary cluster was found in Yunnan Province with RR of 150 during April 2005- November 2007. **Conclusion**: Our findings will be essential to help inform optimal geographical allocation of the limited resources available for CA prevention and control in China, and increase the effectiveness of public health interventions against CA transmission.

072-S

CHARACTERISTICS OF UNPASTEURIZED (RAW) MILK CONSUMERS. Michael Bazaco*, Cary Chen Parker, Amy Lando, Beverly Wolpert (United States Food and Drug Administration, College Park United States)

Unpasteurized (raw) milk consumption persists in the US despite evidence that risks outweigh benefits. To learn about consumers who reported drinking vs. not drinking raw milk in the past year, we analyzed data from the nationally representative 2010 Food Safety Survey (FSS), which tracks food safety attitudes and behaviors among >18-year-old US residents with landline phones. There were 197 respondents who indicated drinking raw milk in the past year and 4369 who indicated not drinking raw milk in the past year. More drinkers vs. nondrinkers were male (62.8%, $p<0.0001$); they were also younger overall and by sex (all: mean 43.6 vs. 51.9 y, $p<0.0001$; female: mean 40.9 vs. 52.6 y, $p<0.0001$; male: 45.2 vs. 51.2 y, $p=0.007$). Race/ethnicity, education, and working status differed overall (each $p<0.0001$), with more raw milk drinkers self-identifying as white (77.9% vs. 69.3%) or as Hispanic/Latino (12.7% vs. 8.6%); more high school non-graduates (25.4% vs. 13.4%) noting past year raw milk intake; and fewer raw milk drinkers vs. nondrinkers citing full-time work (36.7% vs. 42.9%) or not working/ retired (17.3% vs. 35.1%). More raw milk drinkers vs. nondrinkers indicated they thought that organic (42.0% vs. 30.3%, $p=0.0007$) or locally grown (55.3% vs. 44.6%, $p=0.003$) foods are less likely to be contaminated and that microbial contamination is not a food safety issue (15.9% vs. 8.8%, $p<0.0001$). Raw milk drinkers vs. nondrinkers were less likely to report that they thought food from a grocery store are safe (57.5% vs. 67.1%, $p=0.006$), yet more likely to indicate that they believed manufacturers are doing enough to make food safe (58.2% vs. 39.1%, $p<0.0001$). In preliminary logistic regression modeling, age, sex, race/ethnicity, and thinking that locally grown foods are less likely to be contaminated or that manufacturers are doing enough to keep food safe were significant ($p<0.0001$ to 0.04).

073

USING VIDEO ANALYSIS TO DESCRIBE SOCIAL MIXING AND INFECTIOUS DISEASE TRANSMISSION AT LARGE MASS GATHERINGS – A PROOF-OF-PRINCIPLE PROJECT. Jeanette J. Rainey*, Anil Cheriyadat, Richard J. Radke, Julie Suzuki Crumly, Dan Koch (Center for Disease Control and Prevention, Atlanta United States)

Mass gatherings create environments conducive for the transmission of acute respiratory infectious diseases, due to spatial and temporal congregation of infectious and susceptible individuals. Prior approaches for estimating social mixing patterns and disease transmission at mass gatherings have been limited by various constraints. We collected and analyzed video data from the GameFest 2013 event at Rensselaer Polytechnic Institute (RPI) in Troy, New York. We used a tracking system to identify unique contacts through the automated analysis of the RPI video data. We estimated the number and duration of contacts for a single randomly selected subject during a 3-minute video clip. The subject was considered to have a unique contact if the distance between the subject and another person was less than or equal to one meter. A computer simulation was developed to visualize possible social mixing patterns at a mass gathering. The selected subject had contact with three different persons during the 3-minute video clip, although contact with these persons was not continuous. The total duration of contact with these persons ranged from 28 to 64 seconds. We developed a proof-of-principle system to demonstrate the use of automated video analysis for estimating contact parameters at mass gatherings. The next phase will involve extending and scaling the system for automated analysis of hour -long videos with minimal user input. Generated parameters will then be used to improve computer simulations of infectious disease transmission at a mass gathering, with the goal of identifying effective prevention and control strategies.

074

A SYSTEMATIC REVIEW AND META-ANALYSIS OF THE ASSOCIATION BETWEEN DIABETES MELLITUS AND SURGICAL SITE INFECTIONS. Emily Martin*, Caitlin Knott, Huong Nguyen, Maressa Santarossa, Keith Kaye, Linda Jaber (Wayne State University, Detroit United States)

Introduction - Diabetes mellitus is frequently hypothesized to be a risk factor for surgical site infection (SSI) in adults; however individual studies have reported inconsistent findings for this association. Our objective was to conduct a systematic review and meta-analysis of the association between pre-existing diabetes mellitus and SSI and to examine the impact of surgery type and population characteristics on these estimates. **Methods** - We conducted a literature search of relevant articles published from December 1985 through April 2013. Articles were reviewed for eligibility and crude and adjusted effect estimates were abstracted. Summary estimates and predictive intervals were calculated by random-effects meta-analysis. Individual meta-regression analyses assessed the impact of the following factors: surgery type, study type, inclusion of body mass index in the adjusted estimate and population diabetes prevalence. **Results** - Our initial search terms yielded 2,371 articles, and 59 articles were identified as eligible for inclusion. Crude odds ratio (OR) estimates for diabetes and SSI were available from 43 studies and adjusted estimates were available from 18. The overall OR summarized from crude estimates was 1.79 (95% predictive interval: 0.98, 3.25). The overall OR from adjusted estimates was 2.10 (95% predictive interval: 1.12, 3.93). The overall crude estimate varied by surgery type (Colorectal: OR=0.99 (95% predictive interval: 0.34, 2.88); Breast: OR=2.14 (95% predictive interval 1.02, 4.50); Cardiac: OR=2.47 (95% predictive interval: 1.99, 3.07)). No study or population characteristics, including surgery type, significantly impacted the overall estimates in meta-regression analyses. **Conclusion** - Our meta-analysis demonstrated an increase in surgical site infections among diabetic patients. Improved surgical infection prevention strategies are needed for this population.

078-S

MORTALITY AND PRODUCTIVITY LOSSES FROM TOXOPLASMOSIS IN THE UNITED STATES, 2000-2010. Patricia Cummings*, Tony Kuo, MD, MSHS, Marjan Javanbakht, MPH, PhD, Lawrence Ash, PhD, Frank Sorvillo, PhD (Los Angeles County Department of Public Health, Los Angeles)

Toxoplasma gondii is a well-known parasitic infection associated with HIV, but its status as the second most common foodborne illness is often overlooked. Few studies have quantified toxoplasmosis mortality burden in the United States. We examined national multiple cause-of-death data and estimated lost productivity from this disease for the period 2000-2010. Crude and age-standardized rates of toxoplasmosis-related mortality were computed for sex, race, year, and state of residence. A matched case-control analysis was conducted to examine associations between comorbid conditions and toxoplasmosis deaths. Productivity losses due to premature death were calculated using the human capital approach which estimated the present value of lifetime productivity. A total of 789 toxoplasmosis deaths were identified as either an underlying or associated cause of death during the study period. The average annual age-adjusted mortality rate was 0.03 per 100,000 population. Poisson trend analysis showed an annual percent change of -11.7% ($p<0.0001$) over the study period. Blacks and Hispanics had the highest burden of toxoplasmosis-related mortality as compared to whites, with an age-adjusted rate ratio of 8.3 (95% Confidence Interval [CI], 7.3-9.4) and 3.5 (95% CI, 3.1-4.0), respectively. The age-adjusted rate for toxoplasmosis death in males was twice that of females. For the matched case-control analysis, several comorbid conditions were associated with toxoplasmosis deaths, including HIV (OR=27.7; 95% CI, 21.8-35.4), Hodgkin/Non-Hodgkin lymphomas (Odds Ratio [OR]=5.9; 95% CI, 4.0-8.7), leukemia (OR=3.1; 95% CI, 1.95-4.85), and connective tissue disorders (OR=4.4; 95% CI, 2.7-7.2). The total productivity losses were $814.5 million during the 10-year period. Although trends for this infection have declined in the last decade, toxoplasmosis remains an important cause of preventable death among several subgroups.

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PERSISTENCE OF MENINGOCOCCAL SEROGROUP A AND TETANUS IMMUNITY FOLLOWING THE INTRODUCTION OF MENAFRIVAC VACCINE IN MALI. Nicole Basta*, Sophia Ng, Abdoulaye Berthe, Xilian Bai, Helen Findlow, Rachael Almond, Ray Borrow, Samba Sow (Princeton University, Princeton United States)

Devastating meningitis outbreaks caused primarily by *Neisseria meningitidis* occur annually in the African meningitis belt. In 2010, Africa's first preventative meningococcal mass-vaccination campaign was launched using a new conjugate meningococcal serogroup A (NmA) vaccine (MenAfriVac). While immunogenicity trials indicate that immunity persists for at least a year and that tetanus immunity is boosted because tetanus toxoid is the carrier protein, questions remain about long-term antibody persistence. We implemented a longitudinal, household-based age-stratified seroprevalence study in Bamako, Mali, in 2012 with follow-up planned through 2016. Randomly selected participants (n=800) were eligible if they were 1-29 years (targeted for vaccination) during the 2010 campaign. Sera were analyzed to determine NmA-specific serum bactericidal antibody (rSBA) titers, NmA-specific IgG, and anti-tetanus toxoid IgG. The relationship between several individual factors and immunity was assessed. Data were analyzed with STATA 12.1. Nearly all participants (99.0%) had NmA-specific SBA titers ≥8, the standard protective threshold; 97.8% had titers ≥128; 89.5% had titers ≥1024. SBA geometric mean titers were higher in females than males 18 years or younger at vaccination. IgG levels ≥2 µg/mL were observed in 88.5% of participants. Surprisingly, 41.5% of participants had anti-tetanus IgG levels <1.0 IU/mL, indicating no long-term protection against tetanus. Twelve percent had anti-tetanus IgG levels <0.1 IU/mL, indicating no protection. Two years after the MenAfrivac introduction, immunity against NmA persists in Mali. However, there is a lack of evidence that the vaccine has boosted tetanus immunity, which may be due to limited exposure to primary tetanus vaccination in this setting. Our results highlight the need to go beyond clinical trials and assess long-term vaccine effectiveness in representative populations.

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A RANDOMISED FACTORIAL DESIGN TO ASSESS THE EFFECT OF SURVEY MODE AND QUESTION WORDING ON MEASURING FAMILY HARMONY: EVIDENCE FROM THE FAMILY COHORT. Michael Y. Ni*, Nick Ng, Herbert Pang, Brandford HY Chan, Paul H. Lee, C. Mary Schooling, Tai Hing Lam, Ian McDowell, Gabriel M. Leung (School of Public Health, The University of Hong Kong, Hong Kong Hong Kong)

Introduction: The face-to-face interview is often regarded as the gold standard in survey administration, however this may not apply to the assessment of sensitive topics such as family relationships. We therefore examined how survey mode and question wording affected responses to a family harmony scale. **Methods**: Sampling of the FAMILY Cohort was based on randomly selected households, with Wave 1 completed in 2009-2011 and Wave 2 in 2011-2013. The Family Harmony Scale (FHS) consists of 5 items scored on a five-point scale (total score 5-25). A randomised factorial design allocated 1,032 participants aged 15-59 years in Wave 2 to i) administration of the FHS using face-to-face interview ('interview') vs. self-administered questionnaire (SAQ) and ii) wording the 5 FHS items positively ('all-positive') vs. 3 FHS items worded positively and 2 items negatively ('positive-negative'). Independent samples t-test and multivariable linear regression were used to compare FHS means between groups and to assess if group assignment affected associations of FHS with the Subjective Happiness Scale and Family Conflict Index. **Results**: The interview groups (all-positive n=240, positive-negative n=257) had a response rate of 100% and no missing data. The SAQ groups (all-positive n=274, positive-negative n=261) had a mean response rate of 93.6%, 8.4% of whom had missing data. The mean family harmony score for the positive-negative SAQ group was lowest at 19.3 (95% confidence interval (CI) 19.0 to 19.6), followed by the positive-negative interview, all-positive SAQ and the all-positive interview at 20.0 (95% CI 19.8 to 20.3), 20.0 (95% CI 19.7 to 20.3) and 20.2 (95% CI 19.9 to 20.4) respectively. Variances in the SAQ groups were significantly larger ($p<0.001$) than the interview groups. However, the associations of family harmony with the Subjective Happiness Scale and the Family Conflict Index did not differ by group (p-values for interaction >0.05). **Conclusion**s: The main impact was a reduction in harmony scores for the positive-negative SAQ group. However, this slight reduction in mean score did not affect the association of family harmony with related attributes. This suggests that different survey modes and question wordings likely generated similar rankings of family harmony.

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SEVERITY OF PSYCHOLOGICAL DISTRESS AMONG ADULTS WITH AND WITHOUT DISABILITIES. Catherine Okoro*, Satvinder Dhingra (Centers for Disease Control and Prevention, Atlanta United States)

Objective: The aim of this study is to examine psychological distress and its individual symptoms between adults with and without disabilities, and to examine whether an association exists between severity of distress and health-related factors. **Methods**: Cross-sectional data from the 2007 Behavioral Risk Factor Surveillance System were used for this study. Severity of psychological distress was assessed using the Kessler 6 scale of nonspecific psychological distress. Adults with self-reported disabilities were identified using two standardized questions—one relating to activity limitation, the other to special equipment. Logistic regression analyses were performed to estimate predicted marginals and prevalence ratios. **Results**: Nine percent of adults had mild to moderate psychological distress and 3.9% had serious psychological distress. The adjusted mean Kessler 6 total scores and individual item scores were significantly higher for adults with disabilities, as was the average number of days that a mental health condition interfered with activities in the past 30 days. Among adults with disabilities, mild to moderate and serious psychological distress were particularly high among those who were unemployed or unable to work. Those who had either mild to moderate or serious psychological distress were significantly more likely than those with no psychological distress to be physically inactive, to smoke, and to report fair or poor health, life dissatisfaction, and inadequate social support. **Conclusion**: A dose-response relationship exists between categorical severity of psychological distress and examined health-related factors. These findings may inform the design of targeted public health strategies that aim to eliminate health disparities between people with and without disabilities.

082-S

THE LONGITUDINAL EFFECTS OF NEIGHBORHOOD SOCIAL AND MATERIAL DEPRIVATION CHANGE ON PSYCHOLOGICAL DISTRESS IN URBAN, COMMUNITY-DWELLING CANADIAN ADULTS. Alexandra Blair*, Geneviève Gariepy, Norbert Schmitz (Douglas Hospital University Research Centre/McGill University, Montreal Canada)

Objective: Neighborhoods have rarely been examined as time-varying spaces of ecological exposure. The objective of this study is to examine how changes in neighborhood material and social deprivation affect distress outcomes in adult Canadians. **Methods**: This study examines 2745 participants from Canada's National Population Health Survey, all of whom are urban-, community-dwelling adult Canadians (aged 18 and above at baseline in 2000) who did not move between baseline and follow-up in 2006. Psychological distress was measured at baseline and follow-up using the K6 screening tool. Changes in neighborhood social and material deprivation were measured using the census-based Pampalon Deprivation Index. Associations were analyzed using multivariate linear regressions, controlling for key demographic characteristics, and stratified by baseline deprivation exposure. **Results**: At baseline, most participants lived in neighborhoods with low levels of social deprivation, and nearly half of the sample lived in highly materially deprived neighborhoods. In most neighborhoods, the level of social and material deprivation was maintained through time. Adjusting for individual characteristics, an improvement of social and material settings was associated with an increase in distress scores at follow-up. This association remained positive after controlling for baseline distress scores, but the confidence intervals shifted slightly to cross the null. **Conclusion**: This study suggests that an improvement in neighborhood deprivation, when unplanned and caused by systematically occurring shifts in economic and social environments (i.e. urban gentrification), is associated with worsening psychological distress outcomes. This finding is relevant for urban municipalities, as well as future public health policy. The psychological effects of gentrification should be explored in more detail in future research.

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CURRENT DEPRESSION AMONG ADULT CANCER SURVIVORS: FINDINGS FROM THE 2010 BEHAVIORAL RISK FACTOR SURVEILLANCE SYSTEM. Guixiang Zhao*, Catharine Okoro, Jun Li, Arica White, Satvinder Dhingra, Chaoyang Li (Centers for Disease Control and Prevention, Atlanta United States)

Objective: To examine the prevalence of current depression and the risk factors associated with a high burden of depression among cancer survivors in the U.S. **Methods**: We analyzed data from 3,550 cancer survivors (aged ≥18 years) and 26,917 adults without cancer who participated in the 2010 Behavioral Risk Factor Surveillance System survey with both the Cancer Survivorship Module and the Anxiety and Depression Module. Depressive symptoms were assessed by the Patient Health Questionnaire-8 diagnostic algorithm. Participants with a total depression severity score of ≥10 were defined as having current depression. Prevalence and prevalence ratios were estimated by conducting log-linear regression analysis while controlling for potential confounders. **Results**: Overall, 13.7% of cancer survivors (vs. 8.9% of adults without cancer, P<0.001) reported having current depression; the prevalence varied significantly by category of cancer (ranged from 5.8% among male reproductive cancer survivors to 26.4% among female reproductive cancer survivors). Among cancer survivors, after multivariate-adjustment for covariates, cancer diagnosis within a year, being in 'other' racial/ethnic group, divorced/separated/widowed or never married, current or former smoker, or having histories of diabetes, disability, or depression were associated with significantly higher prevalence ratios for current depression; whereas being at an advanced age (≥60 years old), attaining educational levels of >high school graduate, or engaging in leisure-time physical activity were associated with significantly lower prevalence ratios for current depression. **Conclusion**: Our results indicate that cancer survivors are at increased risk for current depression. Targeting cancer survivors at high risk for depressive issues may be especially important for clinical support and interventions aimed at improving mental well-being.

084-S

DAYS OUT OF ROLE DUE TO MENTAL AND PHYSICAL ILLNESS IN THE SOUTH AFRICAN STRESS AND HEALTH STUDY. Sumaya Mall*, Crick Lund, Gemma Vilagut, Jordi Alonso, David Williams, Dan Stein (University of Cape Town/Mailman School of Public Health, New York South Africa)

Both mental and physical disorders can result in role limitation, such as 'days out of role', which have an important impact on national productivity losses. This paper analyses data from the South African Stress and Health Study (SASH) on the association of both mental and physical disorders with days out of role. Face to face interviews were conducted with a representative sample of 4,351 adult South Africans. The World Health Organization's Composite International Diagnostic Interview (WHO-CIDI) was used to assess the presence of 11 mental and physical disorders. Multiple regression techniques were used to explore associations between individual disorders, comorbid conditions, and annual days spent out of role. The estimated societal effects of the disorders (population attributable risk proportion (PARP)) were obtained. The majority of respondents who reported a mental or physical disorder also reported another disorder (62.98%) and the average number of disorders reported by respondents reporting at least one disorder was 2.3. 12.4% of respondents reported any days out of role due to mental or physical disorder. Anxiety disorders and depression were associated with highest days out of role (28.2 and 27.2 respectively) followed closely by arthritis and pain (24.7 and 21.7 respectively). Any mental disorder was associated with 23.6 days out of role, while any physical disorder was associated with 15.5 days out of role. Of the mental disorders, anxiety disorders had the highest PARP in relation to days out of role (9.0%) followed by depression (4.8%) and substance disorder (3.3.%). 37.6% days out of role are attributable to physical disorders and 16.1% to mental disorders. Both mental and physical disorders are associated with substantial days out of role in South Africa, and comorbidity is the norm among those with disorders. This indicates the substantial social and economic loss associated with these conditions, the need to integrate health services to treat comorbid conditions and to include mental health in all basic packages of care.

085

RESIDENTIAL TRANSIENCE, MAJOR DEPRESSION, AND THE UNMET NEED FOR TREATMENT. Cristie Glasheen*, Valerie Hoffman (RTI International, Research Triangle Park United States)

Residential transience (frequent moving) is a component of housing instability, which has been linked to mental illness and poor access to treatment. However, most studies have focused on homelessness as the housing instability construct. These analyses examine whether residential transience is also associated with major depressive episodes (MDE) and unmet need for mental health treatment among a nationally representative sample of community dwelling adults. Data are from adults surveyed in the 2008 - 2011 National Surveys on Drug Use and Health. Primary measures include: past year residential transience (moving 3 or more times), past year MDE, and having an unmet need for mental health treatment in the past year. Weighted analyses involve two-tailed comparisons of prevalence estimates and adjusted logistic regression analyses. Approximately 6.76% of adults with MDE reported residential transience whereas 6.5% of adults without MDE had residential transience ($p<.001$). MDE was associated with double the odds of residential transience in adjusted analyses (adjusted odds ratio (aOR) =2.12, 95% confidence interval (CI): 1.86 – 2.42). Among adults with MDE, having residential transience was associated with double the odds of unmet need for treatment (aOR=2.06, 95% CI: 1.83 – 2.32). Residential transience, while frequently overlooked, is associated with MDE and, among those with MDE, an unmet need for r care. Clinicians should be aware of the increased risk for MDE as they may be able to assist patients in addressing housing stability. Similarly, persons engaging services to assist persons with housing stability may benefit from programs that consider the increased risk of MDE and assisting them to obtain mental health treatment. Further research is needed to examine the temporality of transience and mental illness and the mechanisms that act as barriers to care in this population.

086-S

THE ASSOCIATION OF STRESSFUL LIFE EVENTS WITH ANTIRETROVIRAL ADHERENCE, ACCOUNTING FOR TIME-VARYING CONFOUNDING BY DEPRESSIVE SEVERITY. Julie K. O'Donnell*, Brian W. Pence, Stephen R. Cole, Andrew Edmonds, Nathan Thielman, Riddhi Modi, Quinn Williams, Bradley N. Gaynes (University of North Carolina - Chapel Hill, Chapel Hill United States)

Stressful life events (SLEs) are common among HIV-infected individuals and may affect behaviors such as adherence to antiretroviral (ARV) therapy, with important implications for virologic control and HIV-related outcomes. We examined the association between SLEs and ARV adherence among 289 US-based participants enrolled between 7/1/2010 and 9/1/2013 in the SLAM DUNC study, which tests the effect of evidence-based decision support for depression treatment on ARV adherence. Participants received monthly telephone calls to assess incident SLEs and pill count-based ARV adherence for up to 12 months. We counted each participant's total number of SLEs (out of 46) experienced in the previous month; adherence was measured as the percent of expected pills taken in that same month. The association between SLEs and adherence was modeled using marginal structural linear regression adjusted for clustering by participant. Inverse density weights to address time-varying confounding of the SLE-adherence relationship by depressive symptom severity and inverse probability weights to address missing data were combined and applied to the models. Participants were mostly male (71%) and black (63%), with a median age of 45 years (interquartile range (IQR): 38-51). They experienced a mean of 2.3 SLEs (range: 0-15) in the previous month and median monthly adherence was 96% (IQR: 85-100%). The presence of any SLE was associated with a mean % change in adherence of -8% (95% CI: -14%, -2%). For each additional SLE, the mean % change in adherence was -1% (95% CI: -2%, -0.2%). When limited to the most severe SLEs, the presence of any SLE was associated with a mean % change in adherence of -4% (95% CI: -7%, -0.2%); each additional severe SLE resulted in a mean % change in adherence of -3% (-6%, -0.3%). SLEs were associated with poorer ARV adherence, and the strength of the association increased with increasing SLE severity.

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RETHINKING MENTAL DISTRESS MEASURES USING THE BEHAVIORAL RISK FACTOR SURVEILLANCE SYSTEM. Tammie Johnson*, McDowell Sara, William Boyer, James Churilla (University of North Florida, Jacksonville United States)

Background: Frequent mental distress (FMD) is a dichotomous variable constructed using a core question (CQ) from the Behavioral Risk Factor Surveillance System (BRFSS) instrument. The question ascertains how many of the past 30 days a respondent considers his/her "mental health not good." This question has been part of the CQ portion of the survey since 1993. FMD is defined as reporting 14 or more days of mental distress (MD). The BRFSS has an optional "Anxiety and Depression" (AD) module that uses 8 questions to elicit MD-related information. Data from the 8 questions have been used to construct a five-level MD index of severity (ADMDI). Using a dichotomous construct of MD negates the ability to examine MD and related outcomes across a spectrum of severity. In addition, the AD module is optional and used sporadically by states. The purpose of this study is to construct a five-level MD severity index variable using responses from the single BRFSS core MD question (CQMDI) and validate it against the ADMDI variable. **Methods**: The most recent year of BRFSS data with widespread use of the AD module (36 states/territories) was 2006. In total, there were 170,814 participants with valid responses to all of the variables used for this study. The ADMDI variable was constructed in a manner consistent with the methods used in peer-reviewed literature. The CQMDI was constructed by finding AD-analogous cut points from the single core question. **Results**: The CQMDI variable was tested for reliability against the ADMDI variable and the eight questions in the AD module. The CQMDI variable was found to have acceptable reliability in each comparison (all Cronbach alpha values >=0.70). **Conclusion**: The CQMDI variable has acceptable reliability compared to the ADMDI variable. Using the CQMDI variable enables more frequent and more detailed examinations of health outcomes related to MD using BRFSS data.

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MENTAL HEALTH PROBLEMS AMONG MALES WITH DUCHENNE/BECKER MUSCULAR DYSTROPHIES USING POPULATION-BASED SURVEILLANCE DATA FROM THE MUSCULAR DYSTROPHY SURVEILLANCE, TRACKING, AND RESEARCH NETWORK (MD STARNET). Kristin Caspers Conway*, Katherine Mathews, Pangaja Paramsothy, Joyce Oleszek, Christina Trout, Paul Romitti (University of Iowa, Iowa City United States)

Aim: To describe the occurrence of mental health problems among males with Duchenne/Becker muscular dystrophies and to explore associations with use of steroids and mobility devices. **Methods**: We utilized population-based surveillance data from five sites (Arizona, Colorado, Georgia, Iowa and western New York) participating in the MD STARnet. Medical records for 765 oldest affected males, born since 1981 and followed through 2011, from each family were reviewed to identify reports of mental health problems. Age of onset of attention deficit hyperactivity disorder (ADHD), behavior problems (defiant/aggressive behaviors), and depressive mood were analyzed using Kaplan-Meier curves; associations with indicators of disease progression (use of steroids or mobility device) were analyzed using Cox regression with time-dependent covariates. **Results**: Of the 765 males, 378 (51%) had at least one recorded mental health problem. Kaplan Meier curve analyses, based on survival up to age 29, showed documentation of ADHD for 23%, of behavior problems for 43%, and of depressive mood for 51% of males. Both steroid (HR=2.4, 95%CI=1.8,3.2) and mobility device (HR=1.5, 95%CI=1.1,2.2) use were associated with behavior problems. Mobility device use (HR=3.5, 95%CI=2.1,5.9), but not steroid use, was associated with depressive mood. ADHD was not associated with steroid or mobility device use. **Conclusion**s: Mental health problems were common among males with Duchenne/Becker muscular dystrophies. Selected indicators of disease progression (use of steroids or a mobility device) were associated with behavior problems and depressive mood; increased monitoring and treatment of mental health problems may benefit males with Duchenne/Becker muscular dystrophies as disease progresses.

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ONSET AND PREVALENCE OF PSYCHIATRIC DISORDERS IN A REPRESENTATIVE SAMPLE OF ARMY NATIONAL GUARD SOLDIERS. David Fink*, Marijo Tamburrino, Joseph Calabrese, Philip Chan, Gregory Cohen, Israel Liberzon, Sandro Galea (Columbia University, Department of Epidemiology, Mailman School of Public Health, New York United States)

In the first two years of U.S. military service, mental disorders are the leading cause of hospitalizations and discharge among soldiers. While the evidence suggests that pre-existing disorders may contribute to the military's mental health burden, extant research has focused on deployment and combat exposures as drivers of psychological distress with little consideration of life-course mental health burden. This is likely in part due to the absence of credible estimates of the prevalence of pre-military mental disorders and age-of-onset distributions in military populations. This study examined the lifetime prevalence and age-of-onset of mental disorders in 677 Ohio National Guard study participants using clinical assessments by gold-standard Structured Clinical Interview for DSM-IV (SCID) and Clinician Administered PTSD Scale (CAPS). Retrospective age-of-onset was assessed as part of the interview, using methods shown to be reliable in comparable assessments (e.g., Farrer et al., 1989). The majority of participants with several of the assessed mental diagnoses reported disorders initiated prior to military service, including: specific and social phobias (86% and 95%), drug abuse/dependence (84%), obsessive-compulsive disorder (OCD; 73%), post-traumatic stress disorder (61%), and bipolar I/II disorders (52%). 64% of disorders started before military service (Range: 28-95%). Median age-of-onset varied with anxiety disorders-particularly phobias and OCD-having the earliest (median = 15 years) and mood disorders had the latest median age-of-onset (median = 21 years). The observation that disorders diagnosed while in the military frequently existed prior to service suggests that future studies assessing military mental health should assess lifetime psychiatric morbidity to improve accuracy and validity of mental health predictors within this population.

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EXAMINING THE EFFECT OF PARENTAL INCARCERATION ON CHILDREN'S MENTAL HEALTH IN THE UNITED STATES. Erika Braithwaite*, Arijit Nandi (McGill University, Montreal Canada)

In the US, the number of incarcerated adults has increased exponentially in the past 40 years, from roughly 100 per 100,000 adults in the 1970's to over 700 per 100,000 adults by 2010. Over 80% of incarcerated individuals are parents of minors and emerging evidence suggests that parental incarceration is harmful to their mental health, particularly for girls. Our goal was to examine the effect of parental incarceration on the mental health of adolescents as they transition into adulthood. The NLSY 1997 is comprised of 8,984 young men and women aged 12 to 18. Adolescents were considered exposed if they reported having an incarcerated parent before age 21. Mental health, measured using a 5-item scale, was collected biennially from 2000-2010. We estimated the propensity of having an incarcerated parent, conditional on potential confounders (age, gender, race, household income, parental education, and family structure) and used nearest-neighbour matching to achieve balanced distributions of covariates. The effect of parental incarceration on children's mental health in the matched sample was estimated by linear regression, fitted using generalized estimating equations. After accounting for baseline confounders, there was no effect of parental incarceration on mental health [beta coefficient = - 0.88, 95% confidence interval (CI) -1.18, 0.05]. Women reported fewer mental health problems than men (beta coefficient = -0.81, 95% CI -1.14, 0.48). However, adverse effect of incarceration on mental health was greater for women compared to men (beta coefficient 0.88 95% CI 0.07,1.70). This study adds to a growing body of literature about the intergeneration consequences of incarceration. In congruence with findings from previous research with younger samples, these results suggest that parental incarceration has a lasting negative impact on women that continues into adulthood.

091

PREDICTORS OF DEPRESSIVE DISORDERS AND POOR HEALTH IN ADULTS: THE ROLE OF ADVERSE CHILDHOOD EXPERIENCES. Megan Quinn*, Jill Stinson (East Tennessee State University College of Public Health, Johnson City United States)

Adverse Childhood Experiences (ACEs) such as exposure to abuse, dysfunction, and neglect have been shown to affect adult health outcomes. The Behavioral Risk Factor Surveillance System (BRFSS) captures national data on risk factors and chronic disease and first included ACE items in 2009. The purpose of this study was to determine whether specific ACEs predicted depressive disorders or poor general health in adulthood. ACEs included: living with someone who suffered from a mental illness, and primary exposure (physical abuse) and secondary exposure (interpersonal violence in home) to violence. BRFSS data from 2009-2012 were included. Analyses were performed using SPSS and SAS. Descriptive statistics were completed for ACEs, race, gender, history of depressive disorder (DD), and general health status (GH). Logistic regression analyses were conducted to predict DD and GH, controlling for race, gender, and age. Odds ratios (OR) and 95% confidence intervals (CI) were reported. A total of 1,148 individuals were including in the analyses, with 31.4% having DD, 26.9% reported poor GH, 27.4% lived with someone who had a mental illness, 31.3% exposed to primary violence, and 30.2% exposed to secondary violence. Individuals who lived with someone who suffered from a mental illness were three times more likely to have DD (OR 3.28, CI 2.40-4.47) compared to those who did not, however, this exposure did not significantly affect GH. Those exposed to primary violence were 40% more likely to have DD (OR 1.40, CI 1.02-1.92) and were two times more likely to report poor GH (OR 2.09, CI 1.51-2.89) compared to those not exposed. Individuals exposed to secondary violence were 70% more likely to have DD (OR 1.70, CI 1.24-2.32) and were 48% more likely to report poor GH (OR 1.48, CO 1.06-2.05). This suggests that exposure to specific ACEs negatively impacts adult health, resulting in a higher likelihood of DD and poor GH.

092-S

PREDICTORS OF MENTAL HEALTH IN ILLINOIS HIGH SCHOOL STUDENTS. Bala Mutyala*, Peter Mulhall (Center for Prevention Research and Development, University of Illinois, Champaign United States)

Depression and suicidal thoughts in Illinois high school students (n=6431) were examined in relation to individual risk factors and school climate variables, using the 2012 Illinois Youth Survey data. Results of data analyses indicate that among Illinois high school students, approximately 26.79% (n=1712) were depressed and 13.44% (n=885) had serious suicidal thoughts during 2012. After adjusting for all other variables in the logistic regression model, the odds of being depressed were found to be significantly higher in females (OR: 1.95; 95% CI: 1.65, 2.29), victims of bullying (OR: 2.88; 95% CI: 2.45, 3.38) and dating violence (OR: 1.71; 95% CI: 1.25, 2.35), in those who abused substances (OR: 1.21; 95% CI: 1.01, 1.44) or prescription drugs (OR: 1.81; 95% CI: 1.32, 2.47), and in those with no school connectedness (OR: 1.66; 95% CI: 1.35, 2.05). Female gender (OR: 1.96; 95% CI: 1.53, 2.51), bullying (OR: 3.76; 95% CI: 2.97, 4.77), dating violence (OR: 1.98; 95% CI: 1.52, 2.58), substance abuse (OR: 1.40; 95% CI: 1.05, 1.87), prescription drug abuse (OR: 2.03; 95% CI: 1.44, 2.85), and lack of school connectedness (OR: 1.41; 95% CI: 1.08, 1.84) were also significantly associated with suicidal thoughts. In addition, age (OR: 0.86; 95% CI: 0.77, 0.96), not living with both parents (OR: 1.42; 95% CI: 1.05, 1.90), not having caring teachers at school (OR: 1.43; 95% CI: 1.14, 1.80) and school dissatisfaction (OR: 1.92; 95% CI: 1.44, 2.57) were significantly associated with suicidal thoughts in students. Poor academic grades (OR: 1.69; 95% CI: 1.42, 2.02) were significantly associated with depression, but not with suicidal thoughts in Illinois high school students. Depression and suicide are important causes of morbidity and mortality in youth. Prevention programs should address contextual factors such as school climate in addition to individual risk factors.

093-S

A CAUTIONARY NOTE ABOUT ESTIMATING EFFECTS OF SECONDARY EXPOSURES IN COHORT STUDIES. Katherine Ahrens*, Stephen Cole, Daniel Westreich, Robert Platt, Enrique Schisterman (Division of Intramural Population Health Research, NICHD, NIH, Bethesda United States)

Cohort studies are central to epidemiologic research, in part because they can allow for the assessment of a variety of exposure-outcome relationships. However, cohort studies are often enriched by design for a primary exposure of interest to improve cost-effectiveness. Exposure-enrichment presents analytical challenges not commonly discussed in epidemiology. We use causal diagrams to represent exposure-enriched cohort studies, illustrate a scenario where the risk ratio (RR) for a secondary exposure on an outcome is biased, and propose an analytic method to correct for this bias. In our example, the secondary exposure Z causes the primary exposure X but has no direct effect on Y (i.e. Z→X→Y); strong positive effects exist for Z-X and X-Y; and enrichment for X increases its population prevalence of 10% to 50% in the study. In the X-enriched cohort, unadjusted and X-adjusted analyses lead to bias in the RR for the total effect of Z on Y. This bias is a form of overadjustment, as an intermediate (or its descending proxy) is being conditioned on. After applying inverse probability weights the bias is corrected, with a small loss in efficiency compared to a same-sized study without X-enrichment. With increasing interest in secondary analyses to reduce research costs, caution should be employed when analyzing studies already enriched, intentionally or unintentionally, for a primary exposure of interest. Causal diagrams can help identify scenarios where secondary analyzes may be biased. Inverse probability weights can be used to remove the bias.

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A RANDOMIZED TRIAL OF REPEAT MAILING AND FINANCIAL INCENTIVES AS ENROLLMENT STRATEGIES INTO AN INTERNET-BASED COHORT LINKED TO ELECTRONIC ADMINISTRATIVE DATA. Jorge Chavarro*, Jason Block, Meir Stampfer, Walter Willett, Matthew Gillman (Harvard School of Public Health, Boston United States)

Maximizing enrollment and retention are twin goals of prospective cohort studies, but strategies to enhance them are seldom evaluated systematically. We compared the effects on enrollment and retention of 2 strategies, repeat mailing and a financial incentive, in a pilot internet-based cohort study nested within a health plan. We invited 5,000 women covered by the same health plan and receiving care at the same multispecialty group practice into a 6-month pilot study that comprised completing 2 web-based questionnaires 6 months apart and granting access to electronic medical record (EMR) and insurance claim (IC) data. In a factorial design we randomly allocated women 1) to receive 1 or 2 invitation letters 4 weeks apart (repeat mailing) and 2) to be entered (or not) into a $500 raffle if they enrolled and completed the 6-month follow-up questionnaire (financial incentive). In total, 320 women (6.4%) joined the study. Mean (SD) age was 46 (14) years. Repeat mailing increased enrollment by 32% (95%CI: 6%,63%) from 5.5% to 7.3%, whereas the financial incentive reduced enrollment by 31% (95%CI: -14%,-44%) from 7.6% to 5.2%. Enrollment was highest among women allocated to repeat mailing and no financial incentive (8.9%) and lowest among women who got a single invitation and the financial incentive (4.8%). Among women who joined, 230 (72%) allowed access to EMR and IC data, and 201 (63%) completed the 6-month follow-up questionnaire. Neither intervention condition influenced the probability of allowing access to electronic data, or the probability of completing the follow-up questionnaire. In multivariable log-binomial regression, allowing access to electronic data was the only predictor of completing the follow-up questionnaire (RR[95%CI]=1.29 [1.11,1.50]). In conclusion, repeat mailing led to a small but significant increase in enrollment while a raffle-type financial incentive had the opposite effect.

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ADAPTING SAMPLING METHODS TO OVERSAMPLE HARD-TO-REACH RACE/ETHNIC GROUPS IN A POPULATION-BASED TELEPHONE SURVEY. Duyen Ngo*, Kathy Pickle, Clyde Dent, Renee Boyd, Kathy Morrison (Oregon Public Health Division, Portland United States)

In Oregon, gathering information about chronic disease and health risk factors by race and ethnicity requires adapting the standard Oregon Behavioral Risk Factor Surveillance System (BRFSS) sampling methods. Oregon's adult population is mostly non-Latino White (83.1%); followed by Latino (9.3%), non-Latino Asian/Pacific Islander (4.4%), non-Latino African American (1.9%), and non-Latino American Indian/ Alaskan Native (1.3%). The annual Oregon BRFSS yields particularly small numbers among the last 3 groups, and combining years of data is insufficient for reporting by race and ethnicity. In 2010 and 2011, the Oregon Public Health Division implemented an Oversample using targeted mixed-mode sampling to reach 675 landline (LL) and 165 cell phone respondents from these 3 groups. Oversample data were then combined with Oregon BRFSS 2010 and 2011 data and weighted. Sampling targets for the Oversample were as follows: African American (230 LL, 50 cell), Asian/Pacific Islander (235 LL, 55 cell), and Native American/Alaskan Native (210 LL, 60 cell). Landline sample was primarily random-digit-dial (RDD) in which exchange lists were matched to census tracts that had higher proportions of residents from the 3 target groups. Cell sample could not be mapped as precisely as LL sample. Although billing data provides zipcode information about the rate center, the cell tower connected to the cell phone's place of purchase, it does not include information about the purchaser's address. Early on in the Oversample phase, cell sampling was changed to geotarget rate center zipcodes in counties with higher proportions of residents from the 3 race groups. Although purchase location is not the same as purchaser address, using the rate center to geotarget cell sample greatly improved cell phone sampling efficiency and provided enough accuracy for state-level reporting by race and ethnicity.

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AN INVITATION TO DATA TOURISM: COME EXPLORE NEW ZEALAND'S FIRST CLASS LONGITUDINAL DATA. Sarah Radke* (University of Auckland and Institute for Environmental Science and Research, Wallaceville New Zealand)

Though it is not widely known, New Zealand (NZ) is the "Scandinavia" of the South Pacific in terms of health data. NZ is home to a diverse population of 4.5 million and provides a largely government-funded health care system. A wide array of national health-related data sets is available for epidemiological research. These data are a rich source of information related to demographics, hospital admissions, emergency department visits, pharmaceutical dispensing, immunizations, accidents, screening programs, provision of maternal health care and more. Individual level data from each source can be linked via a unique identifier (the National Health Index) to create retrospective cohort and longitudinal studies. Data can also be used prospectively to augment primary data collection. Novel aspects of the demographic data include measures of socioeconomic deprivation and geographic boundary data (with NZ broken down into more than 46,000 spatial units). The purpose of this presentation is to stimulate interest in working with NZ health data to answer questions of clinical and public health importance. I will provide brief descriptions of select data sets and examples of current research. I will also discuss the data's limitations and key considerations for researchers wishing to work with NZ health data.

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DOES TAKING ON MORE DIFFICULT CASES AFFECT A SURGEON'S RISK-ADJUSTED MORTALITY RATE? Bradley Manktelow*, Alun Evans, Bethan Copsey, Sarah Seaton, Lucy Smith, Enti Spata (University of Leicester, Leicester United Kingdom)

The public and open reporting of clinical outcomes for individual healthcare providers is important for improving care, informing decision making and ensuring value for money. Surgeon level reporting of mortality is becoming increasingly common with cardiac outcomes being reported in many US states and 10 different surgical specialities (including cardiac surgery) having their mortality rates published in the UK. In order to produce risk adjusted-mortality rates it is necessary to calculate an expected number of deaths for each surgeon given their case-mix. When comparing surgeons not only do case-mix profiles differ between individual surgeons by chance but there are systematic differences; the most skilled surgeons tend to perform the more high risk procedures. Hence, the mortality risk associated with high risk patients reflects the risk when operated on by the most skilled surgeons rather than 'average' surgeons. This can lead to additional bias in the estimation of risk-adjusted mortality rates. The extent of bias likely to occur in practice was investigated through a simulation study. Using the observed case-mix profiles for 242 surgeons undertaking adult cardiac surgery in Great Britain and observed national mortality rates, mortality data were simulated for mitral valve (high risk) and non-mitral valve (low risk) procedures for each surgeon with their specified case-mix profile and underlying mortality rate dependent on their 'skill level'. For each surgeon an 'observed' risk-adjusted mortality rate (RAMR). The observed RAMR for performing identically for both types of patients varied according to case-mix profile. For example, for surgeon A who performed 29.5% high risk procedures RAMR=2.00% whereas for surgeon B, who performed 0.4% high risk procedures, RAMR=1.86%. This potential bias needs to be considered when comparing risk-adjusted outcome rates between surgeons.

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THE SELECTION OF MODEL PARAMETERS WHEN USING THE CUSUM TO MONITOR CLINICAL OUTCOMES. Bradley Manktelow*, Enti Spata, Alun Evans, David Jones, Elizabeth Draper, Richard Baker (University of Leicester, Leicester United Kingdom)

Cumulative Sum (CUSUM) control charts are a widely used graphical method for continuous monitoring of clinical outcomes. CUSUMs comprise plotting a cumulative total, with a positive value (weight) added if the patient had a negative outcome (e.g. died) and a negative value for a positive outcome (e.g. survived). The value of the weight is dependent on the degree of poor performance to be detected (R1). This cumulative total is plotted until its value exceeds that of a pre-specified control limit (h). When using the CUSUM interest lies solely in whether performance is poor, so the cumulative total is reset to zero each time it falls below zero. This means that it is inevitable, given sufficient observations, that the control limit will eventually be crossed even if performance is good. Consequently, the value of h cannot be specified using probability criteria. Instead, CUSUMs are characterized by the expected number of observations until the control limit is crossed: Average Run Length (ARL). However, it is unclear how optimal values for R1 and h should be selected to obtain any chosen value for the ARL. In this study the relationship is investigated between specified values of R1 and h and the observed ARL using observed data from acute neonatal care as an example. Since the probability of a negative outcome is unlikely to be the same for all patients, the effect of using risk-adjusted probabilities was also investigated through a simulation study. Recommendations are made for the implementation of CUSUM charts in practice.

100-S

IMPLICATIONS OF NONDIFFERENTIAL DEPENDENT MISCLASSIFICATION OF COVARIATE AND EXPOSURE. Kelly Getz*, Alana Brennan, Matthew Fox, Daniel Brooks (Boston University, Boston United States)

Misclassification is a pervasive problem in assessing relationships between determinants and outcomes in epidemiology. While some attention has been paid to the impact of dependence in measurement error between exposures and outcomes, there is little awareness of the potential impact of dependent error between exposures and covariates, despite the fact that this latter error dependency may occur much more frequently, for example, when both are assessed by questionnaire. We explored the impact of this bias by simulating a dichotomous exposure (E), disease (D) and confounder (C) with varying degrees of nondifferential dependent misclassification between C and E. We then compared the observed crude and the observed adjusted E-D risk ratios (RR) to the truth. We focused on scenarios in which misclassification errors were positively correlated. We demonstrate that under these circumstances the observed adjusted association may not be bounded by the observed crude association and the true effect, as would be expected with nondifferential independent misclassification errors. Under plausible scenarios, the observed adjusted association can be a poorer estimate of the truth than the crude. For example, when we simulated a true E-D RR of 2; C, E and D prevalence of 10%; C-E, C-D and E-D associations with and RR of 2, 4 and 2, respectively and 3% dependent error, we found that the observed crude RR of 2.2 was closer to the truth (RR=2) than the adjusted RR of 1.4. Correlated errors in the measurement of covariate and exposure alter the covariate-exposure, covariate-outcome and exposure-outcome associations creating observed associations that can be exaggerated, attenuated, or in the opposite direction from the true association. The degree and direction of bias depends on the amount of dependent error, the prevalence of covariate and exposure, and the magnitude of the true effect.

101-S

INTRAINDIVIDUAL VARIABILITY OVER TIME IN PLASMA BIOMARKERS OF INFLAMMATION AND EFFECTS OF LONG-TERM STORAGE. Sheetal Hardikar*, Xiaoling Song, Mario Kratz, Garnet Anderson, Patricia Blount, Brian Reid, Thomas Vaughan, Emily White (Fred Hutchinson Cancer Research Center, Seattle United States)

Background: Systemic measures of chronic inflammation, often based on a single blood draw, are frequently used to study the associations between inflammation and chronic diseases. However, more information is needed on the measurement error in these markers due to laboratory error, within-person variation over time, and long-term storage. **Methods**: We investigated the intraindividual variability of inflammation markers C-reactive protein (CRP), Interleukin-6 (IL-6), and soluble tumor necrosis factor receptors (sTNFR) I & II in a subsample of the Seattle Barrett's Esophagus Study cohort. Two fasting blood samples were collected between 1995 and 2009 from 360 participants on average 1.8 years apart (average storage time for the longer of the two samples stored, 13 years). CRP, IL-6 & sTNFR levels were measured by immunonephelometry, ELISA and multiplex assays, respectively. Intra- & inter-batch coefficients of variation (CVs) were estimated using blinded pooled samples within each batch. Intraclass correlations (ICCs) were computed using random effects ANOVA. **Results**: Intra- & inter-batch CVs for the pooled plasma aliquots were low (2.4-8.9%) suggesting little laboratory variability. Reliability over time was excellent for sTNFR ($ICC_{sTNF\text{-}RI}$ =0.89, $ICC_{sTNF\text{-}RII}$ =0.85) and fair to good for CRP and IL-6 (ICC_{CRP} =0.55, $ICC_{IL\text{-}6}$ =0.57). For samples stored for over 13 years, the ICCs for CRP & IL-6 were lower than for samples stored for shorter periods, but those for sTNFR were unaffected by storage time. **Conclusion**: sTNFR levels were more stable within-person over time than CRP or IL-6. Long-term storage of samples appeared to increase the variability of CRP and IL6 measures, while the reliability of sTNFR measures was not affected by storage time. Studies of long duration involving CRP or IL-6 should, therefore, consider averaging multiple measures over time to reduce biomarker variability.

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LINKAGE OF INVASIVE METHICILLIN-RESISTANT STAPHYLOCOCCUS AUREUS (MRSA) SURVEILLANCE DATA TO VITAL RECORDS DATA. Lindsey Lesher*, Emily Goren, Ruth Lynfield (Minnesota Department of Health (MDH), University of Minnesota - Twin Cities - School of Public Health, St. Paul United States)

Background: MDH conducts population-based surveillance for invasive MRSA infection in Hennepin and Ramsey Counties in collaboration with CDC's Active Bacterial Core Surveillance program. In 2012 the surveillance protocol was modified to only follow hospitalized cases during admission but continue to follow non-hospitalized for 30 days post culture for death. **Methods**: Surveillance data from 2005-2012 were linked probabilistically to MN death records data by first name, last name, and date of birth using the EpiLink Algorithm. For cases with discrepant information or unlinked MRSA cases that were reported as having died, we reviewed medical records. **Results**: 1680 invasive MRSA cases were reported corresponding to 1501 unique patients; 1419 were hospitalized. Using surveillance data, there were 222 (14.8%) deaths. 215 patients died during hospitalization and 7 non-hospitalized patients < 30 days of culture. 220 cases were linked to death records upon first attempt; 1 case had first and last name reversed; 1 was not found in MN death records. 12 (5.4%) patients reported as having died had discrepancies in death date: 9 differed by 1 day and 3 differed by 3 - 21 days. When the1501 patients with invasive MRSA were cross matched with death records, 309 were identified. 214 (69%) died during the hospitalization and 82 (27%) <30 days following hospitalization (38 died <7 days of discharge; 44 died in 8-30 days following discharge (1 other patient died 51 days following discharge). Another 12 non-hospitalized patients died <30 days of culture. Of the 309, 28(9%) had discrepancies in first and last names; 18(5.8%) had discrepancies in birth date, of which 5 had a discrepancy of >1 year. The median number of days from culture date to death was 8 (IQR: 3-20). **Conclusion**: Verifying death data among reported cases using a probabilistic approach was useful to ensure complete and accurate data collection. A large number of additional deaths were identified. Errors in data elements were common. This type of assessment is valuable to evaluate surveillance protocols.

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MODELING TOTAL EFFECTS IN THE PRESENCE OF EXPOSURE-MEDIATOR INTERACTION. Onyebuchi A. Arah* (University of California, Los Angeles Fielding School of Public Health, Los Angeles, CA United States)

Total effects are usually estimated by controlling for variables that confound the exposure-outcome relation, but not for the mediators are not adjusted for if one is only interested in the total effect of an exposure on an outcome. An issue that is, however, overlooked is that the specification of the outcome regression model for the total effect might be sensitive to the presence of a mediator that interacts with there is exposure-mediator interaction and the exposure is continuously valued. In this study, using formal proofs, causal diagrams, and simulations, we show that specification of the total effect of an exposure depends on whether the exposure is categorical or continuous and its effect is mediated by an intermediate with which it also interacts to cause the outcome. We derive and demonstrate the conditions under which the total effect becomes, for example, a function of the exposure, the causes of the mediator and a quadratic term involving the exposure if continuously valued and there is exposure-mediator interaction. The causes of the mediator that must be included in the total effect model need not even have a direct effect on the outcome. The results are also extended to scenarios involving multiple mediators and higher order interactions. The formal results are illustrated using simulations as well as analysis of multilevel global health data on socioeconomic position, diabetes and obesity.

104-S

POTENTIAL REVERSE CAUSATION IN PROSPECTIVE COHORT STUDIES OF OLDER PARTICIPANTS: AN ILLUSTRATION WITH DIRECTED ACYCLIC GRAPHS. Shiu Lun Au Yeung*, C Mary Schooling (The University of Hong Kong, Hong Kong China)

Randomized controlled trials are the gold standard for establishing causality but are not always feasible for ethical or logistic reasons. Prospective studies are preferred in observational designs and are often thought to be resistant to "reverse causality". However, prospective studies may still be susceptible to "reverse causality" if the exposure or its detection was previously influenced by the outcome of interest or its pre-clinical course, which may be particularly relevant to studies of older participants. We used directed acyclic graphs (DAGs) to examine the possibility of "reverse causality" in prospective cohort studies, in the context of the "obesity paradox". We showed how "reverse causality" might occur despite a prospective cohort study. The evidence related to the "obesity paradox" is consistent with the proposed DAG. Prospective studies with older participants showing overweight people have a similar or lower risk of mortality than people of normal weight could be a reflection of "reverse causality" arising from the failure to account for factors such as previous weight status, previous health status or prior death, which influence both baseline exposure and the outcome, or their detection. We also discuss the use of a lifecourse approach and a separate sample Mendelian randomization analysis as possible ways to alleviate the problem of "reverse causality" despite a prospective design.

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POTENTIALLY SPURIOUS CAUSAL EFFECTS FROM MENDELIAN RANDOMIZATION. C Mary Schooling* (City University of New York, New York, NY United States)

Mendelian randomization, i.e., instrumental variable analysis with genetic instruments, provides a means of establishing effects of endogenous exposures from observational studies. Such studies are increasingly used to identify the most plausible targets for intervention because Mendelian randomization studies are particularly suitable for refuting causality. Mendelian randomization studies are somewhat less suitable for establishing the effect of an exposure. It is well-known that poor measurement of the exposure in Mendelian randomization tends to inflate any estimates. In addition, Mendelian randomization may generate spurious causal effects, not just through pleiotrophy, where one gene affects multiple, seemingly unrelated phenotypic traits, but also if a genetic instrument determines a chain of causally linked phenotypic traits with an early item in the chain causing the exposure of interest. Any item in the chain subsequent to the item causing the exposure may also appear to be causal, because the genetic instrument will predict each item in the chain and the outcome. Given the current level of understanding of genetic functionality, identifying such situations is not obvious. Here we will use directed acyclic graphs to explain how this situation may occur, provide potential examples and discuss ways of identifying whether spurious causal effects have been generated by Mendelian randomization analysis.

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POWERCOMP: AN R PACKAGE FOR POWER ANALYSES FOR STUDY DESIGNS USING COMPOSITE SAMPLING. Adam Omidpanah*, Jeff Henderson, Nez Henderson (Center for Clinical and Epidemiological Research, Seattle, WA United States)

In large studies, the cost of assays may be prohibitive in enrolling target numbers of subjects. Composite sampling offers an alternative to performing assays on all participants. Composite sampling is a process by which groups of biospecimens are extracted and combined into a single sample for assessment. This is a cost-effective and efficient method to measure aggregate levels of continuous markers. For binary markers with low prevalence, samples contributing to positive composite assays can be individually retested to assess individual level marker status. Composite sampling introduces new issues in calculation of power. No software has yet been implemented to handle this. We develop a suite of tools for power calculation and cost analysis using composite sampling in study designs. Calculation of the composite variance and effective degrees of freedom are handled for t-tests and repeated measures ANOVA for continuous outcomes. Calculation of the probabilistic distribution of assays for binary endpoints is conducted. We allow composite sizes to vary between groups. These tools use graphs and numerical solvers to show qualitative and exact power and cost trade-offs in studies. We show that substantial cost savings can be achieved in a variety of study designs using simulations. An example in household smoking cessation interventions is drawn to illustrate the use of these tools. We show that composite sampling in urinalysis for nitrosamine NNAL leads to $40,000 savings in the cost of assays.

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REVIEW OF THE USE OF PROPENSITY SCORES IN CASE-CONTROL STUDIES. Igor Karp*, Beatrice Lauzon (University of Montreal, Montreal Canada)

Background: Propensity scores (PS) as a modality of confounding control have gained popularity in quasi-experimental studies but the extent and the rigor of their use in case-control studies remain unknown. **Methods**: We searched the Pubmed and EMBASE databases (1980-2012) for publications of case-control studies where a PS was used, and carried out an evaluation of the PS methodology in those studies. **Results**: A total of 26 relevant studies were identified, of which the earliest one was published in 2006. Fourteen studies did not report the sample used to derive the PS. Five studies did not report what statistical technique was used for PS estimation. Six studies selected variables to be included in the PS-estimating model based on statistical significance, and four used the ability of the PS-estimating model to discriminate between the contrasted categories of the determinant under study as a criterion for model selection. Only one study reported assessing whether there was positivity with regards to the PS, and only three studies examined the performance of the PS in terms of balancing the potential confounders' distribution between the contrasted categories of the determinant under study. The two most common means of deployment of the PS were for matching and inclusion as a covariate in a second-stage model, where outcome was the dependent variable. When the PS was used for matching, no study reported either including the PS as a covariate in the second-stage model or stratification on PS categories. Two studies provided no information about either the derivation or deployment of the PS. **Conclusion**s: Very few published case-control studies have reported the use of PS methodology. Among the case-control studies where a PS was used, several important deficiencies in both the PS methodology and reporting have been identified. We outline a series of general principles for the use of PS in case-control studies.

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SELECTION BIAS IN INSTRUMENTAL VARIABLE ANALYSES COMPARING ACTIVE TREATMENTS. Sonja Swanson*, James Robins, Matthew Miller, Miguel Hernan (Harvard School of Public Health, Boston. MA United States)

Instrumental variable (IV) methods are increasingly used in comparative effectiveness research. However, studies using these methods often compare two active treatments, and perform their IV analyses conditional on patients receiving one of these two treatments (while ignoring the third option of "neither treatment"). This potential selection bias has gone relatively unnoticed in interpretations and discussions of these studies' results. We described the structure of this selection bias with examples and directed acyclic graphs, and estimated the magnitude and direction of possible bias across several simulations comparing the risk of an outcome associated with two hypothetical treatments. Examples included commonly proposed instruments, such as calendar-time and preference. When a patient characteristic associated with the outcome influences prescribing decisions, an artificial association can occur between the proposed instrument and outcome in analyses restricted to patients receiving one of the two treatments of interest. This results in bias in the numerator for the standard IV estimator; the bias is amplified in the treatment effect estimate. The direction and magnitude of this bias are functions of the distribution of and relationships between the proposed instrument, treatment decisions, confounder, and outcome. IV methods used to compare two active treatments are prone to substantial biases when ignoring alternative treatment options, even when the proposed instrument appears relatively strong.

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THE MAGNITUDE AND DIRECTION OF POTENTIAL BIAS IN INSTRUMENTAL VARIABLE ANALYSES WHEN TREATMENT EFFECTS ARE HETEROGENEOUS. Sonja Swanson*, James Robins, Matthew Miller, Miguel Hernan (Harvard School of Public Health, Boston, MA United States)

Investigators often estimate an average treatment effect using instrumental variable (IV) methods without acknowledging a critical assumption implicit in their analyses: additive effect homogeneity. Without this assumption, the average treatment effect can only be partially identified with generally wide bounds. However, a reliance on this assumption in the presence of effect heterogeneity to obtain a point estimate may lead to ill-placed conclusions. We sought to clarify the direction and magnitude of potential bias in the presence of effect heterogeneity. We simulated a dichotomous instrument (Z), treatment (X), unmeasured confounder (U), and outcome (Y) under the IV assumptions with outcomes generated from a structural mean modeling framework. Parameters were set to emulate the distribution of variables in a study of the effects of statin initiation. Simulations primarily varied the strength of effect modification by the instrument. As expected, under no effect modification the standard IV estimate was unbiased. In the presence of effect modification, the direction of bias depended on whether $E[Y(1)-Y(0)|Z=1]$ was greater or less than $E[Y(1)-Y(0)|Z=0]$, with more effect heterogeneity leading to more bias. The magnitude and direction of bias will be discussed under various circumstances, including: qualitative effect modification, additive and/or multiplicative effect modification, when using surrogate instruments, and in conjunction with violations of other requisite assumptions. The standard IV estimate may be substantially biased in the presence of effect heterogeneity.

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THE IMPACT OF USING A DELAYED, INDIRECT EFFECT AS A SURROGATE FOR SHORT-TERM EFFECTS WHEN THE SHORT-TERM EFFECTS HAVE NOT BEEN MEASURED. Katherine Mues*, W. Dana Flanders (Emory University Department of Epidemiology, Atlanta, GA United States)

When estimating the causal effect of a treatment regimen on a disease outcome, one may be limited by the length of the time interval between measured outcomes and by lack of observations of both the treatment and outcome within that interval. When estimating the casual effect of treatment at time t on the outcome at time t+1, the investigator may be forced to use a summary outcome at t+1 as a surrogate for the series of outcomes between t and t+1 that were not measured. This situation may have two conditions which could bias the estimate: 1) measurement error of the summary outcome and 2) lack of clarity in the temporal sequence of the treatment and outcome within the unmeasured interval. Furthermore, when time-varying confounding by the outcome at time t is present, we may attempt to control for this variable, which may control away part of the effect. To assess the bias introduced we simulated data for the causal effect of anti-fungal cream use at t on the presence of inter-digital entry lesions at t+1. It is hypothesized that anti-fungal cream treats inter-digital entry lesions often found among lymphatic filariasis patients. We simulated data to produce observations for treatment and outcome within the interval t and t+1. We ran a marginal structural model of the simulated data using the detailed time points to estimate the effect of a specific regimen of cream use at t on lesions at t+1. This was compared to a standard logistic regression model that used a summary outcome measure and did not control for time-varying confounding. We found odds ratios from the MSMs were further from the null than those produced using standard logistic regression. We conclude that the results of the standard logistic regression models using summary outcome data are biased toward the null. Future analyses will tease out whether the bias is due to the lack of observations or time -varying confounding.

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TIME-DEPENDENT PARTIAL ADHERENCE. Ian Shrier*, Robert W. Platt, Russell J. Steele (Centre for Clinical Epidemiology, Lady Davis Institute for Medical Research, Jewish General Hospital, McGill University, Montreal Canada)

Although the intention to treat (ITT) analysis evaluates the causal effect of assigning treatment in a randomized controlled trial (RCT), participants do not always adhere to the treatment they are assigned. Rather than assess treatment assignment through the ITT approach, more recent adherence-based methods have been proposed to assess treatment effectiveness. In these methods, adherence is often dichotomized as Yes or No. However, clinical reality is that adherence is a complex and heterogeneous phenomenon and modeling adherence as a simple dichotomy lacks face validity. Alternatively, one might consider sensitivity analyses by first treating partial adherence as adherent, and then treating partial adherence as non-adherent. We use causal diagrams to illustrate that this approach is generally flawed. We first define three types of partial adherence (Dose-response, Delayed, Time-Dependent), where accepted methods already exist to handle dose-response and delayed partial adherence. With respect to time-dependent partial adherence, assuming partial adherence as full adherence is equivalent to estimating the causal of initiating treatment. However, assuming partial adherence as no adherence does not assess a well-defined causal effect, nor a minimum / maximum bound of efficacy/effectiveness. Further, assessing the exclusion restriction assumption becomes more complicated, and if side effects from the treatment cause cessation of treatment (i.e. partial adherence) and harm, appropriate interpretation requires that this information be included in the model.

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UNDERSTATING THE RELATIONSHIP BETWEEN DIRECTED ACYCLIC GRAPHS (DAGS) AND DATA THROUGH SIMULATION STUDIES. Julia Rohr*, Matthew Fox, Daniel Brooks (Boston University, Boston, MA United States)

DAGs are useful tools for assessing bias, identifying confounders, and depicting the relationships between variables in studies. Rules for using DAGs to diagnose bias are now being taught to epidemiology students. It is our experience that students can easily diagnose confounding and selection bias from DAGs, yet can rarely understand how those biases occur in a dataset, particularly when the pathway between the exposure and outcome is mediated through at least one intermediate. We use simulated datasets to demonstrate how understanding data generating mechanisms can enhance understanding of DAGs. We assessed bias in exposure-outcome relationships in multiple datasets by drawing the DAG for scenarios of interest, specifying the prevalence of variables and strength of effects, and simulating the datasets in SAS. DAGs evaluated included: common causes of intermediates and outcomes; controlling for causes and effects of intermediates; limiting a study population to include or exclude previous occurrence of the disease studied; and limiting a study population to include or exclude previous occurrence of disease when exposure acts through an intermediate. Our simulations demonstrate how known properties of DAGs (e.g. conditioning on a collider) relate to actual datasets. For example, we observe that bias can occur when a study population is limited to those with previous occurrence of disease and additional common causes of previous and future disease exist. This bias could only be corrected by controlling for all common causes of previous and future disease. We saw a similar bias when the exposure acted through an intermediate, yet in this structure controlling for common causes of previous and future disease was not always beneficial. Our approach of combining DAGs and simulation can be used to examine how bias in DAGs affects study data, and to give students a better understanding of epidemiologic data.

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A MULTILEVEL ANALYSIS OF FACTORS ASSOCIATED WITH OVERWEIGHT IN BRAZILIAN ADULTS. Fernanda Penido Matozinhos*, Crizian Saar Gomes, Milene Cristine Pessoa, Larissa Loures Mendes, Gustavo Velásquez-Meléndez (Universidade Federal de Minas Gerais, Belo Horizonte, Brazil, Belo Horizonte Brazil)

Neighborhood may offer opportunities or barriers to adopt healthy habits. Although individual-level variables causes overweight, less is known about the association between local in which people live and the characteristics of the environment with the epidemic of obesity in many countries. Thus, the aim of this study was to identify the variables of the built and social environment associated with overweight in adult population of urban area from Brazil. Data by the Telephone-based Surveillance of Risk and Protective Factors for Chronic Diseases (VIGITEL) from the city of Belo Horizonte were used. Overweight was defined as body mass index (BMI) > 25kg/m2. BMI was calculated from self-reported weight and height. To characterize the social environment, we used neighborhood income and homicide rate. The covered area by basic health care units was used as the neighborhood cluster. For data analysis we used weighted multilevel logistic regression. The study included 4027 adults (40.1% men and 59.9% women, mean age 45.1 years). Cluster variability of overweight between the neighborhoods was observed (median OR = 1.17). Individuals living in neighborhoods with lower population density (OR = 0.99; 95%CI = 0.99-0.99) and fewer healthy food stores (OR = 0.98; 95%CI = 0.98-0.99) had increased odds of being overweight. Furthermore, it was observed that individuals with poorer self-reported health status (OR = 2.23; 95%CI= 1.49-3.31), alcohol abuse (OR = 1.32; 95%CI = 1.13-1.55), had increased odds of being overweight. Regular consumption of fruits (OR = 0.84; 95%CI= 0.72-0.97) and female participants (OR = 0.69; 95%CI = 0.59-0.80) were inversely associated to overweight. In conclusion, population density as a proxy of walkability and healthy food availability may significantly influence health behaviors and outcomes as a weight status.

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FACTORS ASSOCIATED WITH BURDEN METABOLIC SYNDROME DISEASES IN URBAN BRAZILIAN POPULATION: A MULTILEVEL ANALYSIS. Fernanda Penido Matozinhos*, Crizian Saar Gomes, Larissa Loures Mendes, Milene Cristine Pessoa, Gustavo Velásquez-Meléndez (Universidade Federal de Minas Gerais, Belo Horizonte, Brazil, Belo Horizonte Brazil)

The prevalence of the metabolic syndrome (MS) is constantly increasing. Studies reveal that neighborhood may offer opportunities or barriers to adopt healthy habits but less is known about the association between local in which people live and the characteristics of the environment with the MS. Our aim is identify the association between variables of the built and social environment and burden metabolic syndrome diseases (BMSD) in an urban Brazilian population. Participants were selected from the Surveillance of Risk Factors for Chronic Diseases through Telephone Interview (VIGITEL). For the present study, sample from the years 2008-2010 from the city of Belo Horizonte were used. BMSD was defined as the self-reported of at least two of the following factors: diabetes, dyslipidemia, hypertension and obesity. Sociodemographic, health status and lifestyle habits were also used. To characterize the built and social environment, we used georeferenced data of places for physical activity, population density, healthy food stores, neighborhood income and homicide rate. For data analysis we used weighted multilevel logistic regression. We studied 4,027 adults (40.13% men and 59.87% women, mean age 45.13 years) in the urban area of Belo Horizonte, Brazil. Cluster variability of BMSD between the neighborhoods was observed (median OR=1.33). It was observed that individuals living in neighborhoods with more places for practicing Physical Activities (OR=0.98;95%CI=0.97-0.99) had decreased odds of BMSD. Furthermore, former smokers (OR=1.32;95%CI=1.06-1.64), poorer self-reported health status (OR=2.15;95%CI=1.16-4.01) and age (OR=1.06, 95%CI=1.05-1.07) had increased odds of BMSD. Places for practicing physic physical activities may significantly influence health behaviors and outcomes as a BMSD.

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RELATIONSHIP BETWEEN FACTORS ASSOCIATED WITH THE OVERWEIGHT AMONG ADULTS IN BRAZIL: A MULTILEVEL ANALYSIS. Fernanda Penido Matozinhos, Crizian Saar Gomes, Milene Cristine Pessoa, Larissa Loures Mendes*, Gustavo Velásquez-Meléndez (Universidade Federal de Juiz de Fora, Juiz de Fora, Brazil, Juiz de Fora Brazil)

The prevalence of the chronic diseases is constantly increasing worldwide and the individual and environmental factors affect the risk of a lot of these diseases. Characteristics of the neighborhood that people live in addition to individual characteristics could be associated with overweight in Brazilian adults and this motivated the study. Our primary objective was to examine the relationship between individual and contextual factors associated with the overweight in a representative sample living in an urban center. We used data from the surveillance system for risk factors for chronic diseases of Brazilian Ministry of Health was used (VIGITEL - 2008/2009/2010). A telephone survey was carried out with adults in the urban area of Belo Horizonte. Individual variables were collected by telephone interviews. Weighted multilevel logistic regression was used to evaluate the associations between individual and environmental factors and the overweight. Odds ratios (OR) and 95% confidence intervals (95% CI) were estimated by multivariate logistic regression. We used Stata 12.0. The results showed lower overweight in areas with physically active people (OR = 0.99; CI = O.98-0.99) and highest population density (OR = 0.99; CI = O.99-0.99). The results also showed increase in overweight with increasing age as well as alcohol use and perception of the state of bad health – perceived social environment. A negative relationship was observed between overweight and gender (OR = 0.69; CI = O.59-0.80) and fruit and vegetable consumption (OR = 0.84; CI = O.73-0.97). These findings suggest that areas with physically active people and highest population density play a protective role in the onset of overweight in the Brazilian population. This study showed progress in examining the relationships between neighborhoods and health.

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WEIGHT CHANGE TRAJECTORIES FOLLOWING INCIDENT LOWER LIMB AMPUTATION. Erin Bouldin*, Alyson Littman, Mary Lou Thompson (VA Puget Sound Health Care System, Seattle, WA United States)

Excess weight can impede progress toward mobility and independence after lower limb amputation (LLA). Previous studies have shown obesity is prevalent in people with LLA, but there may be important variability in weight change across the population. We sought to identify and characterize trajectories of weight change following LLA. We conducted a retrospective cohort study of 759 male Veterans in the Northwest US who had an incident LLA between 1997 and 2008 using administrative VA data. Veterans were followed for up to 39 months or until December 31, 2010. In order to identify groups of men who had different patterns of weight change after LLA, we used group-based trajectory modeling. Based on the approximated Bayes factor and our qualitative assessment of meaningful differences, we identified four trajectories of mean weight change following LLA, each one a cubic polynomial in time since amputation. The average of individual posterior probabilities for membership in each group ranged from 0.89-0.95, suggesting good model fit. The four trajectory groups were identified as weight loss (14% of sample assigned to this group), stable weight (44%), slow weight gain (35%), and rapid weight gain (7%). Mean weight change over the study period, from the weight loss group to the rapid weight gain group, was -25.7, +0.3, +26.6, and +56.2 pounds, respectively. The average baseline weight across groups, again moving from weight loss to rapid weight gain, was 228, 198, 194, and 223 pounds. Men assigned to the weight loss and stable weight groups most frequently had a foot amputation (55% and 64%), while in the weight gain groups a below the knee amputation was most common (46% of slow gain and 52% of rapid gain). Our findings suggest variability in the weight trajectories of men after LLA. This study is a step toward understanding differences in and identifying risk factors for weight change after LLA.

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THE ROLE OF MEDICAL AND PHARMACEUTICAL TREATMENT IN EXPLAINING OBESITY TRAJECTORIES AND MORTALITY. Amanda Sonnega*, Jessica Faul (University of Michigan, Ann Arbor, MI United States)

For years, scientists have reported on the well-documented obesity epidemic including its negative health consequences. Recently, they have begun to explore weight trajectories over the life course and the potential impact of different patterns of weight gain and loss on health outcomes. However, very few studies have examined trajectories in older adults. A notable exception uses data from the Health and Retirement Study (HRS) to examine heterogeneity in body mass index (BMI) trajectories and mortality risk in adults over age 50 (Zheng, Tumin, & Qian, 2013). While the worst survival was among those who were obese and gained more weight as they aged, the overweight stable trajectory had the highest survival rate. This supports research suggesting that being slightly overweight may actually be considered healthy. The models controlled for a range of covariates including baseline chronic health conditions affected by obesity. However, they did not consider medications and treatment for health conditions. We hypothesize that treatment for conditions like diabetes and heart conditions obscure the true effect of weight and weight gain on the risk of dying for middle age to older adults. We utilize data from three nationally-representative cohorts in the HRS through 2012. Our sample includes 26,582 in the age range of 51-81 yrs including 11,092 deaths over 14-20 years of follow-up. We employ Cox proportional hazard adding as covariates time-varying behavior and health status variables along with medication and treatment for blood pressure, diabetes, heart failure, stroke, and high cholesterol. Our analysis provides evidence that older age weight gain may be worse for mortality risk than previously estimated. Zheng, H., Tumin, D., and Qian, Z. (2013). Obesity and Mortality Risk: New Findings from Body Mass Index Trajectories. American Journal of Epidemiology, 78(11), 1591-99.

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ASSOCIATION OF BODY MASS INDEX WITH SURVIVAL AFTER COLORECTAL CANCER IN THE GECCO STUDY. Jonathan Kocarnik*, Andrew Chan, Martha Slattery, John Potter, Jeffery Meyerhardt, Emily White, Sonja Berndt, Ulrike Peters, Polly Newcomb (University of Washington, Seattle, WA United States)

Colorectal cancer (CRC) is a major cause of morbidity and mortality. Higher body mass index (BMI; kg/m^2) is associated with increased CRC risk, but has been inconsistently associated with survival after CRC diagnosis. We evaluated whether pre-diagnosis BMI was associated with either overall or CRC-specific survival in 7 studies participating in the Genetics and Epidemiology of Colorectal Cancer Consortium (GECCO). 4,946 CRC cases were followed for a median of 4.9 years, of whom 1,692 (34%) died, 1,106 from CRC-related causes (22%). We used Cox regression to calculate the hazard ratio (HR) and 95% confidence interval (95% CI) for the association between three BMI categories (normal 18.5-24.9 (reference), overweight 25.0-29.9, obese ≥30) and overall or CRC-specific survival, stratified by cancer stage at diagnosis (local, regional, distant) and adjusted for age at diagnosis, sex, study, and smoking status (current, former, never). BMI measurements within 1 year of diagnosis were excluded. For local disease, no statistically significant association was observed for overweight participants (p≥0.41), while obese participants had a statistically significant increase in overall mortality risk (HR=1.53; 95% CI=1.02-2.30; p=0.04). For regional disease, overweight participants had a statistically significant decrease in both overall (HR=0.78; 95% CI=0.63-0.96; p=0.02) and CRC-specific (HR=0.75; 95% CI=0.58-0.96; p=0.04) mortality risk, while no statistically significant association was observed for obese participants (p≥0.67). For distant disease, no statistically significant association was observed (p≥0.09). These results suggest that the potential relationship between BMI and survival after CRC diagnosis may vary according to stage at diagnosis and degree of body weight. Higher weight tended to be associated with increased survival for regional disease, but with decreased survival for local disease.

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IS COLLIDER STRATIFICATION BIAS ONE PLAUSIBLE EXPLANATION FOR THE OBESITY PARADOX? Hailey R. Banack*, Jay S. Kaufman (McGill University, Montreal Canada)

In the general population, obesity is associated with increased mortality risk. However, among individuals with cardiovascular disease (CVD), some authors have reported that obesity is associated with lower mortality, a phenomenon called the "obesity paradox". One hypothesized explanation for this paradox is collider stratification bias. The objective of this presentation is to discuss whether collider stratification bias is one plausible explanation for the obesity paradox and to use sensitivity analyses to determine the range of parameters required to produce this paradoxical effect. Data from the Third National Health and Nutrition Examination Survey (NHANES III) was used for all analyses. Average marginal effects were calculated from logistic regression models to estimate effects on the linear scale. In the general population, the adjusted total effect of obesity on mortality was 0.033 (95% CI 0.015, 0.051) while the controlled direct effect among individuals with CVD was -0.121 (95% CI -0.204, -0.037). However, estimation of these effects is biased if there are unmeasured confounders of the CVD-mortality relationship. Cardiorespiratory fitness (CRF) is one possible unmeasured confounder. Thus, the magnitude of bias can be estimated by varying two parameters: 1) the direct effect of CRF on mortality and 2) the prevalence difference in CRF between obese and non-obese individuals conditional on a given level of CVD and confounding variables. Results demonstrate the negative obesity-mortality relationship holds only if the direct effect of CRF on mortality is less than -0.3 and if the difference in prevalence in CRF is 0.1 or less. The results of the sensitivity analysis demonstrate that unmeasured confounding of the CVD-mortality relationship provides one plausible explanation for the protective effect of obesity on mortality among individuals with CVD.

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ASSOCIATION OF RETINOL-BINDING PROTEIN 4 WITH CARDIOMETABOLIC RISK FACTORS AND METABOLIC SYNDROME IN ADOLESCENT. Meng-Hsueh Chen*, Sharon Tsai, Yi-Ling Chen, Chun-Chi Huang, Te-Fu Chan, Wei-Ting Lin, Chun-Ying Lee, Hsiao-Ling Huang, Chien-Hung Lee (Kaohsiung Medical University, Kaohsiung Taiwan)

Retinol-binding protein 4 (RBP4), mainly produced by the liver and adipose tissue, is an endogenous adipokine recommended to be a vital mediator linking obesity and insulin resistance (IR). To investigate the role of circulating RBP4 concentrations on cardiometabolic outcomes and metabolic syndrome (MetS) among adolescents in Taiwan, we evaluated data from 272 representative adolescents (132 boys and 140 girls) who were randomly selected from a large-scale cross-sectional study (n=2727). Detail demographic, physical and dietary variables, and anthropometric and clinical outcomes were collected. Data were analyzed using principal component analysis and multivariate regression models adjusted for covariates. Three principal components were extracted from 12 cardiometabolic risk factors and the first principal component (PC1) explained 38.7% of the total variance. RBP4 levels were positively associated with body weight-related factors, triglyceride, systolic blood pressure and uric acid in both sexes and to MetS and IR. Significant multivariate-adjusted differences at RBP4 levels for one-unit increase in PC1 scores were found. One-standard deviation increment of RBP4 was associated with a 2.5- and 1.9-fold risk of developing MetS and IR, respectively, and explaining 5.5% and 13.7% of the excess risk of PC1 on these two metabolic disorders. Our data suggest that serum RBP4 concentrations are related to combined-cardiometabolic risk factors, as well as MetS and IR in adolescents.

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ASSOCIATION OF THE SAGITTAL ABDOMINAL DIAMETER-TO-HEIGHT RATIO WITH THREE METABOLIC DYSFUNCTIONS. Henry S Kahn*, Kai McKeever Bullard (Centers for Disease Control and Prevention, Atlanta, GA United States)

The sagittal abdominal diameter (SAD, or "abdominal height") may estimate visceral adipose tissue volume better than does the waist circumference (WC) or body mass index (BMI, kg/m^2). We hypothesized that the SAD-to-height ratio (SADHtR) would have a stronger association with metabolic risks than the waist-to-height ratio (WHtR) or BMI. Using the 2011-2012 National Health & Nutrition Examination Survey we analyzed weighted data from 3402 adults (ages 20+ y, not taking hypolipidemic drugs and without diagnosed diabetes by self report) who were eligible for screening with regard to 3 metabolic dysfunctions: dyslipidemia (non-HDL cholesterol ≥160 mg/dL; prevalence 33%), dysglycemia (A1c ≥5.7%; prevalence 23%), or liver compromise (alanine transaminase ≥33 U/L for men, ≥22 for women; prevalence 27%). SAD was measured (supine) by sliding-beam caliper, and WC (standing) by tape measure. Our outcomes were MODERATE metabolic risk (presence of only 1 dysfunction *vs* 0 dysfunctions), and SEVERE risk (presence of 2-3 dysfunction *vs* <2 dysfunctions). We examined the competing association of SADHtR *vs* WHtR entered simultaneously in logistic regression models (age- and sex-adjusted) to estimate prevalence ratios (PR) of quartiles (Q2-Q4 with reference to Q1) for both SADHtR and WHtR. To identify MODERATE risk, SADHtR had $Q3_{PR}$ 1.45 [95% CI 1.05–2.00] and $Q4_{PR}$ 1.74 [1.25–2.44], whereas all WHtR Qs had non-significant associations (null; p>0.05). For SEVERE risk, SADHtR had $Q3_{PR}$ 2.34 [1.19–4.62] and $Q4_{PR}$ 3.55 [1.75–7.22] and all WHtR Qs were null. When SADHtR competed with BMI to identify MODERATE risk, SADHtR had $Q3_{PR}$ 1.56 [1.11–2.19] and $Q4_{PR}$ 1.58 [1.05–2.36] but all BMI Qs were null; to identify SEVERE risk, SADHtR had $Q3_{PR}$ 2.45 [1.05–5.68] and $Q4_{PR}$ 3.67 [1.50–8.99] and all BMI Qs were null. For low-cost metabolic screening among US adults SADHtR was associated with increased risk independently of WHtR or BMI.

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EXCESSIVE BODY WEIGHT AS AN IMPORTANT PREDICATOR OF HYPERGLYCEMIA IN RURAL CHINESE ADULTS: BASELINE DATA FROM THE YUHUAN RURAL HEALTH POPULATION COHORT STUDY. Chaowei Fu*, Meifang Su, Xuhua Ying, Songtao Li, Qingwu Jiang (Fudan University, Shanghai China)

Objective: To explore the risk of hyperglycemia and its association with obesity in rural adults in China. Method This analysis was based on baseline data of the Rural Yuhuan Health Population Cohort Study. This study included all rural communities of Yuhuan County, Zhejiang Province, China, in which 125,479 subjects aged 35 years or above participated with a response rate of 71%. A total of 118,004 subjects were included in the current analysis by excluding those without fasting blood glucose (FBG) test. Subjects were considered to have impaired fasting glucose (IFG) if FBG was in the range from 5.6 to 6.9 mmol/L and to have diabetes mellitus (DM) if FBG was 7.0 mmol/L or above and/or receiving the antidiabetic medications. Hyperglycemia (HG) was defined as IFG or DM. Body mass index (BMI, kg/m2) was used to group subjects into three categories: obesity (≥30.0), overweight (25.0-29.9) and normal weight (<25.0). Binary logistic regression model was used to examine the association between obesity and hyperlipidemia, and crude and adjusted odds ratios (aORs) and 95% confidential intervals (CI) were calculated. Result: FBG were 5.4±1.8mmol/l averagely. The prevalence was 9.8% for DM, 19.5% for IFG, and 29.3% for HG, respectively. Mean BMI was 23.8±3.3 and the prevalence of obesity and overweight of subjects were 3.8% and 29.4%, respectively. The risk of HG increased with BMI (aOR: 1.10, 95% CI: 1.09-1.11) after adjustment for covariates such as age, gender, education, occupation, smoking, exercise and family history of DM. Obesity was significantly associated with HG (aOR: 2.36, 95% CI: 1.93-2.89). Overweight was also significantly associated with increased risk of HG (aOR: 1.57, 95% CI: 1.44-1.72). **Conclusion**: Excessive body weight was an important predictor in this rural adults population with relatively low body weight.

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NEIGHBORHOOD INFLUENCES ON GIRLS' ADIPOSITY ACROSS THE TRANSITION TO ADOLESCENCE. Lindsay T. Hoyt*, Lawrence H. Kushi, Cindy W. Leung, Dana C. Nickleach, Nancy E. Adler, Barbara A. Laraia, Robert A. Hiatt, Irene H. Yen (Robert Wood Johnson Foundation Health & Society Scholar, University of California, San Francisco, CA United States)

The neighborhoods in which children live, eat, and play provide an environmental context that may influence obesity risk and exacerbate health disparities. The current study examines whether neighborhood characteristics predict increases in adiposity among girls and whether this relationship is moderated by overweight status. **METHODS**: Participants were a subset of 174 girls (aged 8-10 at baseline) from the Cohort Study of Young Girls' Nutrition, Environment, and Transitions (CYGNET). At baseline, trained observers completed street audits within a 0.25 mile radius around each girl's residence. Five scales were derived from exploratory factors analysis of 40 observed features (a = 0.50-0.87). Overweight was defined as BMI-for-age =85% (31% of the sample). Linear regression models using generalized estimating equations were used to measure neighborhood influences on changes in body mass index (BMI) and waist-to-height ratio (both clinically assessed) over four years of follow-up, controlling for race/ethnicity, pubertal status, and family income. **RESULTS**: There was moderation for overweight status for two neighborhood factors ($p < 0.01$). For overweight girls, increases in neighborhood physical disorder (e.g., graffiti, litter) (ß = 0.11, 95% CI 0.35-0.87) and commercial retail (e.g., fast food chain, strip mall) (ß = 0.05, 95% CI 0.02-0.78), were associated with increases in BMI z-score. **Results** were similar for waist-to-height ratio. **CONCLUSION**: Neighborhood factors related to food intake and physical disorder may increase risk for overweight girls to become obese later in life, but show less impact on normal weight girls.

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PHYSICAL INACTIVITY AND OBESITY: USING ANOVEL ENVIRONMENTAL QUALITY MEASURE TO CONTROL CONFOUNDING. Christine Gray*, Shannon Grabich, Lynne Messer, Kristen Rappazzo, Jyotsna Jagai, Danelle Lobdell (University of North Carolina at Chapel Hill, Chapel Hill, NC United States)

Physical inactivity is well-established as a contributor to obesity prevalence in the US. Many aspects of the ambient environment (e.g., air pollution, food deserts, neighborhood socioeconomics) have also been associated with obesity. Yet, controlling for the overall ambient environment in studies examining physical inactivity effects on obesity has been limited due to the sheer number of simultaneously occurring exposures. A novel county-level environmental quality index (EQI) was developed for all US counties from 2000-2005 representing 5 environmental domains: air, water, land, built, and sociodemographic. We extracted county-level rates of age-adjusted physical inactivity and adult obesity prevalence from the 2006 Behavioral Risk Factor Surveillance System and linked the EQI for all US counties (N=3,141). We used random intercept multi-level linear regression with clustering by state to estimate fixed effects of physical inactivity on county obesity rates while controlling for overall environmental quality using the EQI. The crude prevalence difference (PD) (95% confidence interval) was 0.51(0.48, 0.53); adjusted PD= 0.47 (0.44, 0.50). To examine further, we stratified by 4 rural-urban continuum codes (RUCC) ranging from metropolitan urbanized (RUCC1) to rural (RUCC4). In all strata, physical inactivity was crudely associated with obesity (RUCC1: PD=0.55 (0.51, 0.58); RUCC2: PD=0.48 (0.41, 0.56); RUCC3: PD=0.47 (0.52, 0.51); RUCC4: PD=0.46 (0.40, 0.52)). Adjusting for the EQI, the magnitude of association was reduced by roughly 10% in each RUCC (8% in RUCC1, 8% in RUCC2, 11% in RUCC3, and 11% in RUCC4). The effect of physical inactivity on obesity rates at the county level is influenced by overall environmental quality, regardless of the extent of urbanization. The EQI may be a useful tool in controlling for the overall ambient environment. This abstract does not necessarily reflect EPA policy.

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THE RELATIONSHIP BETWEEN NEIGHBORHOOD SOCIAL ENVIRONMENT STRESSORS AND BODY MASS INDEX (BMI), WAIST CIRCUMFERENCE (WC), AND WAIST-TO-HIP RATIO (WHR) IN THE WOMEN AND THEIR CHILDREN'S HEALTH (WATCH) STUDY IN LOUISIANA. Samaah Sullivan*, Edward Peters, Edward Trapido, Evrim Oral, Ariane Rung (Louisiana State University Health Sciences Center, School of Public Health, New Orleans, LA United States)

To determine whether body mass index (BMI), waist circumference (WC), and waist-to-hip ratio (WHR) are higher among women who live in neighborhoods with increased social environment stressors, data were used from the WaTCH Study (n=874), a cohort study of the long-term health effects of women exposed to the Deepwater Horizon oil spill. Audits of participants' neighborhoods were performed by trained home visit aides. A composite score of social environment stressors (Cronbach alpha = 0.76) was created by summing 'Yes' responses to 16 questions (e.g., window bars on homes, graffiti on buildings, and litter on streets) and then divided into quartiles. Increasing quartiles represented more adverse social environments. Linear regressions were modeled with log-transformed BMI, WC, and WHR. Least squares means (LS Means) were reverse-transformed for interpretation. The mean age of women was 46 years, 50% were White, 30% had a household income less than $20,000/year, and mean oil spill exposure was 1.4 (SD 1.1). Mean BMI, WC, and WHR were 32.7 kg/m2 (SD 10.2), 99.2 cm (SD 17.5), and .88 cm (SD 0.09), respectively. After adjusting for race/ethnicity, income, age, and oil spill exposure, women in the 3rd and 4th quartiles of social environment scores had significantly higher LS Means for WC (3rd quartile = 99.5; p<.05, 4th quartile 100.5; p<.05) compared to women in the lowest quartile. Only women in the 3rd quartile for social environment scores had significant higher LS Means for BMI (32.4; p-value<.05), while only women in the 4th quartile had significantly higher LS Means for WHR (0.90; p-value<.05) compared to women in the lowest quartile. Women who lived in adverse neighborhoods had increased BMI, WC, and WHR and may be at increased risk for cardiometabolic diseases. Interventions should include a focus on reducing environmental stressors that may increase the risk for obesity and other diseases.

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OBESITY, CENTRAL OBESITY AND MIGRAINE: A CROSS-SECTIONAL ANALYSIS IN THE BRAZILIAN LONGITUDINAL STUDY OF ADULT HEALTH (ELSA-BRASIL). Itamar Santos, Alessandra Goulart, Valeria Passos, Maria del Carmen Molina, Paulo Lotufo, Isabela Benseñor* (Universidade de São Paulo, Brazil)

Background: Most studies assessing the association between migraine and obesity use self-reported data, with conflicting results. We aimed to evaluate the association between adiposity measurements and migraine in ELSA-Brasil, using anthropometric measurements and validated questionnaires. **Methods**: ELSA-Brasil is a cohort study of 15,105 civil servants, 35 to 74 years-old, from six Brazilian cities. We assessed migraine using a validated questionnaire based on International Headache Society criteria and anthropometric measurements using standard techniques. We performed logistic regression models to study the association between migraine diagnosis and frequency and body mass index (BMI) or abdominal obesity (AbO). **Results**: We found an association between daily migraine andobesity (odds ratio [OR] 1.80; 95% confidence interval [95%CI]: 1.06-3.06), adjusted for age, sex, educational level, race and the use of medications for migraine prophylaxis. We found no significant associations between obesity and non-daily migraine in adjusted models. Although the presence of AbO was not associated with migraine or episode frequency, interaction and stratified models showed that the association between obesity and daily migraine remained strong only in absence of AbO diagnosis, notably in individuals younger than 55 years-old. OR (95%CI) for the association between obesity and daily migraine in individuals 35 to 54 years-old were 3.57 (1.15 – 11.10) and 0.21 (0.03 – 1.51) for those without AbO and with AbO, respectively (p for interaction = 0.01). The influence of AbO on the association between daily migraine and obesity was not significant in those 55 years or older (p for interaction = 0.67). **Conclusion**: BMI, but not AbO, was associated with daily migraine in this large sample. AbO may influence the association between BMI and chronicity in younger migraineurs.

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HEALTHFUL DIETARY PATTERNS, WEIGHT GAIN, AND RISK OF OBESITY AMONG WOMEN WITH A HISTORY OF GESTATIONAL DIABETES MELLITUS (GDM). Deirdre Tobias*, Wei Bao, Cuilin Zhang, Frank Hu (Harvard School of Public Health, Boston, MA United States)

Background: Women with a history of GDM are at high risk for developing type 2 diabetes (T2D) after pregnancy. Weight gain and obesity are strong risk factors for T2D thought to be on the pathway between diet and T2D. Identification of healthful dietary patterns associated with weight gain prevention among this high risk group may have important public health implications. **Methods**: US women in the Nurses' Health Study II prospective cohort with a history of GDM (N=3914) were followed from 1991 to 2011. Information on body weight, lifestyle factors, and health-related outcomes was self-reported every two years. Usual diet after a GDM pregnancy was assessed via food frequency questionnaire every four years. Dietary pattern adherence scores were calculated for the following: the alternative Mediterranean Diet (aMED), Dietary Approaches to Stop Hypertension (DASH), and 2010 Alternate Healthy Eating Index (AHEI). Multivariable linear regression and Cox-proportional hazard models were utilized, adjusting for age, total energy intake, baseline BMI, physical activity, smoking, and other risk factors. **Results**: Each 1 standard deviation greater adherence to the aMED (-0.16 lbs, p=0.029) and DASH (-0.17, p=0.021) patterns was significantly associated with a lower rate of weight gain (per 2 year period) after GDM. AHEI was borderline inverse (-0.10, p=0.15). Comparing those with the highest (most healthful) vs. lowest (least healthful) quartiles of adherence scores, each pattern significantly associated with lower risk of incident obesity, among those non-obese at baseline (n=3099): aMED RR=0.74 (CI=0.56, 0.97); DASH RR=0.73 (CI=0.56, 0.95); AHEI RR=0.73 (CI=0.56, 0.95). **Conclusion**: Diet quality, independent of total energy, was associated with less weight gain and lower risk of obesity. Recommendations to adopt healthful dietary patterns may provide one strategy to prevent obesity among women with a history of GDM.

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EXAMINING SEDENTARY WORK AND WEIGHT GAIN PROSPECTIVELY: EVIDENCE FROM NLSY79. Tin-chi Lin*, Theodore Courtney, David Lombardi, Santosh Verma (Liberty Mutual Research Institute for Safety, Hopkinton, MA United States)

BACKGROUND: Work is a major component of most adults' life, but the extent to which sedentariness at the workplace contributes to the nationwide weight problem has not received sufficient scholarly attention. A number of studies have explored this topic, yet the results remain inconclusive. Moreover, most of the previous studies used cross-sectional designs, making it difficult to disentangle the causal effect from selection. To address temporality more appropriately and control for confounding effectively, we use the National Longitudinal Survey of Youth 1979 (NLSY79) from 2002-2010. No previous studies have used nationally longitudinal data to explore this topic. **METHOD**: To evaluate weight gain, we used BMI (body mass index) as the outcome, based on self-reported height and weight from NLSY79 subjects. The primary explanatory variable evaluated was "time spent on sitting", extracted from O*NET (Occupational Information Network) and linked to each individual in the main NLSY79 data by occupation. Sitting time consists of five categories: never (1), less than half of the time (2), about half of the time (3), more than half of the time (4), continuously or almost continuously (5). Age, education, weekly frequencies of moderate and vigorous leisure-time exercise, hours worked, and other physical demands at work such as time spent in repetitive motions were also controlled for in the analysis. To ensure the temporal precedence of exposure, time spent sitting on the job in each previous wave was used to predict the outcome in each wave. To control for unobserved heterogeneity, we used fixed-effects models. **RESULTS**: For the overall sample, fixed-effects regression indicated that an increase in sitting time was associated with an increase in BMI ($p < 0.05$). The results differed substantially by gender. For men, the coefficient of sitting time was not statistically different from zero. For women, a one unit increase in sitting time was associated with a 0.13 increase in BMI ($p< 0.05$); the magnitude is only slightly less than that of age (coefficient = 0.15, $p < 0.001$). **CONCLUSION**: Our results for the overall sample suggest that those who sit for more time at work may be at risk for greater weight gain. However, the results differ substantially between males and females. Possible explanations include that BMI may inaccurately reflect muscularity instead of body fat (Heymsfield et al. 2009), or measurement issues related to O*NET variables. To more accurately assess the relationship between sedentary work and weight gain, further studies with better measures for both outcome and exposure are needed.

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OXIDATIVE STRESS PROGRAMS APPETITE? Zhong-Cheng LUO*, Jean-Francois Bilodeau, Emile Levy, Anne Monique Nuyt, Pierre Julien, William Fraser (CHU Sainte-Justine, University of Montreal, Montreal Canada)

Objective: The perinatal period is a critical developmental window in "programming" the vulnerability to obesity and metabolic syndrome related disorders. There is a lack of data on the mechanisms of programming in humans. This study tested the hypothesis that perinatal oxidative stress may affect fetal circulating levels of ghrelin - an important hormone in regulating appetite and energy balance. **Methods**: In a prospective singleton pregnancy cohort, ghrelin and biomarkers of oxidative stress (F2-isoprostanes, malondialdehyde (MDA)) were measured in maternal (24-28 weeks gestation) and cord blood in 248 mother-newborn pairs. **Results**: Ghrelin, MDA and F2-isoprostanes concentrations were all significantly higher in cord versus maternal plasma. Significant positive correlations were observed between maternal and cord plasma concentrations of ghrelin ($r=0.51$, $p<0.001$) and biomarkers of oxidative stress ($r=0.33$ for MDA, $r=0.74$ for F2-isoprostanes, all $p<0.001$). Adjusting for gestational age at blood sampling and glucose concentration, consistent negative correlations were observed in cord plasma ghrelin levels with indices of oxidative stress in both maternal ($r=-0.32$, $p<0.001$ for MDA; $r=-0.29$, $p<0.001$ for F2-isoprostanes) and cord plasma ($r=-0.13$, $p=0.02$ for MDA; $r=-0.30$, $p<0.001$ for F2-isoprostanes). Similar associations were observed after adjusting for maternal and pregnancy characteristics. **Conclusion**: Perinatal oxidative stress may repress ghrelin levels during fetal development, which may be a pathway in programming appetite and thus the vulnerability to obesity and metabolic syndrome related disorders.

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HORMONAL CONTRACEPTIVE USE IN PREGNANCY AND OFFSPRING OVERWEIGHT OR OBESITY. Elizabeth T Jensen*, Julie L Daniels, Til Stürmer, Whitney R Robinson, Carmen J Williams, Dag Moster, Petur Juliusson, Kristine Vejrup, Per Magnus, Matthew P Longnecker (National Institute of Environmental Health Sciences and the University of North Carolina at Chapel Hill, Chapel Hill, NC United States)

Experiments in animals have shown a positive association between in utero exposure to pharmacologic sex hormones and offspring obesity. The developmental effects of such hormones on human obesity are unknown. Using data from a prospective pregnancy cohort study (n=19,652), with linkage to a national prescription registry, we estimated the association between use of hormonal contraceptives before and after conception (defined from dispensed prescription data and estimated last date of use relative to conception) in relation to offspring overweight or obesity at age 3 years. Odds ratios were obtained using generalized linear models with robust standard errors to account for sibling clusters. Sensitivity analyses were conducted to evaluate possible confounding by indication and out-selection bias. We observed an inverse association between early pregnancy use of a combination oral contraceptive and offspring overweight or obesity at age 3 (adjusted odds ratio (aOR): 0.75, 95% CI: 0.53, 1.08) and a positive, but also imprecise, association with use of a progestin-only oral contraceptive in early pregnancy (aOR: 1.26, 95% CI: 0.79, 2.02). Estimates obtained were robust to sensitivity analyses evaluating possible confounding by indication and out-selection bias. Pharmacologic sex hormones may be associated with offspring overweight or obesity at age 3. The direction of the relation may be contingent upon the specific formulation. These data provide support for the potential for environmental sources of hormonally active agents to exert developmental effects.

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USING RECURSIVE PARTITIONING ANALYSIS TO ESTIMATE COMPLEX ASSOCIATIONS BETWEEN NEIGHBORHOOD AND INDIVIDUAL CHARACTERISTICS AND OBESITY IN CHILDREN. Andraea Van Hulst*, Marie-Hélène Roy-Gagnon, Lise Gauvin, Tracie Barnett (School of Public Health, University of Montreal, Montreal Canada)

We estimate complex associations between neighborhood and individual characteristics and obesity in a subsample of children (n=512) from the baseline wave of QUALITY, an ongoing study on the natural history of obesity in 630 Quebec youth aged 8-10 years with a parental history of obesity. Center for Disease Control and Prevention age- and sex-specific body mass index (BMI) percentiles were computed and children were categorized as obese if their BMI was ≥ 95th percentile. Residential neighborhoods were characterized using in-person neighborhood audits conducted by trained observers and data from a Geographic Information System for 500 m network buffers around participants' residential address. A total of 20 neighborhood, household, and parental predictors were submitted to a recursive partitioning process which produced a classification tree following a series of binary splits. Within this subsample of at risk children, 23% were obese. Associations between neighborhood characteristics and obesity varied by parental and household characteristics. Obesity was very prevalent (80%) among children whose mother was obese and who lived in very low residential density neighborhoods. Similarly, children of obese mothers who lived in neighborhoods with moderate residential density and high proportion of single parent families also presented a high prevalence of obesity (66%). For children of non-obese mothers, maternal overweight status and household income predicted obesity. Obesity prevalence was high (65%) among children of overweight mothers if they lived in low income households (<$21000). For children of normal weight mothers, child obesity was more prevalent (63%) in low income households who were also situated in low residential density neighborhoods. These findings indicate that parental, household, and neighborhood environment characteristics jointly predict child obesity in complex ways.

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TOTAL AND CONTROLLED DIRECT EFFECTS OF CHILDHOOD ABUSE ON ADULT WEIGHT STATUS: ASSESSING COPING-MOTIVATED EATING AS A TARGET FOR OBESITY PREVENTION AFTER ABUSE. Susan Mason*, Richard MacLehose, Bryn Austin, Sabra Katz-Wise, Dianne Neumark-Sztainer, Bernard Harlow, Janet Rich-Edwards (University of Minnesota School of Public Health, Minneapolis, MN United States)

Background: Women with histories of childhood abuse are at increased risk for obesity and obesity-related chronic disease. Identifying modifiable intermediates between abuse and obesity could inform prevention strategies. We used data from the Growing Up Today Study (GUTS) to estimate the total effect of childhood abuse on adult women's weight status, as well as the controlled direct effect if one were able to prevent coping-motivated eating, a plausible intermediate on the causal pathway. **Methods**: In 2007, GUTS ascertained childhood physical, sexual, and emotional abuse through self-report. In 2010, coping-motivated eating was assessed with the Motivations to Eat scale. We used marginal structural models to estimate (1) the total effect of abuse on body mass index (BMI) in 2013, when participants were aged 25-30, and (2) direct effects through pathways other than coping-motivated eating. **Results**: Of 3100 women included in the analysis, almost 30% experienced physical abuse before age 11, with 8% experiencing severe abuse. Roughly 5% experienced at least two types of severe physical, sexual, or emotional abuse. Relative to no physical abuse, experiencing severe physical abuse was associated with an increased BMI of 1.1 kg/m2 (95% CI: 0.3, 1.9) at age 25-30. If one prevented coping-motivated eating, severe physical abuse was associated with an increased BMI of 0.7 kg/m2 (95% CI: -0.1, 1.5). Experiencing two or more types of severe abuse was associated with an increased BMI of 1.9 kg/m2 (95% CI: 0.8, 3.0), or 1.4 kg/m2 units (95% CI: 0.3, 2.5) if coping-motivated eating were prevented. **Conclusion**: Our findings suggest that severe abuse would still have a sizable impact on adult weight status, even after preventing coping-motivated eating in adulthood. Additional work is needed to more fully characterize modifiable intermediates that could offer effective targets for intervention.

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BLOOD ACHE AND BCHE AS BIOMARKERS OF CHOLINESTERASE DEPRESSION AMONG PESTICIDE HANDLERS. Jean Strelitz*, Lawrence Engel, Matthew Keifer (University of North Carolina at Chapel Hill, Chapel Hill, NC United States)

Background: Organophosphates (OPs) are among the most widely used pesticides in the United States. They can exert toxicity in humans through inhibition of the enzyme acetylcholinesterase, which is crucial for the functioning of the nervous system. Agricultural pesticide handlers are at an elevated risk for overexposure to OPs, but symptoms can be difficult to identify, making biomarkers essential for diagnosis. Occupational monitoring programs for cholinesterase depression generally rely on measuring activity of either of two common blood cholinesterases which serve as proxy measurements for nervous-system acetylcholinesterase activity: red blood cell acetylcholinesterase (AChE) and plasma butyrylcholinesterase (BChE). However, these biomarkers may be affected differentially by some OPs and their correlations have not been compared in human populations. **Objective**: To determine the association between blood AChE and BChE activity levels and assess whether they produce comparable classifications of clinical cholinesterase depression. **Methods**: Using blood samples from participants of the Washington State Cholinesterase Monitoring Program, we quantified changes in AChE and BChE activity from before and after exposure to OP pesticides and calculated Pearson correlation statistics for correlation of AChE and BChE changes in activity, as well as weighted Kappa statistics for agreement of classification of clinical cholinesterase depression based on AChE versus BChE measurements. **Results**: AChE and BChE are weakly negatively correlated in our study population. Reaching a clinical threshold for diagnosis of cholinesterase depression based on the AChE marker did not correlate with reaching clinical depression based on the BChE marker. **Conclusion**s: Both AChE and BChE should be measured in monitoring programs because they may both give meaningful but disparate classifications of clinical cholinesterase depression.

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CONSTRUCTION OF A LOCATION-EXPOSURE MATRIX FOR IONIZING RADIATION IN LOW EARTH ORBIT. Robert J Reynolds*, Mohammad H Rahbar, George L Delclos, Sharon P Cooper (The University of Texas Health Science Center at Houston, Houston, TX United States)

Ionizing radiation continues to be a risk to astronauts in low Earth orbit (LEO). A simple tool for estimating doses of ionizing radiation in LEO could facilitate mission planning and historical dose estimation for epidemiological research. Such a tool would need to account for important factors over which radiation dose rates in LEO are known to vary. Using data from peer-reviewed journal articles that offer radiation dosimetry in LEO we constructed a location-exposure matrix (LEM) which provides estimates of mean dose equivalent rates of ionizing radiation for several locations in LEO. The LEM offers arithmetic, geometric, and bootstrapped means and 95% confidence intervals. We also fit a linear mixed model to the data to provide estimation capability beyond the locations in the LEM and to control for any variation in the data that may be due to when and how measurements were made. The LEM showed that the highest dose rates were for extra-vehicular activity, followed by Skylab missions. Mean dose rates generally increased with orbital inclination and altitude. Results of the mixed model show that dose rates were highest between 50 and 56 degrees of inclination and above 500km in altitude. Skylab and Mir produced larger average dose rates than did Gemini Capsules, Space Shuttles, or the International Space Station. Extravehicular activity produced the largest dose rates of all. Estimating tools such as those presented here can be a useful aid in studying the health effects of ionizing radiation in outer space, especially when combined with historical mission parameters and the vital data of astronauts.

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IONIZING RADIATION FROM EXTRATERRESTRIAL ENVIRONMENTS AND THE RISK OF DEATH FROM CANCER AND ALL NATURAL CAUSES AMONG US ASTRONAUTS, 1959-2011. Robert J Reynolds*, George L Delclos, Mohammad H Rahbar, Sharon P Cooper (University of Texas Health Science Center at Houston, Houston, TX United States)

Ionizing radiation is of significant concern for space exploration due its potential for increasing the risk of cancer mortality and mortality from other natural causes. Previous research has demonstrated that US astronauts are at significantly reduced risk of death from cancer and cardiovascular disease compared to the US general population, and failed to find a connection between total dose of ionizing radiation and cancer mortality. However, one study did suggest that astronauts may be at greater risk of death from cancers in comparison to an age-, sex-, and BMI-matched cohort of civilians from Johnson Space Center. In this study we reexamined the hypothesis that total equivalent radiation dose is associated with increased risk of death from cancers and all natural causes in the US astronaut cohort between 1959 and 2012. In general, total equivalent radiation doses remain below the low-dose threshold of 2mSv, even for astronauts who have completed long-duration missions on the International Space Station. The 330 astronauts analyzed contributed approximately 8,200 person-years of follow-up time, 12 cancer deaths, 6 cardiovascular deaths and 2 deaths due to other natural causes. Age-adjusted Poisson regression models failed to demonstrate an increase in the risk of death from cancer or from all natural causes for those astronauts at or above the median total equivalent radiation dose. Because low statistical power, insufficient dose, insufficient latency, and exposure misclassification may be masking a relationship between ionizing radiation and mortality risk, it is advised that periodic follow-ups be performed, especially among astronauts with the largest total doses.

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EFFECTIVENESS OF A HEALTH PROMOTION PROGRAM AMONG EMPLOYEES IN A WESTERN UNITED STATES SCHOOL DISTRICT. Arielle Sloan, Ray Merrill* (Brigham Young University, Provo, UT, United States)

Objectives: To evaluate the effectiveness of a worksite wellness program in decreasing health risk. **Methods**: Analyses were based on 2,411 employees from a school district in the western United States who participated in the WellSteps wellness program for 12 months. **Results**: Numbers of high risk employees at baseline were 683 for BMI, 360 for SBP, 242 for DBP, 72 for glucose, and 216 for total cholesterol. Among participants, 46.0% lowered BMI, 34.7% lowered systolic blood pressure, 56.3% lowered diastolic blood pressure, 65.6% lowered blood glucose, and 38.6% lowered total cholesterol. The percentages moving out of the high risk categories after one year were 11.4%, 39.4%, 70.7%, 38.9%, and 40.7%, respectively. **Conclusion**s: The worksite wellness program effectively lowered risk measures among those identified in high risk categories at baseline.

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OCCUPATIONAL EXPOSURE TO ULTRAFINE PARTICLES AMONG AIRPORT EMPLOYEES IN COPENHAGEN AIRPORT, DENMARK - COMBINING PERSONAL MONITORING AND GLOBAL POSITIONING SYSTEM. Karina Møller*, Lau Thygesen, Jasper Schipperijn, Steffen Loft, Jens Peter Bonde, Sigurd Mikkelsen, Charlotte Brauer (National Institute of Public Health, University of Southern Denmark, Copenhagen Denmark)

Background: Exposure to ultrafine particles (UFP) has been linked to cardiovascular and lung diseases. Combustion of jet fuel and diesel powered handling equipment emit UFP resulting in potentially high exposure levels among employees working at airports. High levels of UFP have been reported at several airports, especially at the apron, but knowledge on individual exposure profiles among different occupational groups working at an airport is lacking. The aim of this study was to assess the environmental exposure to UFP in a cohort study on cardiovascular disease among employees working in Copenhagen Airport (CPH) using personal exposure monitoring and Global Positioning Systems (GPS). **Methods**: 30 employees from five different occupational groups (baggage handlers, catering drivers, cleaning staff and airside and landside security) at CPH were instructed to wear a personal monitor of particle number concentration in real time and a GPS device. The measurements were carried out on 8 days distributed over two weeks in October 2012. The overall differences between the groups were assessed using linear mixed model. **Results**: Data showed significant differences in exposure levels among the groups when adjusted for effect of time and date ($p<0.01$). Baggage handlers were exposed to 7 times higher average concentrations (geometric mean, GM: 37 UFP $10^3/cm^3$, 95CI: 25-55 UFP $10^3/cm^3$) than employees mainly working indoors (GM: 5 UFP $10^3/cm^3$, 95%CI: 2-11 UFP $10^3/cm^3$). Furthermore, catering drivers, cleaning staff and airside security were exposed to intermediate concentrations (GM: 12 to 20 UFP $10^3/cm^3$). **Conclusion**: The study demonstrates a strong gradient of exposure to UFP in ambient air across occupational groups of airport employees and will be used accordingly in an ongoing epidemiological study of the risk of the UFP-related cardiovascular disease among employees at CPH.

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ACUTE MYELOID LEUKEMIA RISK BY INDUSTRY AND OCCUPATION. Rebecca Tsai*, Sara Luckhaupt, Pam Schumacher, Rosemary Cress, Dennis Deapen, Geoffrey Calvert (Centers for Disease Control and Prevention, Cincinnati, OH United States)

Acute myeloid leukemia (AML) is the most common type of leukemia found in adults. Known environmental and occupational exposures, such as benzene and ionizing radiation, explain only a small proportion of AML cases. Identifying specific industry and occupation categories that pose a risk for AML may provide clues about known leukemogens and identify new risk factors that can be targeted for intervention. A matched case-control analysis was conducted using California Cancer Registry data from 1988 to 2007. Controls were subjects diagnosed with breast, colorectal, or low-grade localized prostate cancers. Up to three controls were matched to each AML case by age, sex, race, and year of diagnosis. AML risk for industries, occupations, and industry-occupation pairings was estimated using conditional logistic regression. This study included 8,999 AML cases and 24,822 controls. Industries with a statistically significant increased AML risk were construction (matched odds ratio [mOR]: 1.13; 95% confidence interval [CI]: 1.03-1.25), crop production (mOR: 1.41; 95%CI: 1.18-1.69), support activities for agriculture and forestry (mOR: 2.05; 95%CI: 1.08-3.92), and animal slaughtering and processing (mOR: 2.09; 95%CI: 1.02-4.28). Among occupations with a statistically significant increased AML risk were miscellaneous agricultural workers (mOR: 1.76; 95%CI: 1.37-2.26), fishers and related fishing workers (mOR: 2.02; 95%CI: 1.01-4.03), nursing, psychiatric, and home health aides (mOR: 1.65; 95%CI: 1.24-2.20), and janitors and building cleaners (mOR: 1.54; 95%CI: 1.28 -1.87). As AML has poor survival, efforts in AML prevention are needed. Further investigation is needed to confirm study findings and to identify specific exposures responsible for the increased risks.

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EFFECTS OF EXCLUDING UNEXPOSED WORKERS FROM LIFE TABLE AND REGRESSION ANALYSES: RE-EXAMINATION OF A RETROSPECTIVE COHORT MORTALITY STUDY OF MICROELECTRONICS AND BUSINESS MACHINE FACILITY WORKERS. Sharon Silver*, Stephen Bertke, Donald Fleming, Lynne Pinkerton (Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, Cincinnati, OH United States)

Background: Mortality was ascertained in 34,494 former employees of a microelectronics and business machine manufacturing facility in upstate New York. Stakeholders were concerned that including unexposed workers (30% of the workforce) in analyses could obscure job-related health effects. The current work assessed the influence of unexposed person time in this large occupational cohort study. **Methods**: Standardized mortality ratios (SMRs) were generated using LTAS.net. Relations between selected health outcomes and scores reflecting duration of potential exposure to specific chemicals were evaluated by Poisson regression. For all analyses, time prior to first estimated exposure to any chemical was excluded. Paycode (hourly/salaried) was used to adjust for exposure (more prevalent in hourly workers) and lifestyle factors. **Results** were compared to findings of previous analyses that included all person time, regardless of exposure potential. **Results**: Excluding unexposed person time had little effect on most results. In males, SMR results changed substantially only for outcomes that occurred almost exclusively in either exposed or unexposed workers: the SMR for malignant mesothelioma, found exclusively in exposed workers, increased, attaining borderline statistical significance in hourly males; the SMR for pleural cancer, seen only in unexposed workers, went to 0. Other notable SMR changes were limited to outcomes with sparse deaths. Regression results also changed little. Two relations that approached statistical significance in the original analyses had somewhat wider confidence intervals in the reanalysis, while the relation between kidney cancer and trichloroethylene more nearly approached statistical significance. Discussion: Adjusting for or stratifying by paycode and sex likely helped account for any dilution effects from inclusion of unexposed workers, particularly in life table analyses.

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HYPERTENSION PREVALENCE AND TREATMENT AMONG A LARGE CROSS-SECTION OF COMMERCIAL TRUCK DRIVERS. Matthew Thiese*, Austin Hill, Ulrike Ott, Atim Effiong, Riann Robbins, Kurt Hegmann (University of Utah RMCOEH, Salt Lake City, UT United States)

3 million U.S. Commercial Truck Drivers have unhealthy factors that are associated with their job and may lead to hypertension (HTN). Periodic medical examinations are required for certification. It is believed that many drivers do not achieve adequate HTN control. Quantification of HTN, antihypertensive medication use, and identification of modifiable factors related to HTN can lead to improvement of health. A large, multicenter cross-sectional study collected data of volunteer drivers. Blood Pressure, height, and weight were measured. Past medical professional diagnosis of HTN and medication use were self-reported as was demographics, personal factors, and physical activity. HTN is defined as measured systolic >89 or diastolic >139 or previous diagnosis of HTN. Frequencies, Odds Ratios (OR) and 95 % Confidence Intervals (95% CI) of factors related to HTN were calculated. HTN prevalence is 52.5% (429/817), with 44.8% (192/429) of those without past HTN diagnosis. Of the 55.2% (237/429) with a past HTN diagnosis, 60.8% (144/237) were poorly controlled as having measured HTN. There were 76.4% (181/237) drivers taking at least 1 medication for HTN, and 23.6% (56/237) taking more than 1 medication. 55.8% (101/181) of those taking medication still had uncontrolled HTN. 39.3% (22/56) of drivers taking 2 or more medications also had uncontrolled HTN. Age (OR=1.03 per year), Body Mass Index (OR=1.08 per kg/m^2), variable haul type (OR=5.19), diagnosed sleep apnea (OR=2.18), self-reported sleep problems (OR=3.08), diabetes mellitus (OR=4.01), and high cholesterol (OR=2.17) were statistically significantly associated with HTN prevalence. Alcohol problems and lack of regular physical activity were trending toward statistical significance (0.15>p>0.05) in relationship with HTN prevalence. Additional analyses are planned. The prevalence of HTN in this sample is much higher than the general population. A surprising number had uncontrolled HTN, even among those taking medication. Many modifiable factors are related to HTN prevalence. HTN and uncontrolled HTN among those with a prior diagnosis and/or those taking medication are prevalent among this sample of commercial truck drivers.

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MORTALITY AND CAUSES OF DEATH FOR RUSSIAN AND SOVIET COSMONAUTS, 1960-2013. Robert J Reynolds, Steven M Day*, Zhannat Z Nurgalieva (Mortality Research & Consulting, Inc., City of Industry United States)

In spite of a long and extensive space program starting in the Soviet Union in the early 1960s, little is known about the long-term mortality trends of Soviet and Russian cosmonauts. Meanwhile, US astronauts have been studied repeatedly in the last 20 years, and in comparison to the US general population, have been found to be at significantly lower risk of cardiovascular disease and cancer, but significantly increased risk of accidental death. Using data from all cosmonauts accepted into cosmonaut training from 1960 to 2013, we document the causes of death and crude death rates among cosmonauts. We calculate standardized mortality ratios (SMR) to compare cosmonauts to the general populations of Russia and Ukraine, as well as to US astronauts. We hypothesized that patterns of mortality among cosmonauts would mirror those of US astronauts over the same period. Cosmonauts experienced significantly lower all-cause mortality risk in comparison to age-, gender-, and country-matched general population. However, cosmonauts were at almost double the risk of all-cause mortality in comparison to US astronauts (SMR = 1.90, 95% C.I. 1.54–2.39). Cosmonauts were also at greater risk of circulatory disease (SMR =3.64, 95% C.I. 2.25–5.57) and cancer (SMR = 1.77, 95% C.I. 1.08–2.74) compared to US astronauts. Though not statistically significant, cosmonauts experienced fewer fatal accidents (SMR = 0.88, 95% C.I. = 0.54–1.36) than their US counterparts. Cosmonauts are at much lower risk of all-cause mortality than the general populations of Russia and Ukraine, yet are at greater risk for death by cardiovascular disease and cancer than are US astronauts. This disparity may have common roots with decreases in life expectancy in Russia in recent decades.

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BUILDING-RELATED HEALTH SYMPTOMS AND CLASSROOM CONDITIONS: A SURVEY OF SCHOOL TEACHERS IN NEW YORK STATE. Christine Kielb*, Shao Lin, Neil Muscatiello, Wendy Hord, Joan Rogers-Harrington, John Healy (New York State Department of Health, Albany, NY United States)

Teachers work in classrooms where they may be exposed to poor environmental conditions, but most previous occupational health studies of indoor environments have focused on non-school settings. This study assessed health symptoms and classroom environment via a telephone survey of 501 public school teachers in New York State schools. Teachers were asked about 14 building-related symptoms and classroom conditions related to indoor air quality and climate. Summary symptom measures included having any symptom (48.7%) and having any allergic symptom (43.5%). Classroom conditions associated with these measures ($p< 0.15$) in bivariable analysis were included in Poisson regression models, controlling for demographics and home exposures. The prevalence of these classroom conditions was as follows: allergens/allergen reservoirs (83%), volatile organic chemical (VOC) odors (47%), mold/moisture (33%), inadequate storage (30%), construction or related odors (28%), too hot or cold (26%), inadequate fresh air (24%), too dry (23%), poor flooring condition (16%) and diesel odors (15%). In multivariable analysis the following classroom conditions were significantly associated with having any symptom: allergens/allergen reservoirs (Relative Risk (RR) =2.08; 95% Confidence Interval (CI): 1.29-3.35), too dry (RR=1.39; 95% CI: 1.16-1.67), too hot or cold (RR=1.25; 95% CI: 1.04-1.51) and mold/moisture (RR=1.22; 95% CI: 1.02-1.47). These were also associated with having any allergic symptom, as were VOC odors. A statistically significant and increasing risk of each outcome was found with increasing numbers of conditions related to allergens. Development of a multiple exposure index and covariable-exposure interaction assessment is ongoing. Building-related health symptoms among teachers while at work are common and appear to be associated with key aspects of classroom environments related to climate and indoor air quality.

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SILICOSIS MORTALITY TREND, UNITED STATES, 1999–2010. Ki Moon Bang*, Jacek Mazurek, John Wood, Ainsley Weston (National Institute for Occupational Safety and Health, Morgantown, WV United States)

Silicosis is a preventable occupational lung disease caused by inhalation of dust containing crystalline silica. Studies found that silicosis mortality declined from ≥1,000 in 1968 to approximately 100 in 2004. Occupational exposure to silica dust has been documented. Recently, new operations and tasks were found to expose workers to crystalline silica during hydraulic fracturing and artificial and natural stone countertop fabrication. The 1999–2010 National Center for Health Statistics multiple cause-of-death data were used to identify silicosis deaths (International Classification of Diseases 10th revision code J62) among decedents aged ≥15 years and to examine the national trends in silicosis mortality. Time trends were assessed using the Wilcoxon signed rank test. A total of 1,776 silicosis deaths were identified (range: 101–187 per year); of these, 36 were aged 15–44 years. Silicosis mortality declined 46.0% from 187 (age-adjusted rate 0.87 per million) in 1999 to 101 (0.39) in 2010, but the trend was not statistically significant. These results indicate that silicosis mortality has not significantly decreased over 12 years. Because of lack of effective treatment of silicosis, emerging new jobs placing workers at risk for silicosis, and continuous occurrence of silicosis deaths even in young workers, efforts to effectively limit workplace exposure to crystalline silica should be maintained. Long latency of this disease warrants continuous surveillance, moreover, approaches to early detection (lung function testing and biomarkers) are needed if the disease is to be eradicated.

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THE ASSOCIATION OF CUMULATIVE SILICA EXPOSURE WITH LUNG DISEASE OUTCOMES IN TACONITE MINERS. Nnaemeka Odo*, Jeffrey Mandel, Bruce Alexander, Gurumurthy Ramachandran, Richard MacLehose, Andy Ryan (University of Minnesota School of Public Health, Minneapolis, MN United States)

Introduction: We examined associations between cumulative silica exposure and indicators of lung disease including restrictive ventilatory defect (RVD) on spirometry, shortness of breath symptoms (dyspnea), parenchymal and pleural chest x-ray findings found on health assessment of Minnesota taconite mining industry workers. **Methods**: A cross-sectional study population of 1,188 current and former workers was used. Cumulative silica exposures (mg/m3-years) were a product of time worked and job/year specific silica dust measures for 28 job categories. Work histories were used to determine time worked in each job. Current onsite measures were used to estimate historical exposure levels. Forced Vital Capacity (FVC) less than lower limits of normal (LLN) for age, height, race and gender was used to determine RVD. Chest x-rays were assessed for pleural and parenchymal abnormalities by a minimum of two B-readers, with a third reader used to arbitrate a disagreement. Odds-ratios (OR) and 95% confidence intervals (CI) were estimated with multivariate logistic models adjusted for smoking, gender, age, BMI and asbestos scores. **Results**: Less than 20% of participants had any lung abnormalities (RVD – 7.4%, parenchymal outcomes – 5.4%, pleural outcomes – 16.9%, dyspnea – 11.1%). Silica exposure was significantly associated with prevalent parenchymal abnormality (OR = 1.42, 95% CI=1.01-2.01). It was not significantly associated with the other lung abnormalities (ORSpirometric = 1.28, 95% CI= 0.85-1.94; ORPleural = 0.96, 95% CI= 0.71-1.30; ORDyspnea = 1.26, 95% CI=0.94-1.69). **Conclusion**s: These analyses show a significant association between silica exposure and parenchymal chest x-ray findings. It suggests that pleural abnormalities, RVD and dyspnea are not associated with silica exposure. In this population, parenchymal findings seem to be the most sensitive approach for understanding the lung effects of silica exposure.

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BLOOD SPOT ADIPONECTIN AND INFANT BIRTH SIZE. Edwina Yeung*, Alexander McLain, Nancy Anderson, David Lawrence, Nansi Boghossian, Charlotte Druschel, Erin Bell (National Institutes of Health, Bethesda, MD United States)

Adiponectin can serve as a measure of adipose tissue activity. Although birth weight correlates with neonatal adiposity, conflicting findings have been observed between cord blood levels of adiponectin and birth size. Adiponectin was measured from newborn blood spots among 3557 infants (2360 singletons, 1217 twins) as part of the Upstate KIDS study using a multiplex panel (R&D systems, Minneapolis, MN). Generalized Estimating Equations accounting for correlated measures between twins were used to estimate differences in outcomes in association with log-transformed adiponectin levels adjusting for race, infant gender, and twin birth. To account for sampling design, analyses were weighted by infertility treatment, twin and region of birth. Among all infants, 618 (17%) were low birth weight (LBW, <2500 grams). Among singletons, 184 (8%) were SGA and 240 (7%) were LGA (defined as the lowest or top 10th percentile of birthweight for gender and gestational age). Weighted mean(SD) adiponectin was 18.1(6.9) µg/ml. Adiponectin levels were positively associated with being female, gestational age and white race but no significant associations were found with maternal age, prepregnancy BMI, maternal smoking or infertility treatment. Each log unit increase in adiponectin was associated with 179(38) grams higher mean(SE) birthweight. Additional adjustment for gestational age reduced the magnitude of difference (89(27) grams, $p<0.0001$). Higher adiponectin was associated with lower odds of SGA among singletons (adjusted OR 0.58; 95% Confidence Interval: 0.43-0.78) and LBW (0.36; 95% CI: 0.21-0.59) among all infants, but was not associated with LGA. Blood spot measures of adiponectin were positively associated with birth weight.

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EXAMINING THE ASSOCIATION BETWEEN EXCLUSIVE BREASTFEEDING AND ASTHMA IN A PREDOMINANTLY IMMIGRANT LATINO POPULATION. Gretchen Bandoli*, Ondine von Ehrenstein, Beate Ritz (University of California, Los Angeles, Los Angeles, CA United States)

The association between breastfeeding and asthma has been evaluated previously but results remain inconclusive. Early studies reported exclusive breastfeeding to be protective of asthma, but more recent studies did not confirm these findings. To date, this hypothesis has never been studied in a Latino population, which may have unique characteristics and risk factor profiles associated with both nativity and acculturation. Using a Latina subset (n=519) of a population based birth cohort from the UCLA Environment and Pregnancy Outcomes Study, we estimated risk ratios (RR) for exclusive breastfeeding and asthma (at 3.5 years assessed according to the ISAAC core questionnaire) using Poisson regression models with robust error variance and a log link function. We also conducted stratified analyses by nativity and maternal atopy to assess effect measure modification. In the sample, 56 (10.8%) children had asthma, 69% of the mothers were immigrant Latinas (predominantly from Mexico), and exclusive breastfeeding was reported as n=183/80/125/124 for 0 months/1-2/3-5/6+ months respectively. In an adjusted model including age, education, income, maternal smoking, preterm birth, pregnancy smoking and maternal atopy, there was a 59% reduction in risk of asthma from >6 months of exclusive breastfeeding compared with none (RR 0.41, 95%CI 0.20, 0.86). Maternal history of atopy modified the risk, with greater protection conferred due to >6 months of exclusive breastfeeding in those without maternal atopy (RR 0.36, 95%CI 0.15, 0.84 vs RR 0.75, 95%CI 0.20, 2.83). Nativity did not appear to confound or modify the association. In summary, we found that any exclusive breastfeeding (versus none) reduces the risk of asthma in young Latino children. These findings support the ongoing public health promotion of exclusive breastfeeding for six months.

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EXECUTIVE FUNCTIONING AND EARLY CHILDHOOD OBESITY. Amanda Brzozowski*, Carolyn Drews-Botsch (Emory University, Rollins School of Public Health, University City, GA United States)

Research has demonstrated links between executive functioning (EF) and both obesity and socioeconomic status (SES) and has also found EF to be a highly important predictor of future success. We used data from the Follow-Up Development and Growth Experiences Study (1997-99) to evaluate the possible association between early childhood obesity (body mass index (BMI), triceps- and subscapular-skinfold-thickness (TST, SST)) and EF (Developmental NEuroPSYchology Assessment (NEPSY) statue and visual attention scores: population mean=10, standard deviation=3). Obesity and EF metrics were measured in 418 children aged 4.5 years born at one of two Atlanta hospitals. Covariate information was obtained during the study or from previously collected data. Linear regression was used to estimate the change in NEPSY scores associated with being in the top 15th percentile of BMI/TST/SST based on CDC norms. After adjustment, a moderate, negative association was observed among girls between the NEPSY statue score and both skinfold thickness measurements (TST: -1.02 (95% confidence interval -2.36, 0.32); SST: -1.67 (-2.87, -0.48)) and among children born at the private hospital for all three obesity metrics (BMI: -0.94 (-1.96, 0.07); TST: -1.17 (-2.68, 0.34); SST: -1.99 (-3.17, -0.81)). Among girls born at the private hospital, the magnitude of the negative association was even greater for all three metrics. No consistent association was observed between statue score and any obesity metric among boys and children born at the public hospital, nor between any metric and visual attention score regardless of gender or hospital of birth. The consistent and specific nature of the negative association between obesity and the NEPSY statue score among girls of higher SES warrants further exploration.

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FACTORS ASSOCIATED WITH HOSPITAL RESOURCE UTILIZATION IN A POPULATION-BASED STUDY OF INFANTS WITH DOWN SYNDROME. April Dawson*, Cynthia Cassell, Matthew Oster, Richard Olney, Jean Paul Tanner, Russell Kirby, Jane Correia, Scott Grosse (Centers for Disease Control and Prevention, Atlanta, GA United States)

To better understand hospital resource use for children with Down syndrome (DS), we examined selected characteristics associated with hospitalizations and hospital costs during infancy for children with DS. This was a retrospective, population-based, state-wide study of infants with DS born 1998-2007, identified by the Florida Birth Defects Registry and linked to hospital discharge records. We used multivariable linear regression to analyze associations between selected characteristics and number of hospitalized days and total inpatient costs. Results were stratified by isolated DS (no other coded major birth defect); presence of severe (requiring catheter or surgical intervention or resulting in death during infancy [first 12 months of life]) and non-severe congenital heart defects (CHDs); and presence of coded major non-cardiac birth defects. Of 2,552 infants with DS, there were 4,724 inpatient admissions during infancy. During birth hospitalizations, infants born at facilities with only level I nurseries had lower inpatient costs by 37% for infants with isolated DS, 64% for infants with DS and severe CHDs, and 64% for infants with DS and other major birth defects, compared to infants born in facilities with level III nurseries. The difference was not significant for infants with DS and non-severe CHDs. Prematurity, public payer, and changes in payer were associated with increased hospitalized days and inpatient costs for infants with DS and CHDs. This study found inpatient resource use for infants with DS varies by the presence of other birth defects, birth weight, and gestational age.

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GENITOURINARY CONDITIONS REQUIRING MEDICAL INTERVENTION IN A POPULATION-BASED COHORT OF MALES WITH DUCHENNE/BECKER MUSCULAR DYSTROPHIES. YONG ZHU*, Paul Romitti, KM CONWAY, KD MATHEWS, S KIM, Y ZHANG, M YANG, Muscular Dystrophy Surveillance, Tracking, and Research Network (MD STARnet) (The University of Iowa, IOWA CITY, IA United States)

A limited number of clinic-based studies have reported genitourinary (GU) conditions in males with Duchenne/Becker muscular dystrophies; however, results from population-based studies are not available. The present study examined GU conditions requiring hospitalization or medication in a population-based cohort of males with Duchenne/Becker muscular dystrophies identified by the MD STARnet. The MD STARnet collected population-based surveillance data in Arizona, Colorado, Georgia, Hawaii, Iowa, and western New York State. Data abstracted from medical records of 918 males, born since 1982 and followed through 2012, were reviewed for documentation of GU-related hospitalizations and prescribed medications; percentages of males with GU conditions were estimated. Additionally, associations between GU conditions and treatment (respiratory assist device use, steroid use), disease symptoms (scoliosis, early versus late onset phenotype, ambulation), and sociodemographics (MD STARnet site, race/ethnicity) were examined. The cumulative probability of any GU condition was estimated by the Kaplan-Meier curve; hazard ratios (HRs) and 95% confidence intervals (CIs) were estimated from Cox regression. Among the 918 males, 81 (9%) had documented GU conditions producing a cumulative probability of 27% (95% CI=24-30%); voiding dysfunction (n=40, 49%), GU tract infection (n=19, 23%), and GU tract calculus (n=9, 11%) were the most common conditions. Multivariable Cox regression analyses showed significantly elevated risk of GU conditions in those who were not ambulatory compared to those who were ambulatory (HR=2.5, 95% CI=1.1-5.7). No other sociodemographic, treatment or disease symptoms were associated. These findings highlight the need for increased awareness of GU health and multidisciplinary care of patients with Duchenne/Becker muscular dystrophies.

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LABOR PATTERNS IN WOMEN ATTEMPTING VAGINAL BIRTH AFTER CESAREAN (VBAC) FROM THE CONSORTIUM ON SAFE LABOR STUDY. Katherine Laughon Grantz*, Victor Gonzalez-Quintero, James Troendle, Uma Reddy, Stefanie Hinkle, Michelle Kominiarek, Jim Zhang (Eunice Kennedy Shriver National Institute of Child Health and Human Development, Rockville, MD United States)

Despite an abundance of outcome data for women attempting vaginal birth after cesarean (VBAC), there are limited data on labor patterns. In a retrospective observational study at 12 U.S. centers (2002-2008), we examined interval of cervical dilation from one centimeter to the next and compared labor progression using repeated-measures regression with an 8th degree polynomial function for cervical dilation, stratified by spontaneous or induced labor, in 61,372 nulliparas and 3,211 multiparas undergoing VBAC (second delivery) with vertex presentation and delivery between 37-41 gestational weeks. Labor was induced in 44.0% of nulliparas and 23.5% of VBAC (P<0.001). Oxytocin use occurred in 64.9% of nulliparas versus 53.4% of VBAC with spontaneous labor (P<0.001) and 91.4% of nulliparas versus 89.4% of VBAC with induced labor (P=0.05). Cesarean delivery rates were 19.8% in nulliparas and 58.6% in VBAC. Median (95th percentile) traverse times for nulliparas versus VBAC with spontaneous labor from 4-10cm were 6.9 (27.3) versus 7.4 (28.7) hours (P=0.005), but only significantly slower prior to 7cm dilation. For women who reached 10cm dilation, spontaneous labor patterns were similar. For induced labor, traverse times for nulliparas versus VBAC from 4-10cm were 5.5 (22.6) versus 6.7 (26.6) hours (P<0.001), but only significantly slower prior to 7cm dilation. For women who reached 10cm dilation, labor patterns were slower for induced VBAC. Patterns of spontaneous labor for VBAC were similar to nulliparous labor. The longer duration of labor with induction in VBAC may reflect clinical practice decisions for less aggressive labor management (e.g. less oxytocin).

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MATERNAL POLYBROMINATED DIPHENYL ETHER CONCENTRATIONS (PBDES) AND THYROID HORMONE LEVELS IN MATERNAL AND CORD SERUM. Ann M. Vuong*, Glenys M. Webster, Megan E. Romano, Joseph M. Braun, R. Thomas Zoeller, Andrew N. Hoofnagle, Andreas Sjodin, Kimberly Yolton, Bruce P. Lanphear, Aimin Chen (University of Cincinnati, Cincinnati, OH United States)

Animal models uniformly show PBDEs reduce blood concentration of thyroid hormone. Thyroid hormone is essential for fetal growth and neurological development; therefore, it is of particular concern that PBDEs may interfere with thyroid hormone action during pregnancy. Previous studies have reported neurodevelopmental deficits in offspring of women with subclinical hypothyroidism and hypothyroxinemia. Using the Health Outcomes and Measures of the Environment Study, a prospective birth and pregnancy cohort in Cincinnati, Ohio in which 389 pregnant women were enrolled from 2003-2006 and remained until delivery of live singleton infants, we examined the association between prenatal PBDE exposure and thyroid hormones in maternal and cord serum. Concentrations of PBDEs were measured at enrollment (16±3 weeks gestation). Thyroid hormone concentrations were measured in maternal serum at enrollment (n=187) and in cord serum (n=256). A 10-fold increase in BDE-28 (ß=0.90 µg/dL, 95% CI 0.11, 1.69) and BDE-47 (ß=0.89 µg/dL, 95% CI 0.20, 1.58) was associated with increased maternal total thyroxine concentrations (TT4). Both congeners were similarly associated with free thyroxine (FT4), but to a lesser extent. Median concentrations of BDE-28 and -47 were 1.0 and 19.1 ng/g lipid, respectively. We also observed positive associations between BDE-47 and total (TT3) and free triiodothyronine (FT3). Every 10-fold increase in BDE-28 resulted in elevated concentrations of FT3 (ß=0.14 pg/ml, 95% CI 0.02, 0.26). These results do not indicate prenatal PBDE exposure is related to fetal thyroid hormone concentration, except for an inverse relation between BDE-28 and FT3. No association was observed between thyroid antibodies and PBDEs. These findings suggest prenatal PBDE exposure, particularly BDE-28 and -47, may increase maternal concentrations of TT4, FT4, TT3, and FT3 during pregnancy.

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MATERNAL SERUM MARKERS OF LIPID METABOLISM IN RELATION TO NEONATAL ANTHROPOMETRY. Nansi Boghossian*, Pauline Mendola, Candace Robledo, Edwina Yeung (Division of Intramural Population Health Research, Eunice Kennedy Shriver National Institute of Child Health and Human Development, Bethesda, MD United States)

Evidence regarding the relation between maternal lipid metabolism and birth size is inconsistent. We examined maternal serum from a random group of participants in the Calcium for Preeclampsia Prevention trial for total cholesterol (TC), triglycerides, HDL, LDL, and lipoprotein A (LpA) in relation to neonatal anthropometry. Non-fasting blood collection occurred at three time-points during pregnancy according to the trial's scheduling of specimen collection: <22 (average 15.7) (N=212), 22-32 (average 27.2) (N=185), and >33 (average 36.0) weeks' gestation (N=167). Lipids were log-transformed for normality. Linear regression determined the associations between lipids and birthweight z-score, ponderal index, and head circumference adjusting for race and body mass index. Mean (SD) gestational age at delivery was 39.6 (1.6) weeks. At baseline, women averaged (SD) in mg/dl 199.8 (36.8) TC, 61.6 (13.4) HDL, 117.0 (33.7) LDL, 131.3 (45.3) triglycerides, and 38.3 (41.7) LpA. There were no significant associations for birthweight z-score or head circumference and lipids. A 1-unit log increase in TC and HDL measured at baseline was associated with increases in ponderal index of 7.1 (95% CI: 1.1, 13.2) and 7.7 (95% CI: 2.1, 13.2) kg/m3, respectively. Ponderal index also increased in association with TC at the 2nd (8.5; 95% CI: 1.4, 15.6) and the 3rd measurements (10.6; 95% CI: 3.1, 18.0) and in association with LDL at the third measurement (4.7; 95% CI: 1.0, 8.5). TC measured throughout pregnancy was consistently associated with ponderal index indicating a regulatory role in fetal growth.

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PREECLAMPSIA RISK IN ASSOCIATION WITH MATERNAL ANTIOXIDANT LEVELS IN MID-PREGNANCY. Jacqueline Cohen*, Michael Kramer, Robert Platt, Olga Basso, Susan Kahn (McGill University, Montreal Canada)

Background: Endothelial dysfunction is a feature of the pathophysiology of preeclampsia hypothesized to be due to oxidative stress. Antioxidant molecules including vitamins A and E defend against the damaging effect of reactive oxygen species. **Objective**: To assess whether antioxidant levels in mid-pregnancy are associated with risk of preeclampsia. **Methods**: We conducted a case-control study, nested within a cohort of pregnant women in Montreal, Canada. Blood samples were obtained at 24-26 weeks and assayed for antioxidant levels among cases of preeclampsia (n=111) and unaffected controls (n=441). Women who developed gestational hypertension alone were excluded. We used logistic regression with z-score of each antioxidant as the main predictor variable for preeclampsia risk. We summed levels of highly correlated biomarkers (r^2>0.3) and log-transformed highly skewed distributions. We adjusted for body mass index, primiparity, preexisting diabetes, hypertension, smoking, and proxies for ethnicity and socioeconomic position. We accounted for missing data using multiple imputation. **Results**: A-carotene, b-carotene, anhydrolutein, a-cryptoxanthin, and b-cryptoxanthin were highly correlated and were summed to create the variable carotenoids. Lutein was significantly negatively associated with preeclampsia risk; OR=0.6 (95%CI 0.5-0.8) per SD. We found no significant associations for alpha-tocopherol/cholesterol (OR=0.9), gamma-tocopherol (OR=1.0), retinol (OR=1.1), lycopene (OR=0.9), or carotenoids (OR=0.8) in adjusted analyses. **Conclusion**: While we found that most antioxidants assessed in mid-pregnancy were not significantly associated with preeclampsia, lutein was a noted exception. Absence of association between vitamin E (tocopherols) and preeclampsia in the second trimester may help explain why previous supplementation trials have not been successful for preeclampsia prevention.

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RED BLOOD CELL FOLATE CONCENTRATIONS AMONG NON-PREGNANT U.S. WOMEN OF CHILDBEARING AGE, NATIONAL HEALTH AND NUTRITION EXAMINATION SURVEY, 2007-2010. Sarah Tinker*, Heather Hamner, Krista Crider (Centers for Disease Control and Prevention, Atlanta, GA United States)

Current U.S. guidelines for neural tube defect (NTD) prevention focus on folic acid intake, but do not address target concentrations of red blood cell (RBC) folate. Published data support a marked decrease in NTD risk for pregnant women with RBC folate concentrations above 906 nmol/L. We assessed RBC folate concentrations of U.S. non-pregnant women aged 12-49 years using 2007-2010 data from the National Health and Nutrition Examination Survey. We estimated the distribution of RBC folate concentrations stratified by folic acid supplement use and amount, sources of folic acid intake, age, race/ethnicity, and body mass index (BMI). We also examined factors associated with RBC folate concentrations above and below 738 nmol/L (equivalent to 906 nmol/L; values differ based on assay method/laboratory). We analyzed data on 3,861 women. The geometric mean RBC folate concentration was 1002 nmol/L (95% confidence interval [CI]: 973, 1022), well above the concentration associated with lower NTD risk. However, even with folic acid fortification in the U.S., 21.6% (95% CI: 19.4, 23.9) of women aged 12-49 years have RBC folate concentrations below 738 nmol/L, putting them at increased risk for having a pregnancy affected by a folate-sensitive NTD. This percentage differs substantially based on folic acid supplement use; 8.6% of supplement users compared to 26.8% of non-supplement users. Significant differences in RBC folate distributions were also observed by folic acid source, age, race and ethnicity, and obesity status. Future analyses will focus on modeling the total folate intake needed to achieve RBC concentrations associated with the lowest NTD risk.

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SHORT INTERPREGNANCY INTERVAL, TIMING OF GESTATION, AND THE FOLATE DEPLETION HYPOTHESIS. Ashley Naimi*, Nathalie Auger (McGill University, Montreal Canada)

Pre and early term birth have been linked with infant mortality and morbidity. Short interpregnancy intervals, or the elapsed duration between a woman's previous pregnancy and her next conception, are a risk factor for preterm and early term birth. One hypothesis explaining this relation is folate depletion caused by the previous pregnancy. We analyzed registry data to assess whether the national folic acid fortification program influenced the risk of preterm and early term birth in Québec, Canada, between 1981 and 2010. We extracted 1.9 million preterm, early term, and full term live singleton births by year and interpregnancy interval in two categories: 0 to <6 months and =6 months. We calculated preterm and early term birth rates by year standardized by maternal age. We used joinpoint regression to test whether the risk of preterm and early term birth changed following implementation of the policy within interpregnancy interval categories. For mothers with interpregnancy intervals < 6 months, joinpoint analysis estimated a change in the risk of preterm birth in the year 2000 (95% confidence interval: 1994, 2005), from an annual increase of 1.3% (95% confidence interval: 1.1%, 1.6%) to an annual decrease of 1.1% (95% confidence interval: -1.7%, -0.4%). For mothers with optimal interpregnancy intervals, the preterm birth risk changed in 2000 (95% confidence interval: 1995, 2008), from an annual increase of 1.7% (95% confidence interval: 1.1%, 2.3%) to no annual change (annual decrease of 0.3%, 95% confidence interval: -2.0%, 1.4%). Results for early term birth were less conclusive. Our results suggest that folic acid fortification positively impacted preterm birth risk in Quebec among women with inter-pregnancy intervals of less than six months.

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THE ASSOCIATION BETWEEN TRAJECTORIES OF GESTATIONAL WEIGHT GAIN AND CHILD IQ AT 5 YEARS OF AGE. Stefanie Hinkle*, Paul Albert, Lindsey Sjaarda, Jagteshwar Grewal, Katherine Grantz (Eunice Kennedy Shriver National Institute of Child Health and Human Development, Rockville, MD United States)

Extremes of gestational weight gain have been suggested to be associated with poor child cognitive development. Using a prospective cohort of parous Scandinavian women (1986-1988) with prepregnancy weight and a median of 12 weight measurements throughout gestation, we examined the association between trajectories of pregnancy weight gain and child development. To estimate each woman's weight gain trajectory we used linear mixed models (random effects) with piecewise regression for each trimester (n=1,793). In a sub-sample (n=501) the estimated random effects, which reflect prepregnancy weight and individual rate of weight gain within each trimester, were then used to associate weight gain trajectories with child's total, performance, and verbal IQ assessed at 5 years using Wechsler Preschool and Primary Scales of Intelligence-Revised. The mean (standard deviation) prepregnancy weight (kg) was 58.77 (10.17), and rate (kg/week) of weight gain in trimester 1, 2 and 3 was 0.26 (0.04), 0.32 (0.08), and 0.38 (0.09), respectively. Unadjusted analyses suggested a linear relationship with prepregnancy weight ($P<0.05$ for all) and a quadratic relationship with 3rd trimester rate ($P<0.03$ for all) and all IQ measures; however, when adjusted for maternal age, education, marital status, economic situation, and smoking, compared to the median quintile only the lowest quintile of 3rd trimester rate was associated with total [β=-5.5 (95% confidence interval (CI) -9.7, -4.1)] and performance [β=-6.0 (95%CI -10.2, -1.8)] IQ. These associations persisted when analyses were limited to deliveries ≥37 weeks. Low rate of maternal weight gain late in pregnancy may be associated with lower child cognitive scores.

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THE EFFECT OF MATERNAL STRESS ON CHILD ACADEMIC READINESS, AS MEDIATED BY PRETERM BIRTH. Rachel Burke*, Theresa Chapple-McGruder, Michael Kramer (Rollins School of Public Health, Emory University, Atlanta, GA United States)

Prenatal maternal stress has been shown to have an adverse effect on pregnancy outcomes such as preterm birth (PTB), which can have lingering effects on a child's well-being. This analysis explores the potential effect of maternal stress on child academic performance and mediation of this relationship through PTB. The study population comprises 3325 first-grade children born to Georgia-resident mothers between 2000 and 2002 with linkable data on state standardized test performance, birth certificates, and the Pregnancy Risk Factors Assessment Monitoring Survey (PRAMS). Exposures were defined as maternal experience, in the year preceding the birth, of at least one stressful life event (SLE) in each of four domains: financial, partner-related, emotional, or traumatic. The intermediate was PTB (<37 weeks gestation), and the outcomes were failure to pass each test section (English Language and Arts, Math, Reading). Logistic regression indicated partner-related SLEs, maternal education, primiparity, and delivery payor (Medicaid vs. other) as significant predictors ($p<0.05$) of PTB, while regression on test performance indicated PTB, maternal education, maternal race, delivery payor, and child sex as significant predictors ($p<0.05$). Mediation analysis using a SAS macro showed a null relationship between SLEs and test performance, also indicating that this relationship was not mediated through PTB (controlled direct effect of emotional SLEs on reading 1.11 [0.81, 1.50], natural indirect effect 1.00 [0.98, 1.03]). This is consistent with prior research showing a null or weak effect of SLEs on PTB. Future analyses will test for effect modification by race.

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THE IMPACT OF MATERNAL DIET DURING PREGNANCY ON EXCESS GESTATIONAL WEIGHT GAIN. Sneha Sridhar*, Fei Xu, Assiamira Ferrara, Monique Hedderson (Kaiser Permanente Northern California, Division of Research, Oakland, CA United States)

Excess gestational weight gain increases the risk of short- and long-term complications in both women and their offspring. Little is known about how maternal diet influences gestational weight gain. This study examined total caloric and macronutrient intake during pregnancy in relation to exceeding the 2009 Institute of Medicine (IOM) gestational weight gain guidelines. The multi-ethnic cohort consisted of 1,666 women (43% racial/ethnic minorities) at Kaiser Permanente Northern California who completed a Block Food Frequency Questionnaire (FFQ) during pregnancy (2011-2013). Total gestational weight gain was calculated from electronic health records and categorized per the 2009 IOM guidelines. The majority of the cohort exceeded the IOM recommended weight gain (14% below, 27% met, 59% exceeded). After adjusting for prepregnancy body mass index, maternal age, race/ethnicity, parity, and gestational age at FFQ completion, being in the highest tertile of total caloric intake vs. the lowest tertile resulted in a 36% increase in odds of exceeding the IOM recommendations [Odds Ratio (OR) (95% Confidence Interval (CI)): 1.36 (1.07-1.74)]. Higher polyunsaturated fatty acid intake reduced the odds of exceeding the guidelines [OR (95% CI): 0.65 (0.48-0.89) (Tertile 2), 0.51 (0.34-0.77) (Tertile 3), both vs. Tertile 1], after further adjusting for total energy intake. There was some suggestion that higher total fiber intake may reduce the odds of excess gestational weight gain [OR (95% CI): 0.79 (0.56-1.10) (Tertile 3, vs. Tertile 1)]. Saturated fat was not associated with gestational weight gain. Higher total caloric intake increased the odds of exceeding the IOM recommendations, whereas higher polyunsaturated fatty acid and fiber intake reduced the likelihood of exceeding them. Maternal macronutrient intake may be an important area of focus for interventions aiming to reduce excess weight gain in pregnancy.

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THE INFLUENCE OF INFANCY WEIGHT GAIN ON PATTERNS OF ADOLESCENT GROWTH IN JAPANESE CHILDREN. Wei Zheng*, Kohta Suzuki, Miri Sato, Hiroshi Yokomichi, Ryoji Shinohara, Zentaro Yamagata (Department of Health Sciences, Interdisciplinary Graduate School of Medicine and Engineering, University of Yamanashi, Chuo Japan)

Previous studies have indicated that the tempo of growth might be largely established during infancy. Greater weight gain during infancy was related to taller stature and advanced bone maturation at 8-9 years of age. However, these studies were carried out in western countries and the outcome was measured at a single time point. To better understand the influence of infancy growth rate on later growth in the Asian population, this study explored the overall growth trajectory from childhood to adolescence in Japanese children with or without rapid growth during infancy. This study included 563 boys and 543 girls born in Japan between 1991 and 1998. These children were followed up from birth to graduation from junior high school. Anthropometric data were collected at birth, 3 years of age, and then annually from first grade at elementary school (6 years of age) to third grade at a junior high school (14 years of age). A change in weight SD scores >+0.67 between birth and 3 years of age in the same sex was defined as rapid infancy growth. Annual height gain trajectories according to infancy growth in the same sex were constructed by performing multilevel analysis. Approximately 26% of the children were recognized as having rapid infancy growth. These children had lower birth weights and tended to have a taller-than-average stature at 6 years of age. Height gain trajectories showed that girls with rapid infancy growth initially gained more height, reached the peak height gain earlier, and experienced an earlier decline in height gain. Whereas, boys with and without rapid infancy growth had similar height gain until they reached the peak height gain stage. Subsequently, boys with rapid infancy growth experienced an early decline in height gain. In conclusion, children with rapid infancy growth might have taller statures in childhood and experience earlier decline in annual height gain after the growth peak.

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UNDERSTANDING THE IMPACT OF SOCIOECONOMIC RISK FACTORS ON LATE AND MODERATELY PRETERM BIRTH: A POPULATION-BASED COHORT STUDY. Lucy Smith*, Elizabeth Draper, David Field, Samantha Johnson, Bradley Manktelow, Neil Marlow, Stavros Petrou, Sarah Seaton, Elaine Boyle (University of Leicester, Leicester United Kingdom)

Objectives: To explore the impact of socioeconomic deprivation on birth at late and moderate preterm gestations (LMPT; 32-36 weeks). **Methods**. A geographical population-based cohort study of 938 LMPT and 939 term-born (=37 weeks) singleton babies recruited at birth. Detailed individual-level information on socio-demographic, economic, lifestyle and stress factors were collected via interview. Poisson regression analyses were used to explore maternal education level as a risk factor for late and moderate preterm birth, and to whether modifiable factors explained any of this variation. Cluster analysis will also be undertaken to define groups of women with similar socioeconomic, lifestyle and stress characteristics and explore rates of prematurity by these clusters. **Results**. The odds of delivering LMPT increased with decreasing levels of education (Odds ratio 1.60 (1.23 to 2.09) for degree -level education compared to no qualifications P=0.002). Three key risk factors explained this variation with education levels: access to a car (OR 1.30 (1.03 to 1.66); smoking during pregnancy (OR 1.28 (1.01 to 1.63) and low levels of fruit and vegetable consumption (OR 1.26 (0.99 to 1.62)). **Conclusion**s. Infants born to mothers with low levels of education are at greatest risk of being born LMPT. This association was predominantly explained by lifestyle behaviours and access to a car which may limit access to health care services. Socioeconomic risk factors continue to impact on prematurity up until 36 weeks gestation.

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USE OF MECONIUM IN PERINATAL EPIDEMIOLOGY: POTENTIAL BENEFITS AND PITFALLS. Bo Park*, Brian Lee (Drexel University School of Public Health Department of Epidemiology and Biostatistics, Philadelphia, PA United States)

Background: Meconium is a biomarker matrix that can be used to assess cumulative exposures in epidemiological studies of prenatal risk factors. Depending on when meconium is collected, different exposure windows during pregnancy can be measured. However, little guidance exists regarding the extent to which timing of meconium collection will influence resulting effect estimates. **Methods**: We performed a simulation study of prenatal tobacco smoke exposure (assessed from meconium nicotine) and birthweight. We discuss four typical meconium collection methods capturing different exposure windows, and assess the biases induced by these methods. **Results**: In simulations assuming that exposure to tobacco smoke only during late gestation was of etiological relevance to birthweight, use of a meconium collection method that captured exposure windows other than late gestation resulted in biased estimates of the true nicotine-birthweight association. **Conclusion**: Using meconium collection methods that do not reflect an exposure window of etiological relevance can lead to biased results and erroneous conclusions regarding the nature of prenatal exposure-outcome associations. Understanding how prenatal exposure patterns vary across the pregnancy and exposure windows of etiological relevance is essential in determining when and how to collect meconium for use in biomarker studies of prenatal exposure.

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MEALTIME BEHAVIOR PROBLEMS IN PRESCHOOL-AGED CHILDREN BORN PRETERM: PREVALENCE AND ASSOCIATIONS WITH ADHD AND PARENT USE OF FOOD AS A REWARD. Sarah Keim*, Kelly McNamara, Sarah Anderson (Nationwide Children's Hospital, Columbus, OH United States)

Introduction: Very or extremely preterm birth has been associated with greater externalizing behavior problems, but how these problems manifest at family mealtime remains unknown. Our objective was to characterize mealtime behavior problems among children aged 42-52 months born at 25-29 weeks' gestation, the extent of spousal/partner stress over these problems, and their associations with child attention and use of food as a reward. **Methods**: A parent questionnaire assessed frequency and severity of the child's mealtime behavior problems (20 items, 0-4 points per item, Cronbach's α=0.94), the Child Behavior Checklist for ADHD, and demographics during the PreK Picnic study visit (n=38: 23 boys). Gestational age and birth weight were obtained from the neonatal record. **Results**: Mealtime behavior problems varied in extent [mean (SD)=18 (13), range 0-45], but 38% of parents indicated multiple problem behaviors occurred often/very often. Common problems were not staying seated (29%), squirming/fidgeting (18%), and overstuffing one's mouth with food (18%). Seven of 28 parents with a spouse/partner (25%) agreed/strongly agreed their spouse/partner is bothered by the child's behavior at meals. Greater ADHD symptoms were associated with more mealtime behavior problems (β=1.50, 95% CI: 0.40, 2.60), and 18% of children scored in the borderline or clinical range for ADHD. Mealtime behavior problems were positively associated with parent's use of food as a reward (reward as dependent variable, 24-pt scale, β=0.17, 95% CI: 0.09, 0.25) in a linear regression model including sex, child age, gestational age, and maternal education. **Conclusion**: Parents of children born very or extremely preterm commonly report mealtime behavior problems and spousal stress. Mealtime behavior problems occur more frequently with increasing ADHD symptoms. Parents may deal with the stress of mealtime problems by using food to reward.

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MEALTIME BEHAVIOR PROBLEMS IN RELATION TO SELF-REGULATION: FINDINGS FROM THE PREK PICNIC STUDY OF PRESCHOOL-AGED CHILDREN BORN VERY PRETERM. Sarah Anderson*, Kelly McNamara, Rebecca Andridge, Sarah Keim (The Ohio State University College of Public Health, Columbus, OH United States)

Introduction: Children born very preterm are at higher risk for impaired executive functioning including deficits in self-regulation and are more likely to have behavior problems. It is unknown how these manifest at mealtimes. Our objective was to assess the extent to which self-regulation in preschool-aged children born preterm was associated with parent-report of problematic behavior at mealtime. **Methods**: Self-regulation in 38 children (23 boys) who were born at 24-29 (mean=27) weeks completed gestation was assessed using a standardized protocol (Gift Bag) in a laboratory setting when children were between 42 and 52 (mean=47) months of age. A parent completed a 20-item index (Cronbach's alpha = 0.94) of frequency and severity of child mealtime behavior problems. Gestational age and birth weight were obtained from the neonatal record. **Results**: Only 24% of children (9/38) were able to stay seated and refrain from touching an attractive gift while an examiner was out of the room for 3 minutes ("passed" the task). Poor self-regulation, defined as children who did not meet this standard, was more common among boys than girls (91% vs. 53%, p=.01), but was not associated with age, birth weight, or gestational age. The association between mealtime behavior problems score [mean (SD) = 18(13)] as a continuous outcome variable and self-regulation (poor vs. not) was modeled using linear regression with adjustment for sex, age, gestational age, birth weight, and a gestation x birth weight interaction. Children with poor self-regulation had mealtime behavior problem scores that were 11.4 (95% CI: 1.3 – 21.4) units higher than children with better self-regulation. **Conclusion**s: In a cross-sectional pilot study of children born very preterm, poor self-regulation at preschool-age was associated with more parent-reported mealtime behavior problems. Larger, prospective studies of this population are needed.

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PRE-PREGNANCY AND EARLY PREGNANCY LEISURE TIME PHYSICAL ACTIVITY AND FETAL GROWTH IN THE OMEGA STUDY. Sylvia E Badon*, P. Luke Wander, Chun-fang Qiu, Raymond Miller, Michelle A Williams, Daniel A Enquobahrie (University of Washington, Seattle, WA United States)

Background: Physical activity has well-known health benefits. However, associations of leisure time physical activity (LTPA) duration and energy expenditure with measures of fetal growth are largely unknown. **Methods**: Study participants (N= 3310) were identified from the Omega study, a prospective pregnancy cohort study. During a structured interview at 15 weeks gestation, participants reported LTPA duration (hours/week) and energy expenditure (MET-hours/week) in the year before pregnancy (ppLTPA) and in the week before the interview (epLTPA). Birth size measures were abstracted from medical records. Regression models were used to determine mean differences in infant birthweight (BW), ponderal index, and head circumference (HC) across quartiles of duration and energy expenditure of ppLTPA or epLTPA. **Results**: Overall, participants reported a median of 2.5 hours per week of epLTPA and 3.9 hours per week of ppLTPA. Women in the highest quartile for epLTPA duration delivered infants who weighed 43g less compared to women in the lowest quartile (95% CI: -84, -2). Women in the highest quartile of epLTPA energy expenditure delivered infants who weighed 40g less compared to women in the lowest quartile (95% CI: -81.5, 1.07), though this estimate was marginally significant. Higher ppLTPA was associated with higher HC (trend P for duration and energy expenditure=0.02 and 0.10, respectively). Women in the highest quartiles for either ppLTPA duration or energy expenditure had infants with a marginally significant 0.18-0.20cm greater HC compared to women in the corresponding lowest quartiles. **Conclusion**s: Early pregnancy LTPA is inversely associated with BW, and pre-pregnancy LTPA is positively associated with HC. Future studies to replicate findings and evaluate clinical importance of observed differences are warranted.

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UNDERSTANDING THE CAUSES OF AUTISM, THE RISE N AUTISM, AND THE CAUSES OF THE RISE IN AUTISM. Irva Hertz-Picciotto* (University of California Davis, MIND Institute and Department of Public Health Sciences, Davis, CA United States)

For decades, research on causes of autism spectrum disorder (ASD) and its underlying pathophysiology was at a standstill. Determining contributions from physical, chemical, microbiologic, and maternal physiologic factors was not up for discussion. Bettelheim's psychologic theories prevailed for many years, until scientific evidence demonstrated a neuropathologic basis of ASD, launching an era of intense research using tools and technologies from the molecular biology revolution to establish and decipher the role of genetics. In this last arena, candidate genes, genome-wide association studies, copy-number or structural variation, and now deep, full-genome/exome sequencing have each taken (or are currently taking) center stage in the pursuit of causal factors. Current estimates indicate 10% to 20% of autism cases can be traced to specific gene variants, and this figure is expected to continue rising. In the 1970s, snippets of evidence began to appear regarding environmental agents, including microbial pathogens, pharmacologic and other chemical exposures, nutritional factors, and maternal demographic and physiologic states. The pace of discoveries has been accelerating, with air pollution, maternal periconceptional nutrition, pesticides, some medications, and certain maternal morbidities during pregnancy emerging as candidate modifiable factors. Potential roles for chronic neuroinflammation, early life epigenetic changes, gene-by-environment interaction, and metabolic dysregulation affecting organs other than those of the central nervous system are gaining traction. The history of this etiologic research and the literature on potential targets for intervention to prevent or reduce severity of autism will be discussed within a framework that describes the rise in autism, distinguishes causes of autism from causes of the rise in autism, and provides an integrative framework for advancing the field.

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ASSOCIATION BETWEEN NEONATAL PHOTOTHERAPY AND ADMISSIONS FOR INFANTILE CANCER. Andrea Wickremasinghe, Michael Kuzniewicz, Barbara Grimes, Charles McCulloch, Thomas Newman* (University of California, San Francisco, San Francisco United States)

Background: Although in vitro and in vivo studies suggest phototherapy can damage DNA, epidemiologic studies linking it to childhood cancer have yielded mixed results. Objective: To determine if neonatal phototherapy is associated with infantile cancer. **Methods**: We analyzed datasets from the California Office of Statewide Health Planning and Development, created by linking birth certificates and hospital discharge abstracts up to 1 year. Subjects were 5,145,024 infants born in California at ≥35 weeks from 1998-2007. We used ICD-9 codes to identify phototherapy at <15 days and discharge diagnoses of cancer at > 60 days. To reduce confounding we used a propensity score including sex, birth weight, gestational age, large for gestational age, twin birth, C-section, Down syndrome, parental race/ethnicity, parental ages and education levels and year of birth. **Results**: The proportions of infants who received phototherapy (N=177,980; 3.5%) and were admitted for cancer (N=1,101; 21.4/100,000) are consistent with national data. Phototherapy was associated with subsequent admissions for cancer (adjusted odds ratio (aOR) 1.5, 95% CI 1.2-2.0, P=0.002). Consistent with studies from Sweden, phototherapy was associated with myeloid leukemia (aOR 2.8, 95% CI 1.5-5.3, P=0.002) but not lymphoid leukemia (aOR 1.0, 95% CI 0.42-2.5). The overall risk differences were approximately 1/8,000 for cancer and 1/25,000 for myeloid leukemia but were 10 times greater for cancer and 82 times greater for myeloid leukemia in children with Down syndrome. We also found previously unreported associations between phototherapy and cancers of the kidney (aOR 2.8, 95% CI 1.4-5.9, p=0.006) and bone (aOR 5.9, 95% CI 2.2-16, p<0.001). **Conclusion**s: Phototherapy may slightly increase the absolute risk of cancer in infancy. This should be considered when making phototherapy treatment decisions, especially for infants with Down syndrome.

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PHOTOTHERAPY AND THE RISK OF CHILDHOOD CANCER IN TERM AND LATE PRETERM NEWBORNS. Thomas Newman*, Andrea Wickremasinghe, Soora Wi, Barbara Grimes, Charles McCulloch, Michael Kuzniewicz (University of California, San Francisco, San Francisco, CA United States)

Background: Phototherapy for neonatal jaundice may damage DNA. Studies linking phototherapy to childhood cancer have yielded mixed results and have had limited ability to distinguish between effects of phototherapy and hyperbilirubinemia. **Objectives**: To quantify associations between phototherapy and childhood cancers controlling for bilirubin levels and other confounders. **Methods**: This retrospective cohort study included 498,393 newborns born at =35 weeks from 1995 through 2011 in Kaiser Permanente Northern California (KPNC) hospitals and followed =60 days after birth. We ascertained phototherapy use at <30 days and first cancer diagnoses at =60 days from in-and outpatient ICD-9 codes and the KPNC tumor registry. Covariates included Down syndrome and age-specific bilirubin levels in relation to phototherapy guidelines. We analyzed data using traditional multivariate Cox models and models adjusted for phototherapy propensity scores in quintiles or using restricted cubic splines. **Results**: Overall, 7.7% of included newborns (N=38,456) received phototherapy (inpatient only 6.2%; home only 1.1%; both 0.4%). Phototherapy use increased from 2.7% in 1995 to 14.7% in 2011. Over a mean follow-up of 7.1 years, 677 children were diagnosed with cancer (19/100,000 person-years). Unadjusted hazard ratios (HR) were elevated for all cancers (HR 1.4, P=0.01), all leukemias (HR 1.8, P=0.006), myelocytic leukemia (HR 2.5, P=0.04) and kidney cancer (HR 2.5, P=0.06). With any of the adjustments for covariates or propensity to receive phototherapy, these associations were attenuated and no longer statistically significant, though the upper limits of the 95% confidence intervals for hazard ratios for all cancers except brain crossed 2. **Conclusion**s: We found concerning associations between some childhood cancers and use of phototherapy. However, we were unable to rule out confounding as the basis for the associations.

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DOES EARLY-LIFE CARDIOVASCULAR HEALTH HAVE AN INDEPENDENT EFFECT ON BIRTH OUTCOMES? AN EXAMPLE OF MARGINAL STRUCTURAL MODELS WITH THE BOGALUSA HEART STUDY. Emily W Harville*, Leann Myers, Marni Jacobs, Maeve Wallace, Wei Chen (Tulane University, New Orleans, LA United States)

Pregnancy outcomes may be affected by lifetime health. In this analysis, we explore whether early-life cardiovascular health predicts birth outcomes. Vital records data for births to 1037 women who had participated in the Bogalusa Heart Study were linked. Women had participated at least twice but up to 12 times in the study; lipid levels and blood pressure measured at the median-aged visit during childhood (<18 years) and adulthood visit prior to and closest in time to pregnancy (18+ years) were analyzed. Cardiovascular risk factors were divided into quartiles; low birthweight (LBW) was defined as birthweight <2500 g and preterm birth (PTB) as gestational age <37 weeks. Marginal structural models with inverse probability weighting were used to investigate a possible independent effect of childhood cardiovascular measures. Weights were truncated at the 1st and 99th percentiles. Log-poisson models were used to model the relative risk, with adjustment for age, race, smoking, education, and BMI. For LDL-c, the results suggested independent effects of both childhood and adult levels on LBW (adjusted relative risk 2.80, 95% CI 1.15-6.81 for the highest childhood quartile; aRR 0.43, 95% CI 0.20-0.93 for the third adult quartile). The lowest risk for PTB was found in the third quartile of adult cholesterol (aRR 0.38, 95% CI 0.18-0.84) and the highest risk in the second quartile of adult diastolic blood pressure (aRR 2.40, 95% CI 1.04-5.58). No independent associations for either childhood or adult measures were found for systolic blood pressure, HDL, and triglycerides. Marginal structural models may assist in estimating direct effects of early-life risk factors, but weighting requires careful consideration.

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LIFETIME BURDEN OF CARDIOVASCULAR HEALTH AND BIRTH OUTCOMES: A VITAL RECORDS LINKAGE ANALYSIS WITH THE BOGALUSA HEART STUDY. Emily W Harville*, Marni Jacobs, Maeve Wallace, Wei Chen, Leann Myers (Tulane University, New Orleans, LA United States)

Worse preconception cardiovascular health has been linked to worse birth outcomes. In this analysis, we examine whether a greater cumulative lifetime burden of cardiovascular risk factors is associated with birth outcomes, rather than a single measurement. A total of 449 women participants in the Bogalusa Heart Study with measurements during childhood (< 12 years), adolescence (12-17 years), and adulthood (18+ years) were linked to vital records data for analysis of birth outcomes. Cumulative burden of lipids and blood pressure was estimated by area under the curve using the latest measurements in childhood, adolescence, and adulthood, and divided into quartiles. Low birthweight was defined as birthweight <2500 g and preterm birth as gestational age <37 weeks. Logistic models and linear models were used, with adjustment for age, smoking, race, education, and BMI. Low birthweight was highest in the second quartile of diastolic blood pressure (aOR 4.83, 95% CI 1.52-15.36) and the highest quartile of triglycerides was associated with birthweight (beta -194 g, 95% CI -372 to -16), preterm birth (aOR 3.63, 95% CI 1.18-11.18), and gestational age (beta -1.13 week, 95% CI -1.79 to -0.47). There were no associations with total cholesterol, HDL-c, or LDL-c. Lifetime higher levels of triglycerides may indicate a higher risk for poor birth outcomes.

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A VALIDATION STUDY OF NEONATAL SEIZURE REPORTS IN BIRTH CERTIFICATES COMPARED TO MATERNAL INTERVIEWS AND HOSPITAL DISCHARGE FILES. Qing Li*, Nigel Paneth, Matthew Francis, Madeleine Lenski, Ariel Brovont (Department of Epidemiology & Biostatistics, Michigan State University, East Lansing, MI United States)

Neonatal seizures are an important newborn neurological disorder, a risk factor for cerebral palsy, and an indicator of the quality of perinatal care. Although routinely collected in both U.S. Standard Certificate of Live Birth formats (1989 and 2003 revisions) currently in use, the validity of birth certificate recording of NS has not been reviewed recently. We compared seizures recorded on birth certificates and two other sources – hospital discharge abstracts and maternal interviews – in 372 case and control children born 2003-2010 and enrolled in a case-control study of CP (Origins, Wellness, and Life-history in CP, OWL) in Michigan. Neonatal seizures on birth certificates were based on the entry "seizures" in the 1989 revision and "seizure or serious neurologic dysfunction" in the 2003 revision. For discharge abstracts, the following International Classification of Diseases, Ninth Revision, Clinical Modification codes were sought: 779.0 (convulsions in newborn), for infant discharges at age less than 28 days, 345.X (epilepsy), 780.3 (convulsions), 780.39 (other convulsions) and 333.2 (myoclonus). In maternal phone interviews, we asked for a history of seizures or convulsions in the first 24 hours of life. In children with all three sources of information, we found 16 seizures in discharge abstracts, 20 reported in maternal interviews, but only one of these was recorded in birth certificates. The Kappa coefficient for maternal interview and hospital discharge abstracts was 0.55 (moderate agreement), but Michigan birth certificates were a very poor source of neonatal seizure history.

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LABOR COMPLICATIONS, BIRTH DEPRESSION, AND SIGNS OF POSSIBLE NEONATAL ENCEPHALOPATHY IN THE ASPHYXIAL PATHWAY TO CEREBRAL PALSY AMONG TERM BIRTHS: AN APPLICATION OF G-ESTIMATION IN A MATCHED CASE-CONTROL STUDY. Qing Li*, Zhehui Luo, Nigel Paneth, Matthew Francis, Madeleine Lenski, Ariel Brovont (Department of Epidemiology & Biostatistics, Michigan State University, East Lansing, MI United States)

Our goal was to investigate the relationship of labor complications (LC), birth depression (BD), and signs of neonatal encephalopathy (NE) in the asphyxial pathway to cerebral palsy (CP). From 2009-2012, 197 children with CP born from 1993 to 2010 and aged 2-15 were recruited from specialty clinics in Michigan in a study of Origins, Wellness, and Life-history in CP (OWL). They were matched with 197 controls on birth year, gender, and gestational age (< 28; 28-32; 33-36; >=37 weeks). Only a term-born (37 completed weeks of gestation) subset of 97 pairs of participants was included. Exposure information was collected from birth certificates, maternal and child hospital discharge files and maternal phone interviews. Following the approach in Berzuini et al. (2012), we estimate the causal controlled direct effect (CDE) of LC on CP while NE pathway is blocked and the post-exposure intermediate confounding effect of BD is adjusted, incorporating the G-estimation formula in this matched case-control design. Cases and controls were similar in gestational age, gender and year of birth, three matching criteria ($p>0.05$). Compared to mothers of controls, mothers of cases were more likely to experience LC ($p<0.01$). Compared to controls, cases were more likely to have lower birthweight and experience BD and signs of NE ($p=0.02$). The causal controlled direct effect of LC on CP in the risk ratio scale is 1.73 (95% CI: 0.73, 4.10), i.e., the risk for CP is 1.73 higher among term-births with labor complication than term-births without labor complication if the mediating pathway through NE is blocked. Comparing this estimate to the total causal effect of LC on CP conditional on W, which equals to OR=4.57 (95% CI: 1.20, 17.49), we conclude that a large portion of the effect of LC to CP is mediated through NE. Future studies can include sensitivity analysis techniques in unmeasured mediator-outcome confounders and a prospective study design.

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PREPREGNANCY LOW DENSITY LIPOPROTEIN (LDL) PEAK PARTICLE DIAMETER AND SUBSEQUENT RISK OF GESTATIONAL DIABETES (GDM). Monique Hedderson*, Ronald Krauss, Fei Xu, Sneha Sridhar, Assiamira Ferrara (Kaiser Permanente Northern California, Oakland, CA United States)

LDL particles exhibit substantial heterogeneity in size, density and composition. A predominance of small, dense LDL particles and smaller LDL peak particle diameter are associated with an atherogenic lipoprotein profile as well as insulin resistance, a strong risk factor for developing GDM. This study aimed to evaluate whether LDL peak diameter measured before pregnancy predicted subsequent risk of GDM. We conducted a nested case-control study of women who participated in a Health Check-up exam and had a subsequent pregnancy at Kaiser Permanente Northern California. Cases were 257 women who developed GDM. Controls were selected in a 2:1 ratio and matched for year of blood draw, age at exam, age at pregnancy, and number of intervening pregnancies. Conditional logistic regression was used to obtain odds ratios (ORs) as estimates of the relative risk of GDM. LDL peak particle diameter was measured by ion mobility. Prepregnancy LDL peak diameter was smaller in women who developed GDM compared with controls (230.6 ± 5.6 Å and 232.0 ± 4.7 Å, respectively, P-value< 0.001). A one standard deviation decrease in LDL peak diameter (4.7 Å) was associated with a 34% increased likelihood of developing GDM (95% CI: 1.09-1.68), after adjusting for race-ethnicity, family history, BMI, weight change before pregnancy and homeostasis model assessment-estimated insulin resistance. In summary, a prepregnancy lipoprotein profile characterized by smaller LDL peak particle diameter is associated with an increased risk for developing GDM. Improving this profile in women of reproductive age may reduce the risk of pregnancy complications, such as GDM.

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POSTNATAL GROWTH PATTERNS OF PRETERM AND LATE TERM INFANTS, AND DIFFERENCES IN THIS ACCORDING TO MATERNAL EDUCATION. Laura Howe*, Michael Kramer, Kate Tilling, Debbie Lawlor (University of Bristol, Bristol United Kingdom)

Background: The long-term growth consequences for preterm and early-term birth, and whether these differ according to maternal education, are poorly understood. Understanding whether long-term consequences for preterm infants differ by maternal education is important from an equity perspective, and may also be informative about the degree to which these consequences are preventable. **Methods**: Using the Avon Longitudinal Study of Parents and Children (N=11,886), we examined gestational age (<32, 32-36, 37-38, 39-41, =42 weeks) differences in height and BMI up to age 10, and maternal education differences in this association. **Results**: Preterm (<32; 32-36 weeks) and early -term birth (37-38 weeks) were associated with shorter height compared to term birth (39-41 weeks). Differences were large for children born <32 weeks (mean difference at age 10: -4.2cm, $p<0.001$) but small for those born at 32-36 or 37-38 weeks (<1cm at age 10, $p=0.04$ or 0.07). Children born at <32 weeks or 32-36 weeks had slightly lower BMI. No BMI differences were observed for those born at 37-38 weeks. Height deficits associated with being born at 32-36 or 37-38 weeks were larger in children of less educated mothers (mean height deficit at age 10 for 37-38 weeks compared with term birth was 1cm greater in children with least compared with most educated mothers, $p=0.1$); maternal educational did not modify the associations between gestational age <32 weeks and height, or between any gestational age and BMI. **Conclusion**: The height deficits associated with moderate preterm and early-term birth are slightly larger in children with less educated mothers; differences in the underlying causes of early delivery and/or characteristics of the postnatal environment may explain this. Lower BMI across childhood in preterm children is not modified by maternal education.

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THE ASSOCIATION BETWEEN FINANCIAL LIFE EVENT STRESSORS AND RISK OF LOW BIRTH WEIGHT AMONG AFRICAN AMERICANS AND WHITES – AN ANALYSIS OF LOS ANGELES MOMMY AND BABY (LAMB) SURVEYS. Yuan Zhao*, Trace Kershaw, Chandra Higgins, Shin Chao (Yale School of Public Health, New Haven, CT United States)

Objectives: We examined the association between financial life events stressors during pregnancy and low birth weight among African Americans and Whites, while systematically controlling for potential confounders including individual characteristics and city-level variations and clustering. **Methods**: We analyzed data from 4970 women with singleton births from the 2007 and 2010 Los Angeles Mommy and Baby Surveys. Having experienced financial life event stressors was defined as having experienced at least one of the following life events during pregnancy: lost job, husband lost job, and had a lot of bills she could not pay. Multilevel logistic regression was used to assess the association between financial stressors and low birth weight among African Americans and Whites. Potential confounders included were: city-level economic hardship index, maternal demographics, pre-pregnancy conditions, insurance, behavioral risk factors and social support. **Results**: Significantly higher proportion of African Americans experienced one or more financial stressors during their pregnancy, compared to Whites ($p<0.001$). The association between financial stressors and low birth weight was significantly different between African Americans and Whites (P for interaction=0.033). Experience of financial stressors during pregnancy was significantly associated with low birth weight among African Americans (adjusted Odds Ratio=1.49; 95% Confident Interval=1.01, 2.20) but not whites. **Conclusion**s: Differential impact of financial stressors during pregnancy may contribute to racial disparities in low birth weight among African Americans and Whites. We showed that the three financial life event stressors examined in this study were more likely to impact African Americans than Whites. Financial stress during pregnancy is an important area for public health to address in order to improve birth outcomes among African Americans.

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PRENATAL EXPOSURE TO PERFLUORINATED CHEMICALS, ATTENTION-DEFICIT/HYPERACTIVITY DISORDER AND AUTISM. Zeyan Liew*, Beate Ritz, Ondine von Ehrenstein, Bodil Bech, Ellen Nohr, Chunyuan Fei, Rossana Bossi, Tine Henriksen, Eva Bonefeld-Jørgensen, Jørn Olsen (University of California, Los Angeles, Los Angeles, CA United States)

Introduction: Perfluorinated chemicals (PFCs) are persistent pollutants that found to be endocrine disruptive and neurotoxic in animals. Positive correlations between PFCs and neurobehavioral problems in children were reported in cross-sectional data, but finding from prospective studies are limited. We investigated whether prenatal exposure to PFCs increases the risks of attention-deficit/hyperactivity disorder (ADHD) or autism in children. **Methods**: We studied 83,389 mother-child pairs enrolled in the Danish National Birth Cohort during 1996–2002. From a total of 890 ADHD cases and 301 autism cases identified from the Danish National Hospital Register and the Danish Psychiatric Central Registry in 2011, we randomly selected 220 cases of ADHD and autism each into a case-cohort study and also randomly selected 550 controls frequency matched on child's sex. Fifteen PFCs were measured in maternal plasma samples from early or mid-pregnancy. We used unconditional logistic regressions to estimate odds ratios. **Results**: Perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA) were detected in all samples, and 6 other PFCs were quantified in about half samples. We found no associations between ADHD or autism in children and maternal PFC concentrations (modeled as per inter-quartile range or natural log unit increase, as well as categorized in quartile). No effect measure modification by child's sex. **Conclusion**s: We found no evidence to suggest prenatal PFC exposures increase the risks of ADHD or autism in children in the Danish birth cohort.

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MATERNAL AND ENVIRONMENTAL PREDICTORS OF UMBILICAL CORD BLOOD LEVELS OF INTERLEUKIN-33 (IL33), THYMIC STROMAL LYMPHOPOIETIN (TSLP), AND IMMUNOGLOBULIN E (IGE) IN A CANADIAN BIRTH COHORT. Jillian Ashley-Martin*, Linda Dodds, Tye Arbuckle, Adrian Levy, Robert Platt (Dalhousie University, Halifax Canada)

Prenatal environmental exposures and parental genotype have the potential to alter fetal immune system development and subsequent risk of childhood atopy. Previous efforts at early life detection of atopic disease have focused on Immunoglobulin E (IgE) despite the fact it is a poor predictor of childhood atopy. The role of the epithelial-cell produced cytokines Thymic Stromal Lymphopoietin (TSLP) and Interleukin-33 (IL33) in atopic disease etiology has been observed in animal models buthas not been studied in neonates. The objectives here were to assess the correlations among TSLP, IL33, and IgE and to identify prenatal predictors of these immune system biomarkers. This study utilized data collected in the Maternal-Infant Research on Environmental Chemicals (MIREC) Study, a trans-Canada cohort study of 2001 pregnant women. Of these women, 1254 had a singleton, term birth and cord blood sample. Spearman correlation coefficients (SCC) and logistic regression models were used to examine associations and estimate odds ratios (0R) of elevated immune system biomarker levels (≥80%ile). TSLP and IL33 were more strongly correlated with each other (SCC=0.7, $p<0.0001$) than with IgE (IL33 SCC=0.16, TSLP SCC= 0.23). In a multivariate model, maternal atopy (OR=2.1, 95% CI: 1.1-4.0), low household income (OR=2.7, 95% CI: 1.2-6.3), and self-reported exposure to heavy street traffic (OR=1.7, 95% CI: 1.0-2.5) were associated with a significantly increased risk of elevated TSLP and IL33 levels. While similar trends were observed with IgE, none of these associations were statistically significant. Our findings provide supporting human evidence for the mechanistic hypothesis that both IL33 and TSLP are operational in early life atopy pathways. This study provides motivation for further investigation into the sensitivity of cord blood IL33 and TSLP levels as prognostic factors for childhood atopy.

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SYSTEMATIC CRITICAL REVIEW OF ECONOMIC EVALUATIONS OF THE ELIMINATION OF H. PYLORI FOR GASTRIC CANCER PREVENTION. Arianna Waye*, Karen Goodman, Philip Jacobs (University of Alberta, Edmonton Canada)

Background: Chronic H.pylori infection causes gastric cancer, a cancer responsible for a large global disease burden. Evidence suggests that elimination of H.pylori may reduce the frequency of gastric cancer, but prevention strategies based on this approach have not been adopted by health care systems due to uncertainties regarding the feasibility and cost-effectiveness of specific infection control strategies. **Objectives**: This review summarizes existing information of relevance to establishing cost-effective international guidelines for the elimination of H.pylori infection as a cancer prevention strategy. **Methods**: Comprehensive systematic electronic searches of electronic databases were conducted through September, 2013. Studies examining the cost-effectiveness of H.pylori elimination as a means of reducing gastric cancer incidence were considered in this review. Data extraction included: country, perspective, target population, screening instrument, measure of disease frequency, costs and health outcomes, and ICER. The methodological quality of studies was appraised using the Quality of Health Economics Studies (QHES) instrument. A narrative synthesis approach was used to summarize the evidence. **Results**: Over 1743 titles and abstracts were screened, with 45 full-text articles reviewed for eligibility. The fifteen studies included conclude that elimination strategies were cost-effective under a subset of conditions considered, or that conclusions regarding cost-effectiveness could not be drawn without better data. Study findings conflict on the specific factors that determine when it is cost-effective to screen and treat, especially in terms of the target population. Furthermore, current practice, costs, and the distribution of disease and relevant population characteristics introduce uncertainty regarding the validity of transferring findings from one jurisdiction to another. **Conclusion**s: At present, it does not appear possible to generate a cost-effective international guideline for screening practices for H.pylori infection aimed at cancer prevention. This study furthers current discussions concerning the transferability of findings derived from cost-effectiveness studies across jurisdictions. To inform cost-effective international guidelines, a new methodological approach is necessary.

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ESTIMATING QUALITY ADJUSTED LIFE YEARS LOSS DUE TO NONCOMMUNICABLE DISEASES AND PREDICTING ITS CHANGES UNTIL 2040. Minsu Ock*, Jung won Han, Jin Yong Lee, Min-Woo Jo (Department of preventive medicine, University of Ulsan, South Korea, Seoul Korea)

Objectives: This study aims to estimate QALYs loss for Korean adults due to 13 noncommunicable diseases (NCDs) in 2010 and predict the changes of QALYs loss until 2040. **Methods**: Thirteen NCDs (Hypertension, diabetes mellitus, hyperlipidemia, stroke, myocardial infarction, angina, osteoporosis, asthma, allergic rhinitis, atopic dermatitis, cataract and depression) were selected from Korean Community Health Survey (KCHS) 2010. The EQ-5D indexes from KCHS 2010 and the Korean valuation set were used as utility weight by gender, age, and diseases. The morbidity was also from KCHS 2010. The mortality by diseases and life expectancy were from Korean Statistical Information Service (KOSIS). To predict QALYs loss for the future, the data of future population projection from KOSIS were used as substitutes for the number of population of 2010. **Results**: Among 13 NCDs, the largest total QALYs loss was arthritis (406,653 QALYs), followed by hypertension (364,252 QALYs), and stroke (333,897 QALYs). The largest QALYs loss due to mortality was stroke (226,359 QALYs), whereas the largest QALYs loss due to morbidity was arthritis (400,861, QALYs). Applying the middle estimates of future population, the largest difference of total QALYs loss between 2010 and 2040 was stroke (529,248 QALYs), followed by hypertension (529,220 QALYs) and diabetes mellitus (359,028 QALYs). **Conclusion**s: Arthritis, hypertension, and stroke were important in terms of total QALYs loss, and QALYs loss due to NCDs will be increasing continuously. These results could be utilized to develop the cost-effective interventions to reduce the burden of diseases for NCDs. Keywords: quality adjusted life year, noncommunicable disease, health related quality of life

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INCIDENCE OF DIALYSIS IN LIVE KIDNEY DONORS AND A MATCHED NONDONOR COHORT. Allan Massie*, Xun Luo, Brian Boyarsky, Nathan James, Daniel Scharfstein, Jennifer Alejo, Dorry Segev (Johns Hopkins School of Medicine, Baltimore, MD United States)

Kidney transplantation is the preferred treatment for end-stage renal disease; live-donor transplants have better outcomes than deceased-donor transplants. Live kidney donation is assumed to be safe, but long-term outcomes in live donors are poorly understood. Comparison between donors and the general population is inappropriate since donors undergo health screening prior to donation. We retrospectively obtained diabetes incidence and patient survival in 1074 living kidney donors and individually matched them to a healthy nondonor population from two community-based studies (ARIC and CARDIA), matching on age at entry, race, gender, and BMI and excluding nondonor participants with baseline contraindications to donation. Time origin was donation (donors) / study entry (nondonors). Participants were followed until death, diabetes incidence, or censorship. Diabetes-free survival was modeled with Poisson regression. In the first 4 years after donation, incident diabetes was lower in nondonors than in matched controls (incidence rate ratio (IRR) =0.2, 95% CI 0.1-0.5, p <0.01). Incidence in nondonors decreased over time, from 0.60 events per 100 person-years (py) in years 0-4 to 0.33 events per 100 py after 10 years. Incidence in donors increased over time, from 0.15 events per 100 py in years 0-4 to 1.26 events per 100 py after 10 years. Past 10 years, incidence in donors was significantly higher than in nondonors (p<0.01). Incidence was higher in males than females (IRR=1.2), in black participants than nonblack participants (IRR=1.5), in older participants (IRR per 10y=1.3), and participants with higher BMI (IRR per 5 units=2.1) (all comparisons p<0.001).Living donors had lower diabetes than matched controls immediately after donation, but higher incidence past 10 years. Living donors have substantially higher long-term risk of diabetes. Risk is higher in donors who are male, older, black, or have higher BMI.

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LACK OF INSURANCE, BLACK RACE, AND REGION OF RESIDENCE ARE ASSOCIATED WITH LACK OF ADEQUATE NEPHROLOGY CARE AMONG U.S. PATIENTS WITH LUPUS NEPHRITIS-ASSOCIATED END-STAGE RENAL DISEASE. Laura Plantinga*, Rachel Patzer, William McClellan (Emory University, Atlanta, GA United States)

Nephrology care prior to end-stage renal disease (ESRD), which leads to improved ESRD outcomes, is associated with social and geographic factors. Whether this association exists in those with ESRD secondary to lupus nephritis (LN), who should receive dual-provider (nephrologist/rheumatologist) care, is unknown. In 6271 U.S. patients initiating treatment for LN-ESRD, we examined whether race, sex, pre-ESRD insurance, employment status, and region were associated with pre-ESRD nephrology care using 2005-2011 United States Renal Data System data. Logistic and ordinal logistic regression models were used to estimate odds ratios (ORs) and 95% confidence intervals (CIs), with adjustment for the above factors, age, and total number of comorbid conditions. In this predominantly young (median age, 38), female (82%), and black (50%) LN-ESRD population, 29%, 14%, 22%, and 36% received no, <6 months, 6-12 months, and >12 months of pre-ESRD care, respectively, compared to 34%, 14%, 24%, and 28% among other ESRD patients (P<0.001). With full adjustment, having public [OR=2.5 (95% CI, 2.1-3.0)] or private [OR=3.8 (3.1-4.6)] insurance and being female [OR=1.2 (95% CI, 1.0-1.4)] were associated with greater likelihood of having any pre-ESRD care, whereas black vs. white race [OR=0.8 (0.7-0.9)] was associated with lower likelihood of any pre-ESRD care. Estimates were similar with pre-ESRD care defined as an ordinal variable and as a dichotomous variable with a cutoff of 12 months of pre-ESRD care. Further, in all models, most U.S. regions showed statistically significantly lower likelihood of pre-ESRD care relative to New England (range of ORs, 0.2-0.7). In conclusion, patients with LN-ESRD are more likely to receive pre-ESRD care than those with ESRD secondary to other causes, but LN-ESRD patients who are uninsured, black, and do not live in the Northeast may be less likely to receive adequate pre-ESRD care.

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SOCIOECONOMIC INDICATORS AND GEOGRAPHY ASSOCIATED WITH ACCESS TO KIDNEY TRANSPLANTATION AMONG U.S. PATIENTS WITH LUPUS NEPHRITIS-ASSOCIATED END-STAGE RENAL DISEASE. Laura Plantinga*, Rachel Patzer, William McClellan (Emory University, Atlanta, GA United States)

The social and geographic factors associated with access to kidney transplantation among patients with end-stage renal disease (ESRD) secondary to lupus nephritis (LN) have not been examined. Using United States Renal Data System data on U.S. patients with LN initiating ESRD treatment 2005-2011, we examined whether race, sex, insurance, employment status, and region were associated with (1) being informed of transplant options at the start of ESRD and (2) time to kidney transplant waitlisting. Logistic regression and Cox proportional hazards models were used to estimate odds ratios (ORs) and hazard ratios (HRs), 95% confidence intervals (CIs), with adjustment for the above factors, age, body mass index, smoking, and total number of comorbid conditions. Among 6376 LN-ESRD patients (82% female; 53% black; median age, 36), 86% were informed of transplant options and 27% were waitlisted within 1 year. With full adjustment, only having private (vs. no) insurance was associated with being informed of transplant options [OR=1.5 (95% CI, 1.2-2.0)]. Public [HR=1.2 (1.0-1.3)] and private [HR=1.8 (1.5-2.1)] insurance and employment [HR=1.4 (1.3-1.5)] were associated with greater likelihood of earlier waitlisting, whereas black vs. white race [HR=0.9 (0.8-1.0)] and residence in regions in the South and West (vs. New England) were associated with delayed waitlisting (range of HRs, 0.5-0.7). While being informed of transplant options was associated with earlier waitlisting [HR=1.5 (1.3-1.7)], its inclusion in the model resulted in similar estimates of the associations of these factors with waitlisting. These results suggest that LN-ESRD patients who are uninsured, unemployed, black, or live in the South or West may have decreased access to transplantation. Being informed of transplant options at the start of ESRD does not appear to mediate the association of these factors with waitlisting.

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MODELING TREATMENT TRAJECTORIES TO OPTIMIZE THE ORGANIZATION OF RENAL REPLACEMENT THERAPY AND PUBLIC HEALTH DECISION MAKING. Cécile Couchoud*, Emmanuelle Dantony, Mad-Hélénie Dantony, Emmanuel Villar, René Ecochard (Agence de la biomédecine, Saint Denis La Plaine France)

Nephrologists and health-care providers need to better understand the impact of their decisions about long-term treatment strategies. Therefore, we have developed a statistical tool to study the course of incident end-stage renal disease patient cohorts over time and to quantify, by simulations, the impact of various expected changes or new strategies. Based on the data from 67 258 adult patients, a multi-state model was used to estimate the transitions between ten modalities of treatment and the risk of death. In order to reduce the problems of having a big database and considering truncation, we focused on a method of estimation of the transition rates based on grouped data instead of individual trajectories. In each of the states, transitions from this state to the other ones may be considered as concurrent risks; the likelihood of the whole model being decomposed into conditionally independent clusters. Rates were supposed to be constant on 7 time intervals. Costs for the national health insurance were estimated from hospital discharge and outpatients reimbursement databases. We predicted 15-year restricted mean lifetime, the monthly cost and the number of patients in each compartment at each time point for a cohort of 1 000 patients for 180 months after the onset of treatment considering their age and their diabetic status. We present 2 scenarios to illustrate the possibility of simulating policy changes for patients aged 45-69 years without diabetes. Compared to prediction based on current practice, increased use of non-assisted peritoneal dialysis and hemodialysis in satellite units (i.e. 15% of the total time spent on in-center hemodialysis vs. 24%) will increase the 15-year restricted mean lifetime (95.6 vs. 89.2 months) and lower the costs (3 405 €/months vs. 3 685). Improving access to kidney transplants (i.e. 613 transplantations vs. 495) will increase the 15-year restricted mean lifetime to 94.3 months, the time spent with a functioning graft (61.4% vs. 51.6%) and lower the costs (3 267 €/months). Sensitivity analysis on mortality didn't substantially influence the results. A model based on patients' treatment trajectories can improve the description and understanding of RRT as a dynamic phenomenon. Its use for simulation may help professionals and decision-makers to optimize renal organization and care.

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THE ASSOCIATION BETWEEN BODY MASS INDEX AND INCIDENT END-STAGE RENAL DISEASE IN BLACKS AND WHITES: THE SOUTHERN COMMUNITY COHORT STUDY. Elvis Akwo*, Kerri Cavanaugh, Alp Ikizler, William Blot, Loren Lipworth (Vanderbilt University Medical Center, Nashville, TN United States)

Background and objectives The relationship between body mass index (BMI) and end stage renal disease (ESRD) may differ by race due to underlying metabolic differences between blacks and whites. There are few studies investigating this differential association. **Methods** We conducted a nested case-control study of 631 incident ESRD cases and 1,897 matched controls within the Southern Community Cohort Study, a large prospective cohort study that enrolled >85,000 adults aged 40-79 from 2002-2009. Current weight and height, as well as weight at age 21, were reported by participants at cohort entry and were used to calculate BMI at enrollment and BMI at age 21. Occurrence of ESRD among cohort members was ascertained by linkage with the United States Renal Data System. **Results** With normal BMI (18.5-24.9 kg/m^2) as the referent category, conditional logistic regression was used to calculate adjusted odds ratios (OR) and corresponding 95% confidence intervals (CI) for ESRD across other BMI categories by race. Among blacks, there were significant increases in odds of ESRD among those who were overweight (OR: 1.43; 95%CI: 1.10, 1.87) or obese (OR: 2.51; 95%CI: 1.84, 3.43) at age 21. Among whites, the association between ESRD and BMI at age 21 was more pronounced, with corresponding ORs of 2.00 (95%CI: 0.84, 4.75) and 7.46 (95%CI: 2.77, 20.12), respectively. The p-value for interaction with race = 0.047. For BMI at study enrollment, only among whites was increasing level of obesity associated with ESRD risk, particularly for those in the highest class of obesity (BMI≥40 kg/m^2; OR: 3.37; 95%CI 1.15, 9.87). **Conclusion** Our results provide evidence of racial differences in the relationship between BMI, both in early adulthood and middle age, and ESRD. These findings warrant further research into understanding the underlying metabolic differences that may explain these differences.

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ASSOCIATION BETWEEN CHLORDANE LEVELS AND SERUM HORMONE CONCENTRATIONS IN THE U.S. SERVICEMEN'S TESTICULAR TUMOR ENVIRONMENTAL AND ENDOCRINE DETERMINANTS (STEED) STUDY. Armen Ghazarian*, Britton Trabert, Barry Graubard, Frank Stanczyk, Nader Rifai, Ralph Erickson, Katherine McGlynn (National Cancer Institute, Rockville, MD United States)

Background: Endocrine-disrupting chemicals (EDCs) such as organochlorine pesticides are thought to affect hormonal homeostasis. Several studies have investigated the effects of organochlorine exposure on reproductive outcomes, but studies examining their effects on endogenous hormones are scarce. Of these, inverse associations have been reported between organochlorine exposure and testosterone levels in men. The purpose of this study was to determine if two major metabolites of the insecticide chlordane, trans-nonachlor and oxychlordane, were associated with serum hormone concentrations in men. **Methods**: The study examined serum samples from 667 white males without cancer between 17-42 years of age in the U.S. Servicemen's Testicular Tumor Environmental and Endocrine Determinants (STEED) study. Serum EDC levels were categorized into quartiles. Linear regression models adjusted for identified covariates were used to examine the association between each metabolite and male endogenous hormones. **Results**: Trans-nonachlor and oxychlordane were inversely associated with luteinizing hormone (LH) [Q4 vs. Q1 oxychlordane: Beta -0.20, p-trend 0.02; trans-nonachlor: Beta -0.22, p-trend 0.03]. Partial correlations revealed similar inverse associations [oxychlordane: R-squared -0.12; trans-nonachlor: R-squared -0.12]. Mutual adjustment for testosterone and follicle-stimulating hormone did not attenuate these results. **Conclusion**: Our data suggests that exposure to trans-nonachlor or oxychlordane may be inversely associated with serum concentrations of LH in white males. The hypothesis that EDC exposure is associated with male endogenous hormones remains viable. LH stimulates the testicular Leydig cells to produce testosterone. Thus, low serum LH may lead to reduced testosterone levels. Further investigation is warranted to examine whether exposure to other EDCs is associated with changes in male endogenous hormones.

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EXPERIENCE MATTERS: DIFFERENCES IN CESAREAN DELIVERY RATES BETWEEN RESIDENT AND ATTENDING PHYSICIAN PRACTICES. Anna M. Modest*, Michele R. Hacker, Celeste Royce (Beth Israel Deaconess Medical Center, Boston, MA)

Objectives: To determine whether there is a difference in the incidence of unscheduled cesarean delivery based on whether the patient's intrapartum care is provided by a chief resident physician (resident) or an attending physician (attending). **Methods**: We conducted a retrospective medical record review of all singleton, nulliparous, term deliveries for women at least 18 years of age from January 1, 2008 through December 31, 2012. Scheduled cesarean deliveries were excluded. Delivering physician was categorized as resident or attending. Poisson regression with robust variance was used to estimate the risk ratio (RR) and 95% confidence interval (CI). **Results**: We identified 8,629 deliveries, and 345 (4.0%) were performed by residents. Among women delivered by residents, 19.7% were Caucasian, 46.1% were Black and 15.4% were Hispanic. This was significantly different from the attending group where 51.6% were Caucasian, 8.2% were Black and 4.7% were Hispanic ($p<0.0001$). Women delivered by a resident were less likely to be nulligravid ($p<0.0001$) and were younger (mean age 26.1 ± 5.4) than women in the attending group (31.0 ± 5.0, $p<0.0001$). The incidence of unscheduled cesarean delivery was 29.6% among resident deliveries and 25.1% among attending deliveries, yielding a crude RR of 1.18 (95% CI: 0.996-1.39) for the risk of unscheduled cesarean delivery when intrapartum care was provided by a resident. When adjusted for race/ethnicity, maternal age at delivery and gravidity, women delivered by a resident had a higher risk (RR: 1.24, 95% CI: 1.03-1.48) of unscheduled cesarean delivery than women delivered by an attending. **Conclusion**: After controlling for risk factors, such as race/ethnicity, maternal age and gravidity, residents at our institution were more likely to perform an unscheduled cesarean delivery than attendings. More research is needed to understand this difference in practice patterns.

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INTERNATIONAL COMPARISON OF PLACENTAL ABRUPTION RATES: AGE-PERIOD-COHORT ANALYSIS. Ava Hamilton*, Cande Ananth, Katherine Keyes, Mika Gissler, Chunsen Wu, Rolv Skjarven, Shiliang Liu, Michelle Williams, Minna Tikkanen, Sven Cnattingius (Columbia University, New York, NY United States)

Objective: To examine the varying rates of placental abruption by maternal age, year of delivery, and maternal birth cohort across four European countries and the United States (US).**Methods**: The study comprised of all women who delivered from 1978-2011 in Denmark, Finland, Norway, Sweden, and a sample of 863,879 women who delivered in the US (National Hospital Discharge Survey) from 1979-2010. Maternal birth cohort was calculated by subtracting age from delivery year. Abruption was reported based on International Classification of Disease. Trends in age, period, and cohort rates of abruption were estimated using age-period-cohort models with a Poisson distribution. **Results**: Abruption rates across the five countries varied greatly. Overall, the highest and lowest abruption rates across age, period, and birth cohorts were 10 per 1000 in the US and 4 per 1000 in Finland. Maternal age in each country showed a J-shaped pattern with increased rates at the extremes of the age distribution. In comparison to births in 1990, births after 1990 in all European countries had lower risks of abruption. As compared with birth cohorts in 1970, cohorts born before 1950 in Norway and US had higher risks of abruption, while those in Denmark, Finland, and Sweden had lower risks of abruption. **Conclusion**: There is a strong and consistent maternal age effect on abruption. Unlike the US, European countries show a clear decrease in abruption since births in 1990. These findings suggest population rates of abruption are country specific; differences across countries in the distribution of risk factors, especially smoking during pregnancy may help guide policy to reduce abruption rates. Future research is needed to determine the explanations underlying differences in overall rates as well as period and cohort trends across countries.

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SENSITIVITY ANALYSIS FOR ESTIMATING DIRECT EFFECTS: THE DIFFICULT CASE OF PRETERM BIRTH AS A MEDIATOR. Olga Basso* (McGill University, Montreal Canada)

In perinatal epidemiology, many exposures act on relevant endpoints directly and through preterm birth. Strong unmeasured factors causing both preterm birth and the outcome are generally assumed in this setting, resulting in biased estimates of direct effects. VanderWeele (2010) proposed a formula to correct the empirical estimates, given assumptions on the unmeasured factors. The formula's behavior was examined in simple simulations, where a measured exposure, E, and an unmeasured factor, U, independent of one another, reduced gestational length and increased risk of outcome. U was set to have a stronger effect than E on both length of gestation and outcome. In the examined scenarios, babies with E had a lower prevalence of U at preterm and, to a lesser extent, at term weeks. Odds ratios (OR) at term were 10-15% higher than the "truth", but slightly lower than those that would have been obtained in term babies without U (due to residual confounding by gestational length). In preterm births, estimates were strongly biased, and mildly influenced by factors that caused early birth but had no direct effect on the outcome. Different patterns of risk for E (constant across gestation, or increasing with gestational age) could result in similar observed ORs. Plugging the empirical parameters for U into the formula resulted in corrected ORs very close to those restricted to babies without U (at term, very similar to the observed), but somewhat different from the true ones. Estimates at 39-40 weeks were closest to the true direct effect of E. In large datasets, the OR estimated in a narrow stratum of term babies may serve as the upper limit for the direct effect of interest, setting a lower limit based on the –generally underestimated- observed estimates at earlier weeks. A range of possible direct effects of E may then be obtained without making assumptions on the unmeasured factor U.

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ASSOCIATION OF SOCIAL AND EMOTIONAL SUPPORT WITH CONTRACEPTIVE USE AMONG U.S. ADULTS: RESULTS FROM THE 2010 BEHAVIORAL RISK FACTOR SURVEILLANCE SYSTEM. Ramos Mboane*, Madhav Bhatta, Vinay Cheruvu (Kent State University College of Public Health, Kent United States)

Introduction: Unintended pregnancy is a major public health concern in the United States (U.S). Role of social/emotional support and social networks in contraceptive use to prevent unintended pregnancy has been studied in developing country populations. However, studies from the developed countries are limited. This study examined the relationship between the level of social and emotional support and contraceptive use among U.S. adults. **Methods**: Data from the 2010 Behavioral Risk Factor Surveillance System (BRFSS) were analyzed (sample size= 15,127) for this study. The outcome of interest was whether the respondents or their partners were currently doing something to keep from getting pregnant (contraceptive use). The primary exposure of interest was "rarely/never "or "always/usually/sometimes" receiving the needed social and emotional support. Multivariable logistic regression analyses were performed to estimate adjusted ORs and the corresponding 95% CI. Stratified analyses were performed to assess potential effect modification by gender and race. **Results**: Overall, 70.8% (95% CI: 69.3% – 72.3%) of the respondents reported that they or their partners were currently using contraceptives. After adjusting for potential confounders, "rarely/never" getting social and emotional support was significantly negatively associated with contraceptive use compared to those reporting "always/usually/ sometimes" getting the support (OR= 0.59; 95% CI: 0.40–0.87). In the stratified analysis by gender and race, "rarely/never" getting social and emotional support was significantly inversely associated with contraceptive use among Hispanic males only (OR= 0.13; 95% CI: 0.05–0.36). **Conclusion**: In a population-based study of U.S. adults, a significant inverse association was observed between lack of social and emotional support and current contraceptives use. However, this association was modified by gender and race.

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THE IMPACT OF AN EXERCISE INTERVENTION ON PHYSICAL ACTIVITY DURING PREGNANCY: THE BEHAVIORS AFFECTING BABY AND YOU (B.A.B.Y.). Marquis Hawkins*, Bess Marcus, Edward Stanek, Barry Braun, Glenn Markenson, Joseph Ciccolo, Lisa Chasan-Taber (Division of Biostatistics & Epidemiology, Department of Public Health, School of Public Health & Health Sciences, University of Massachusetts, Amherst, MA United States)

OBJECTIVES: To examine the impact of a prenatal exercise intervention on physical activity in 260 women at risk for gestational diabetes mellitus. **METHODS**: Participants in the Behaviors Affecting Baby and You (B.A.B.Y.) Study were randomized to either a 12-week individually- tailored, motivationally-matched exercise intervention (n=132) or a comparison health and wellness intervention (n=128). Physical activity was assessed with the Pregnancy Physical Activity Questionnaire. Linear mixed models evaluated the impact of the interventions on change in total physical activity and according to intensity, type and total walking. **RESULTS**: As compared to the health and wellness arm, the exercise arm had significantly greater increases in sports/ exercise activity (0.3 vs. 5.4 MET hours/week respectively; ($p<0.001$), smaller declines in total activity (-42.7 vs. –1.4. MET hours/week respectively; $p=0.01$) and activities of moderate-vigorous intensity (-30.6 vs. -10.3 MET hours/week respectively; $p=0.049$), and were more likely to achieve recommended guidelines for physical activity (OR=2.12; 95% C.I. = 1.45, 3.10). There was a similar trend of a positive impact of the intervention in activities of light intensity, total walking, and transportation; however, these findings were not statistically significant. There were no reported injuries related to increasing physical activity in the intervention group. **DISCUSSION**: A prenatal exercise intervention increased exercise and compliance with physical activity guidelines while attenuating decreases in overall activity in a population of high-risk pregnant women.

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TREATMENT FOR INFERTILITY AND RISK OF HYPERTENSION. Leslie V Farland*, Francine Grodstein, John P Forman, Janet Rich-Edwards, Jorge E Chavarro, Stacey A Missmer (Department of Epidemiology, Harvard School of Public Health, Boston, MA United States)

Many infertile women seek fertility treatment that may expose them to elevated levels of exogenous hormones. Oral contraceptives and other hormonal treatments have been known to alter risk for hypertension later in life. We evaluated the association of fertility treatment with hypertension risk among participants in the Nurses' Health study II. Women reporting incident infertility were followed from 1989 until 2009 (N=7,714), at which time they ranged in age from 45-62. Women were categorized into exclusive exposure categories based on level of fertility treatment attained (No treatment, Clomiphene, Gonadotropin alone/ Intrauterine insemination (IUI), In-vitro fertilization (IVF), Clomiphene + Gonadotropin/IUI, Clomiphene + IVF, Gonadotropin/IUI + IVF, Clomiphene + Gonadotropin/IUI + IVF). Cox proportional hazard models adjusted for age, calendar time, BMI, smoking, income, parity, healthy eating index, and BMI at age 18 were used. No clear pattern between fertility treatment and hypertension was found. Compared to infertile women with no treatment, women with treatment regimes that initiated with clomiphene and continued with gonadotropins tended to be at increased risk of hypertension (Clomiphene + Gonadotropin/IUI: Relative Risk (RR): 1.21; 95% Confidence Interval (0.96, 1.54), Clomiphene + IVF: 1.23; (0.83, 1.82), Clomiphene + Gonadotropin/IUI + IVF: 1.66; (1.02, 2.69)). However, gonadotropin treatments not initiated with clomiphene and clomiphene treatment alone showed no increased risk (Clomiphene: 1.04 (0.94, 1.14), Gonadotropin/IUI: 1.01; (0.84, 1.21), IVF: 0.74; (0.56, 0.98), Gonadotropin/IUI + IVF: 0.93; (0.69, 1.26)). Overall, among this relatively young cohort of women, there was no clear relationship between fertility treatment and hypertension. However further research should consider these treatment groups, especially those who initiated with clomiphene and continued with gonadotropins.

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GLYCEMIC CONTROL AMONG WOMEN WITH PREGESTATIONAL DIABETES: MODELING ITS POTENTIAL PUBLIC HEALTH IMPACT ON THE PREVENTION OF CONGENITAL HEART DEFECTS IN THE UNITED STATES. Regina Simeone*, Owen Devine, Jessica Marcinkevage, Suzanne Gilboa, Hilda Razzaghi, Barbara Bardenheier, Andrea Sharma, Margaret Honein (Centers for Disease Control and Prevention, Atlanta, GA United States)

Diabetes prior to pregnancy, i.e., pregestational diabetes (PGDM) increases risk for having a pregnancy affected by a congenital heart defect (CHD). Glycemic control before and early in pregnancy reduces risk of PGDM-associated CHDs. We estimated population attributable fractions (PAFs) and number of children born with CHDs annually in the United States in which the CHD could potentially be prevented by establishing glycemic control prior to and early in pregnancy in women with PGDM. We conducted a systematic search of the literature through December 2012 in Medline, Embase, CINAHL, and POPLINE. Included studies were case-control or cohort studies, provided estimates for associations between PGDM and all or individual CHDs, and had a comparison group of women without PGDM. Of 3,352 studies, 12 met criteria for a meta-analysis of all CHDs. Meta-analyses of specific CHD subtypes used subsets of 3 to 5 studies. We estimated summary odds ratios (ORs) with Bayesian meta-analysis methods and combined these ORs with estimates of CHD prevalence using a Monte Carlo simulation approach to obtain uncertainty intervals (UIs) for PAFs. The summary OR for the association between PGDM and all CHDs was 3.8 (95% UI 3.0-4.9); summary ORs ranged from 3.7 (95% UI 1.7-7.4) for coarctation of the aorta to 10.6 (95% UI 4.7-20.9) for atrioventricular septal defect. We estimate that 760 (95% UI 585-975) cases of CHDs, 40 (95% UI 20-55) cases of coarctation of the aorta, and 55 (95% UI 40-70) cases of atrioventricular septal defect could potentially be prevented annually if all women in the United States with PGDM achieved glycemic control before pregnancy. Estimates from this analysis suggest that adequate preconception care of PGDM could have a measureable impact by reducing the number of infants born with a CHD annually.

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EFFECTS OF STRESS AND DEPRESSION ON RISK OF UNINTENDED PREGNANCY AMONG YOUNG WOMEN. Kelli Stidham Hall*, Yasamin Kusunoki, Heather Gatny, Jennifer Barber (University of Michigan, Ann Arbor, MI United States)

Objective: To prospectively examine the effect of depression and stress symptoms on young women's one-year unintended pregnancy risk. **Methods**: Panel data were drawn from a longitudinal study of 992 U.S. women ages 18-20 years, 97% of whom strongly desired to avoid pregnancy. Weekly journals measured relationship, contraceptive, and pregnancy outcomes. We examined 27,572 journals from 940 women over the first year. Self-reported pregnancy was our outcome. We assessed moderate/severe stress (PSS-4) and depression (CESD-5) symptoms at baseline. We used discrete-time, mixed-effects, proportional hazard logistic regression models to estimate the effect of stress and depression on time-variant pregnancy risk. **Results**: Nearly a quarter of women reported baseline moderate/severe stress (23%) and depression (24%) symptoms. The one-year unintended pregnancy rate was 10%. Pregnancy rates were higher among women with stress (15% vs. 9%, P=0.03) and depression (14% vs. 9%, P=0.04) compared to women without symptoms. In multivariable models, the risk of pregnancy was 1.6 times higher among women with stress compared to those without stress (Risk Ratio (RR) 1.6, 95% CI 1.1,2.7). Women with comorbid stress and depression symptoms had over twice the risk of pregnancy (RR 2.1, CI 1.1,3.8) compared to those without symptoms. Among women without a prior pregnancy, having both stress and depression symptoms most strongly predicted subsequent pregnancy (RR 2.3, CI 1.2,4.3), while stress alone was the strongest predictor among women with a prior pregnancy (RR 3.0, CI 1.1,8.8). **Conclusion**s: Stress symptoms, and especially comorbid stress and depression, contributed to an increased risk of unintended pregnancy over one year. We are continuing to examine the biological (fecundity) and behavioral (sex and contraception) mechanisms and social context through which stress shapes young women's experiences with unintended pregnancy.

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A PROSPECTIVE COHORT STUDY OF PREPREGNANCY POTATO CONSUMPTION AND THE RISK OF GESTATIONAL DIABETES: POTATOES, FRIEND OR FOE? Wei Bao*, Deirdre K. Tobias, Frank B. Hu, Cuilin Zhang (Eunice Kennedy Shriver National Institute of Child Health and Human Development, Rockville, MD United States)

The Dietary Guidelines for Americans continuously include potatoes within vegetables as a healthful food. However, unlike most other vegetables, potatoes may detrimentally affect glucose metabolism because they contain rapidly absorbed starch of high glycemic index. We prospectively examined the association between prepregnancy potato consumption and risk of gestational diabetes (GDM). We included 15,264 women who were free of prior GDM or pre-pregnancy chronic diseases in the Nurses' Health Study II (1991-2001). Consumption of potatoes and other foods was assessed every four years via validated food frequency questionnaire. Incident first-time GDM was ascertained by biennial questionnaires, which was previously validated by medical records. Relative risks (RRs) and 95% confidence intervals (CIs) were estimated using log-binomial models with generalized estimating equations. During 10 years of follow-up, we documented 867 incident GDM cases among 21,411 singleton pregnancies. After adjusting for age, parity, body mass index, dietary and other factors, the RR (95% CI) of GDM comparing the highest with lowest quartile of total potato consumption was 1.32 (1.06-1.64) (P for linear trend = 0.01). The adjusted RRs (95% CIs) of GDM associated with 1 serving/day increment of consumption were 1.88 (1.17-3.01) for baked, boiled, or mashed potatoes and 5.02 (1.20-21.05) for French fries. Substituting 1 serving/day of potatoes with other vegetables, legumes, or whole grains was associated with lower GDM risk, with the corresponding RRs (95% CIs) of 0.74 (0.58-0.94), 0.70 (0.50-0.97), and 0.69 (0.54-0.87), respectively. These associations did not differ by age, parity, BMI, family history of diabetes, or physical activity. In conclusion, prepregnancy potato consumption was positively associated with the risk of GDM. Substitution of potatoes with other vegetables, legumes, or whole grains may lower the risk of GDM.

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DIETARY CARBOHYDRATE INTAKE AND ANDROGENS IN NORMALLY MENSTRUATING WOMEN. Lindsey Sjaarda*, Sunni Mumford, Edwina Yeung, Karen Schliep, Jean Wactawski-Wende, Enrique Schisterman (Eunice Kennedy Shriver National Institute of Child Health and Human Development, Bethesda, MD United States)

We previously described a mild polycystic ovary syndrome (PCOS)-like phenotype, with a higher rate of anovulation with increasing testosterone (T) and anti-mullerian hormone (AMH, marker of antral follicle count) in premenopausal, healthy women. Studies associate PCOS with insulin resistance which can be promoted by a high carbohydrate diet. Thus, we explored the relationship between dietary carbohydrate intake, insulin, T and AMH in the same cohort of normally menstruating women studied previously. Dietary carbohydrate intake during up to two menstrual cycles among 259 women (n=509 cycles) was measured as the average of four 24-hr dietary recalls administered in each cycle. Serum hormones (insulin, T, AMH) were measured fasting up to 8 times each cycle and free T (fT) and free androgen index (FAI) were calculated. Mixed linear models were adjusted for age, total caloric intake, physical activity and repeated hormone measures across and within cycles to evaluate relationships between carbohydrate intake and log-transformed hormones. Both insulin and T were not different across quartiles of mean total carbohydrate or total sugar intake, while fT ([geometric mean, 95% CI] Total Carb: 0.44 ng/dL, 0.41-0.47 vs. 0.39, 0.37-0.42, P=0.02; Starch: 0.43, 0.41-0.45 vs. 0.39, 0.37-0.41, P=0.03) and FAI (Total Carb: 2.5, 2.3-2.7 vs. 2.1, 1.9-2.3, P=0.02; Starch: 2.4, 2.2-2.6 vs. 2.1, 2.0-2.3, P=0.03) were lower in the highest vs. lowest quartiles of each. However, there were no differences in insulin, T, fT or FAI across quartiles of mean total starch intake. Furthermore, AMH did not differ across quartiles of any carbohydrate intake measure. Despite evidence of dietary influences on insulin resistance, dietary carbohydrate intake was not related to insulin, androgen or AMH concentrations in our study. Thus, relative increases in carbohydrate intake likely do not contribute to elevated T and AMH in healthy women.

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MATERNAL PREPREGNANCY BODY MASS INDEX AND GESTATIONAL WEIGHT GAIN IN RELATION TO MACROSOMIA: BEFORE AND AFTER 2009 INSTITUTE OF MEDICINE GUIDELINE. Aimin Chen*, Fan Xu, Changchun Xie, Tianying Wu, Emily DeFranco (University of Cincinnati, Cincinnati, OH United States)

In the Institute of Medicine (IOM) 2009 gestational weight gain (GWG) guideline for women with different prepregnancy body mass index (BMI) , it recommends a GWG of 12.5-18 kg for underweight, 11.5-16 kg for normal weight, 7-11.5 kg for overweight, and 5-9 kg for obese women. However, its impact on birth outcomes remains to be determined, especially in the midst of an obesity epidemic. We analyzed Ohio birth certificates from 2006 to 2012 to examine the conformity to the guideline and the risk of macrosomia (birth weight >4000 g) by prepregnancy BMI categories, and determined the relation between prepregnancy BMI, GWG, and macrosomia. We limited the data to 869,531 singleton live births at 22-44 weeks of gestation. Overall 43% of normal weight, 66% of overweight, and 60% of obese women gained weight above the guideline (>16, 11.5, 9 kg, respectively), with the percentage barely changed between 2006-2008 and 2010-2012. Compared with normal weight women, overweight women had a covariates adjusted risk ratio (RR) of 1.45 (95% confidence interval [CI]: 1.43, 1.48) for delivering macrosomic babies and obese women had a RR of 1.78 (95% CI: 1.75, 1.81); the RRs were similar before or after 2009. In 2006-2012, the risk of macrosomia was 4.82% among normal weight women with GWG within the guideline. Using this group as the referent, obese women with GWG above the guideline had the highest risk (13.54%), with a RR of 2.95 (95% CI: 2.87, 3.03), followed by overweight women with GWG above the guideline (11.57%, RR 2.46 [95% CI: 2.39, 2.53]) and normal weight women with GWG above the guideline (9.97%, RR 2.14 [95% CI: 2.08, 2.19]). In conclusion, pregnant women did not significantly reduce weight gain after the issuance of 2009 IOM GWG guideline, and its impact on the risk of macrosomia was minimal. GWG above IOM guideline still significantly contributed to higher risk of macrosomia in the general population.

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MATERNAL OCCUPATIONAL PESTICIDE EXPOSURE AND RISK OF CARDIOVASCULAR MALFORMATIONS IN THE NATIONAL BIRTH DEFECTS PREVENTION STUDY. Carissa Rocheleau*, Steven Bertke, Christina Lawson, Paul Romitti, Wayne Sanderson, Sadia Malik, Philip Lupo, Tania Desrosiers, Erin Bell, Charlotte Druschel, Adolfo Correa, Jennita Reefhuis (National Institute for Occupational Safety and Health, Centers for Disease Control and Prevention, Cincinnati. OH United States)

Background: Cardiovascular malformations (CVMs) are among the most common congenital malformations, affecting approximately 4 per 1,000 live births. Pesticide exposure has been suggested as an etiologic factor, but results of previous studies have been inconsistent. **Methods**: We used data for 1997-2002 births from the National Birth Defects Prevention Study, a population-based multicenter case-control study, to examine maternal occupational exposure to fungicides, insecticides, and herbicides for 3328 infants with CVMs and 2988 unaffected control infants whose mothers reported working. Potential pesticide exposure from one month before conception through the first trimester of pregnancy was assigned by an expert rater using a job-exposure matrix and job history details self-reported by mothers. Odds ratios (ORs) and 95% confidence intervals (CIs) were calculated with multivariable logistic regression, adjusted for maternal and paternal education, center, income, Body Mass Index, alcohol use, and interview language. **Results**: Maternal occupational exposure to pesticides was not associated with CVMs overall. In examining increasingly specific CVM subgroups, some novel associations were observed: joint exposure to insecticides and herbicides was associated with hypoplastic left heart syndrome (OR = 3.15, 95% CI 1.27-7.82, 6 exposed cases), and joint exposure to insecticides, herbicides, and fungicides was associated with secundum atrial septal defects (OR = 1.63, 95% CI 1.02-2.61, 27 exposed cases). **Conclusion**: Broad pesticide exposure categories were not associated with CVMs overall, but examining specific defects revealed some elevated odds ratios. These results highlight the importance of examining specific malformations separately. Because of multiple comparisons, additional work is needed to verify these associations.

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DO THE CAUSES OF INFERTILITY PLAY A ROLE IN THE ETIOLOGY OF PRETERM BIRTH? Carmen Messerlian, Robert Platt, Baris Ata, Seang Lin Tan, Robert Gagnon, Olga Basso* (McGill University, Montreal Canada)

Although it is well established that even singletons born of assisted reproductive technology (ART) are at higher risk of preterm birth and other adverse outcomes, it is unclear whether the increased risk is attributable to the effects of the treatment alone or whether the underlying causes of infertility also play a role. A long time to pregnancy in couples conceiving naturally is associated with increased risk, suggesting that some characteristics of infertile couples may be involved. The aim of this study was to examine whether any of six categories of causes of infertility were associated with a direct effect on preterm birth using novel causal inference methods. We assembled a hospital-based cohort, with causes of infertility ascertained through a clinical database and chart abstraction. The final singleton cohort comprised 18,147 births, including 1435 born to couples with ascertained infertility. Ovulatory dysfunction, male factor and unexplained infertility were the most commonly diagnosed conditions. The incidence of preterm birth (<37 weeks) was higher in the infertile group (10% vs. 7.2%). We employed marginal structural models (MSM) to estimate the controlled direct effect of each cause of infertility on preterm birth compared with a reference group without the cause of interest. After holding treatment constant, our results suggested no significant direct effect for any of the six categories of causes. However, power in our study was limited, and we could not rule out a possible effect for uterine abnormalities (e.g., fibroids and malformations). In this cohort, most of the increased risk of preterm birth seemed to be explained by maternal characteristics (such as age, body mass index, education) and by assisted reproduction, whether associated with gamete manipulation or not. If these findings are corroborated, physicians should consider these risks when counseling patients.

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SHORTER TIME TO FIRST MORNING CIGARETTE (TTFC) INCREASES RISK OF CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD) AMONG CURRENT CIGARETTE SMOKERS. KA Guertin*, F Gu, C Reyes-Guzman, S Wacholder, OA Panagiotou, NE Caporaso (National Cancer Institute, Division of Cancer Epidemiology & Genetics, Bethesda, MD United States)

Chronic obstructive pulmonary disease (COPD) is the third leading cause of death in the United States. Cigarette smoking is the main risk factor for COPD, however not all smokers develop COPD. More detailed characterization of smoking behaviors may identify smokers at greatest risk of COPD for additional screening and intervention; this may reduce the incidence of COPD. The time to first cigarette (TTFC), a single query of "How soon after you wake up do you usually smoke your first cigarette of the day?" is a measure of nicotine dependence included on the six-item Fagerström Test for Nicotine Dependence. We evaluated the association between TTFC and COPD (self-reported emphysema and/or bronchitis) in 6,162 current smokers within the Prostate, Lung, Colorectal, and Ovarian (PLCO) Cancer Screening Trial. The impact of TTFC on COPD risk was assessed using logistic regression models adjusted for age, race, education, and other smoking-related variables (cigarettes per day, years smoked during a lifetime, pack-years, age at smoking initiation).Compared to smokers with the longest TTFC (>60 minutes), smokers with shorter TTFC had greater risk of COPD. This trend was consistent by gender and for the chronic bronchitis and emphysema separately. The multivariate adjusted Odds Ratios (95% Confidence Intervals) for COPD were 1.48 (1.15, 1.91), 1.64 (1.29, 2.08), 2.18 (1.65, 2.87) for those with TTFC 31-60 minutes, 6-30 minutes, and =5 minutes (P-trend <0.0001). Among current smokers, TTFC provides important information for COPD risk independent of that provided by traditional smoking metrics, including cigarettes per day. Querying smokers about TTFC may identify those at elevated risk of COPD and allow for better targeting of resources and smoking cessation.

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AGREEMENT BETWEEN ASTHMA DEFINED FROM ADMINISTRATIVE HEALTHCARE DATABASES AND SELF-REPORTED ASTHMA IN THE PROVINCE OF QUEBEC, CANADA. Marie-Claude Rousseau*, Mariam El-Zein, Florence Conus, Andrea Benedetti, Richard Menzies, Marie-Elise Parent (INRS-Institut Armand-Frappier, Laval Canada)

The Quebec Birth Cohort on Immunity and Health was designed to examine the association between bacillus Calmette-Guerin (BCG) vaccination and childhood asthma occurrence. It consists of 81,496 individuals born in the province of Quebec (Canada) in 1974 at ≥32 weeks of gestation. This retrospective cohort was assembled through the linkage of administrative demographic and medical databases, with healthcare data available until 1994. Additional information unavailable in administrative databases was collected by telephone interview with a subset of subjects (n=1643) using a two-stage sampling strategy with a balanced design according to BCG vaccination (yes/no) and asthma status (yes/no). Among these subjects, we aimed to evaluate agreement between asthma defined from administrative medical databases and self-reported asthma. The overall proportion of agreement, Kappa and 95% confidence interval (CI), and proportions of positive and negative agreement were estimated. Subjects who had ≥2 asthma-related medical services or ≥1 hospitalization in the Quebec healthcare databases were considered asthmatics, representing 7.2% of the cohort. By design, 50% of the interviewed subjects were defined as being asthmatic according to medical databases. At interview, 49% (807 out of 1640 with valid answers) reported ever having asthma. The proportion of agreement between the two sources of information was 84.5%, with a Kappa of 0.69 (95% CI: 0.66-0.73). The proportions of positive and negative agreement were 0.84 and 0.85, respectively. When considering self-report of physician-diagnosed asthma, the proportion of agreement was 84.9%. Kappa, as well as the proportions of positive and negative agreement remained unchanged. These findings indicate good agreement between asthma defined from administrative medical data and self-report, and support the use of healthcare data to define asthma in this cohort.

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ASSOCIATION BETWEEN BACILLUS CALMETTE-GUéRIN (BCG) VACCINATION AND CHILDHOOD ASTHMA IN THE QUéBEC BIRTH COHORT ON IMMUNITY AND HEALTH (QBCIH). Mariam El-Zein*, Parent Marie-Elise, Florence Conus, Andrea Benedetti, Richard Menzies, Marie-Claude Rousseau (INRS-Institut Armand-Frappier, Laval Canada)

Meta-analyses on the association between BCG vaccination and childhood asthma came to mixed conclusions. To investigate this association, the QBCIH population-based birth cohort of 81,496 individuals born in Québec in 1974, at or after 32 weeks of gestation, was assembled through linkage of provincial administrative databases. BCG vaccination status, asthma-related events, and potential confounders were obtained for each subject until 1994. Those who had 2 or more asthma-related medical services or at least 1 hospitalization were considered asthmatics (7.7%). Using a two-stage sampling design, additional information was gathered by interviewing 1643 subjects. Logistic regression was used to estimate ORs and 95% CIs. For Stage 1 (n=76,623 alive subjects with known BCG and asthma status), the OR was adjusted for variables retrieved from the administrative databases: sex, birth weight for gestational age, number of older siblings, parents' age and birthplace, census-based family income, and area of residence. For Stage 2, the most parsimonious model using a purposeful selection of covariates approach included sex, census-based family income, area of residence, parental history of asthma, personal history of respiratory and allergic diseases, and pets' exposure before age 10. Following the method proposed by Collet et al. (1998), the final adjusted OR estimate was obtained by applying the Stage 2 sampling fractions to the adjusted Stage 2 risk estimate. A slightly lower asthma risk was observed in vaccinated compared with non-vaccinated subjects in Stage 1 [adjusted OR: 0.90 (95% CI: 0.85, 0.95)]. The final estimate showed that asthma risk was non-significantly lower in BCG vaccinated subjects [adjusted OR: 0.94 (95% CI: 0.78-1.11)]. Further analyses will consider age at BCG vaccination to explore whether BCG vaccination in early life might influence immune maturation and prevent asthma.

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VITAMIN D, OXIDATIVE AND INFLAMMATORY MARKERS, AND RESPIRATORY HEALTH: NHANES 2001-2006. Michael Hendryx*, Juhua Luo (School of Public Health, Indiana University, Bloomington, IN United States)

Background: Previous studies have shown that vitamin D has beneficial impacts on respiratory health. The role of inflammation or oxidative stress as possible mediators between vitamin D and respiratory health is not well understood. **Methods**: We used NHANES 2001-2006 data to investigate the associations between vitamin D, markers of inflammation and oxidative stress, and measures of respiratory health (unweighted N=13641.) Vitamin D was measured by serum 25(OH)D and the resulting distribution divided into quintiles. Respiratory health was measured by the presence or absence of self-reported respiratory symptoms, and by self-reports of COPD and current asthma. Markers included c-reactive protein, fibrinogen, bilirubin, alkaline phosphatase, eosinophil and neutrophil counts, and ferritin corrected for transferrin saturation. Data were analyzed using SAS 'surveyreg' and 'surveylogistic' to account for the sampling design, and weighted using NHANES guidelines. Models controlled for age, sex, race/ethnicity, body mass index, and current and former smoking. **Results**: Lower levels of vitamin D were significantly associated with respiratory symptoms (p<.0004) and with COPD (p<.0002), but not with current asthma. Both vitamin D and respiratory symptoms were significantly related to c-reactive protein, neutrophil count, and alkaline phosphatase. However, when both vitamin D and each of the markers was included in the same models, vitamin D and the markers continued to exert significant independent effects on respiratory symptoms and COPD; that is, none of the markers acted as a mediator between vitamin D and respiratory health. **Conclusion**s: Vitamin D is beneficial to improved respiratory health. Its benefits do not appear to be mediated by any of the markers examined in this study. Further research is indicated to better understand the mechanisms by which vitamin D benefits respiratory health.

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BREASTFEEDING AND CHILDHOOD HOSPITALIZATIONS FOR ASTHMA: EVIDENCE FROM HONG KONG'S "CHILDREN OF 1997" BIRTH COHORT. June Y.Y. Leung*, Man Ki Kwok, Gabriel M. Leung, C. Mary Schooling (School of Public Health, Li Ka Shing Faculty of Medicine, The University of Hong Kong, Hong Kong)

Observational studies, largely from Western settings, show that breastfeeding is associated with lower risk of asthma in the first few years of life. Breastfeeding and asthma in Western settings share social patterning, making these observations open to confounding. A cluster randomized trial in Belarus (PROBIT) showed no effect of the promotion of breastfeeding on childhood asthma up to age 6.5 years. However, its generalizability is uncertain. To clarify the role of breastfeeding in asthma, we examined the association of breastfeeding with asthma in a developed non-Western setting with little clear social patterning of breastfeeding or asthma. Using Cox regression, we examined the adjusted association of breastfeeding with public hospital admissions for asthma from birth to 6 years of age in the "Children of 1997" birth cohort, a population-representative prospective cohort of 8,327 Hong Kong Chinese children born in 1997. Children who had been exclusively breastfed for >/=3 months, compared to never breastfed, did not have lower risk of hospitalization for asthma (hazard ratio (HR) 1.25 [95% confidence interval (CI): 0.70, 2.21]), nor did those who had been partially breastfed for any length of time or exclusively breastfed for < 3 months (HR 1.10 [95% CI: 0.80, 1.52]), adjusted for sex, birth weight, gestational age, mode of delivery, birth order, maternal age, secondhand smoke exposure and markers of socioeconomic position. Similar to our previous findings on the associations of breastfeeding with childhood adiposity and blood pressure, our results were consistent with the PROBIT trial, which showed no effect of breastfeeding on the risk of childhood asthma (cluster adjusted odds ratio 1.2 [95% CI: 0.7, 1.9]). These null findings from a developed non-Western setting further indicate that observed associations of breastfeeding and asthma may be contextually specific rather than biologically based.

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EARLY-LIFE ASTHMA CLASSIFICATION IN AN ELECTRONIC MEDICAL RECORD SETTING. Audrey Flak*, Matthew Strickland, Karen DeMuth, Craig Hansen, Lyndsey Darrow (Emory University, Atlanta, GA United States)

Background: Asthma is difficult to diagnose in young children. Classification schemes to define early-life incident asthma in large medical record based studies vary considerably. It is unknown which classifications of early-life asthma best identify children with persistent asthma at school age. **Methods**: A birth cohort of 7,103 children enrolled in Kaiser Permanente Georgia was used to examine which classifications using events in the medical record by age 3 (the test) most reliably predict an ICD-9 asthma diagnosis between ages 5 and 8 (considered here the gold standard). Fourteen classifications were examined that differed on number and types of medical encounters indicating an asthma or wheeze ICD-9 code and number and types of medication dispensings required to classify a child as having asthma. Sensitivity, specificity, positive and negative likelihood ratios (LRs), and proportion correctly classified were examined. The magnitude of bias induced by non-differential outcome misclassification was explored for each classification for a scenario with a hypothetical dichotomous exposure and true risk ratio (RR) of 2.0. **Results**: Depending on classification, 9% to 35% of children were classified as asthmatic by age 3. Classification performance varied greatly, with more stringent definitions correctly classifying more children at school age and resulting in the least bias of the RR. Requiring 3 asthma encounters to classify a child as asthmatic by age 3 correctly identified school age asthma in 79.9% of children (positive LR=7.9, biased RR of 1.5). One commonly used classification, requiring 1 asthma diagnosis or 2 medication dispensings, performed poorly with a positive LR of 2.4 and a biased RR of 1.2. **Conclusion**: The impact of misclassification of early-life asthma in a medical record setting differs substantially between asthma classification schemes.

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TOBACCO USERS WITH ASTHMA: QUIT LINE DATA. Holly Uphold* (Utah Department of Health, Salt Lake City, UT United States)

Cigarette use is a major public health concern and is especially harmful and costly for those with chronic conditions, such as asthma. The purpose of this study is to determine differences in tobacco use, beliefs, and behaviors between tobacco users with asthma and those without asthma. Additionally, this study will highlight the Stage of Change smokers with asthma are in as a way to determine their readiness to quit. Using prevalence and 95% confidence intervals along with logistic regression odds ratios this study found that the most widely used tobacco product was smoked tobacco (i.e., cigarettes, cigars, etc.) for both those with asthma (95.2%) and those without asthma (94.3%). Additionally, there was no difference by asthma status (No asthma: 97.6% vs. Asthma: 96.9%) for those willing to quit smoking 30 days after calling the Quit Line. Those with asthma (40.9%) had a higher prevalence of "5 or more" quit attempts than those without asthma (34.9%). Finally, those with asthma were 30%less likely to have "no quit attempts" than those without asthma. Females with asthma were 60% more likely to have used a medication to help them quit tobacco than females without asthma, whereas for males, having asthma was not an important predictor of cessation medication use. Results suggest that both those with asthma and those without asthma who called the Quit Line were ready to quit using tobacco, however, those with asthma may be even more ready to quit. Also, there seem to be important gender based health beliefs and chronic disease health beliefs about asthma that impact behaviors related to quitting.

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ASSOCIATION BETWEEN LONGITUDINAL CHANGES IN GAIT SPEED AND SURVIVAL TIME IN AGING MEN: A JOINT LONGITUDINAL AND TIME-TO-EVENT ANALYSIS OF DATA FROM THE MROS STUDY. Kyle Hart*, Carie Nielson, Mara Tableman, Petty Cawthon, Tien Dam, Jodi Lapidus (Oregon Health & Science University, Portland, OR United States)

Background: Slower gait speed is associated with mortality in aging populations, but repeated measurements may provide better prediction. Joint models facilitate modeling a longitudinal outcome and survival time simultaneously, without underestimating the effect size and standard error, as may occur in an extended Cox model with a time-varying covariate.[1] Also, joint models have less stringent missingness assumptions than linear mixed effects models. **Objectives**: We sought to estimate the association between longitudinal trajectories of gait speed and survival and to compare estimates of association from Cox and joint models. **Methods**: A subset of 877 ambulatory, community-dwelling older men from 2 of the 6 sites in the Osteoporotic Fractures in Men Study (MrOS) performed a 6-meter walking test up to 5 times over a median of 7 years and were followed for a median of 11 years for mortality. The hazard ratio (HR) of gait speed was modeled 1) as a baseline measure alone, 2) as a time-varying covariate ("extended Cox"), 3) as a longitudinal sub-model using linear mixed-effects with cubic splines ("joint model"). **Results**: Slower gait speed was associated with mortality in all models. The HR for baseline gait speed (per 0.1m/s) was 0.94 in the Cox model (95% CI: 0.88 to 1.00); 0.93 (95% CI: 0.90 to 0.96) in the extended Cox model; and 0.67 (95% CI: 0.62 to 0.73) in the joint model. Estimates of longitudinal parameters from the linear mixed-effects vs. joint model suggested estimation was not sensitive to missingness assumptions. **Conclusion**s: Incorporating longitudinal measurements of gait speed in joint models yielded stronger associations with mortality and, ultimately, better prediction. [1] Rizopoulos D. Joint Models for Longitudinal and Time-to-Event Data With Applications in R. Boca Raton, FL: CRC Press. 2012.

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PRE-OPERATIVE PREDICTION OF SURGICAL MORBIDITY IN CHILDREN. Jennifer Cooper*, Lai Wei, Soledad Fernandez, Peter Minneci, Katherine Deans (The Research Institute at Nationwide Children's Hospital, Columbus, OH United States)

The accurate prediction of surgical risk is important to patients and physicians. Logistic regression (LR) models are typically used to estimate these risks. However, in the fields of data mining and machine-learning, alternative classification and prediction algorithms have been developed. This study aimed to compare the performance of LR to machine-learning algorithms in predicting 30-day surgical morbidity in children. All models included procedures and 49 pre-operative patient characteristics and were fit using data from 48,089 cases in the National Surgical Quality Improvement Program-Pediatric. After optimizing model fit using cross-validation in a training dataset, we compared discrimination (c-statistic), calibration intercept and slope, classification accuracy, sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) of the models in the remaining cases. Compared to a LR model with no interactions and linear relationships between predictors and the log-odds of morbidity, ensemble-based methods showed higher accuracy (random forests (RF) 93.6%, boosted classification trees (BCT) 93.6%, LR 93.2%), sensitivity (RF 39.0%, BCT 39.8%, LR 37.5%), specificity (RF 98.7%, BCT 98.5%, LR 98.4%), PPV (RF 73.2%, BCT 71.5%, LR 68.0%), and NPV (RF 94.6%, BCT 94.7%, LR 94.5%). However, only BCT showed superior discrimination (BCT c=0.880, LR c=0.871) ($p<.05$ for all), and none of the models performed better than a more flexible LR model that incorporated restricted cubic splines and significant interactions (accuracy 93.7%, sensitivity 41.5%, specificity 98.5%, PPV 72.0%, NPV 94.8%, c=0.877). Both LR models showed superior calibration compared to the ensemble-based algorithms. After further validation, the flexible LR model derived in this study could be used to assist with clinical decision -making based on patient-specific surgical risks.

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REGRESSION MODELS FOR A RIGHT-SKEWED OUTCOME SUBJECT TO POOLING. Emily Mitchell*, Robert Lyles, Amita Manatunga, Enrique Schisterman (National Institute of Child Health and Human Development, North Bethesda, MD United States)

Pooling specimens prior to performing laboratory assays has various benefits in epidemiological studies. Pooling can help reduce cost, preserve irreplaceable specimens, meet minimum volume requirements for certain lab tests, and even reduce information loss when a limit of detection is present. Regardless of the motivation for pooling, appropriate analytical techniques must be applied in order to obtain valid inference from composite specimens. While logistic regression models to properly analyze pooled specimens have previously been developed, fewer statistical methods are available for regression of a pooled, continuous outcome, particularly when that outcome is skewed. In such cases, statistical techniques that are applicable to individual specimens may not be valid when measurements are taken from pools. We use simulation studies to demonstrate the potential repercussions of naively applying such invalid regression models to pooled specimens. We contrast these results with a recently developed regression model based on a weighted least squares analysis that provides valid estimation when pools are formed from specimens with identical predictor values. In addition, we propose a new semi-parametric estimation method based on an adaptation of the quasi-likelihood approach that is applicable to all pool types. We then test these methods on a substudy of the Collaborative Perinatal Project (CPP). Simulation studies demonstrate that improper analytical methods can produce statistically biased regression estimates, potentially resulting in invalid inference. When appropriate regression models are applied to strategically-formed pools, however, valid and efficient estimation of the regression coefficients can be achieved.

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COMPARISON OF SELF-REPORT AND OBJECTIVE PHYSICAL ACTIVITY LEVELS IN A COHORT OF WOMEN WITH CHILDREN. Kristi Storti*, Bonny Rockette-Wagner, Claudia Holzman, Bertha Bullen, Janet Catov (University of Pittsburgh, Pittsburgh, PA United States)

We compared self-report and objective physical activity (PA) levels in a cohort of women 7 to 13 years after pregnancy, and related each to health indices. PA levels were assessed via self-report (Modifiable Activity Questionnaire, MAQ) and objective monitor (Actigraph accelerometer, ACCEL) in a subsample of women (n = 214, mean age 38.9±5.2 years; 72% White) from the Pregnancy Outcomes and Community Health Moms (POUCHmoms) Study. Spearman correlations controlling for age, race, and accelerometer wear time were used to examine associations between the two assessment tools and with health indices. Median Total PA (TPA) levels were: MAQ (leisure & occupational) 43.1(IQR: 11.3, 117.3) MET/hrs/wk; ACCEL (sum of light, moderate, and vigorous) 8.1 (IQR: 6.7, 9.3) hrs/day. Total sedentary (SED) time was: MAQ 10.0 (IQR: 7.5, 14.0) hrs/day, ACCEL 7.0 (IQR 6.2, 8.1) hrs/day. Based upon ACCEL, 88% of TPA was spent in light PA (LPA). Moderate to weak associations were noted between MAQ TPA and all ACCEL PA measures ($\rho = 0.13$ to 0.30, $p< 0.05$). MAQ SED and ACCEL SED were moderately correlated ($\rho = 0.41$, $p<0.0001$). ACCEL TPA and LPA were negatively associated with weight, waist, BMI, systolic and diastolic blood pressure, and triglycerides ($\rho = -0.19$ to -0.30, $p<0.05$), and positively associated with HDL cholesterol ($\rho = 0.22$ to 0.27, $p<0.05$). MAQ SED and ACCEL SED were negatively associated with HDL cholesterol; only the ACCEL SED was positively associated with all other health indices. Self-report and objective measures of TPA and SED were moderately correlated. In contrast, health indices were more often associated with ACCEL measured PA, specifically LPA, which is not assessed on the MAQ. Our results suggest LPA is the dominant activity among women with children, and this requires an objective measurement tool. In addition, LPA in this group of women was significantly related to important health indices.

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ASSOCIATIONS BETWEEN ADHERENCE TO BREASTFEEDING RECOMMENDATIONS AND MATERNAL WEIGHT 6 YEARS AFTER DELIVERY. Andrea Sharma*, Deborah Dee, Samantha Harden (Centers for Disease Control and Prevention, Atlanta, GA United States)

Information on the long-term maternal effects of breastfeeding is limited. This study examines associations between adherence to the breastfeeding recommendations of exclusive breastfeeding for at least 4 months and continuation of breastfeeding for at least 1 year and maternal weight retention six years after delivery. Using data from the Infant Feeding Practices Study (IFPS) II, women were categorized by the degree to which they met breastfeeding recommendations. Mothers' self-reported weight six years after delivery (IFPS Year 6 Follow-Up) was compared to self-reported prepregnancy weight from IFPS II. Using linear regression models we examined associations between breastfeeding recommendation adherence and weight retention. Of the 726 women in our study, 17.9% never breastfed. Among those who initiated breastfeeding, 29.0% breastfed exclusively for at least 4 months and 20.3% breastfed exclusively for at least 4 months and continued breastfeeding for at least 12 months. Prepregnancy BMI modified the association between breastfeeding recommendation adherence and weight retention. Adjusting for covariates, there was no association between breastfeeding recommendations adherence and weight retention among normal and overweight mothers. Among obese mothers, there was a significant linear trend (p=0.04) suggesting those who fully adhered to breastfeeding recommendations retained less weight (-6.2 kg) than those who never breastfed. This study suggests that improving adherence to breastfeeding recommendations may help reduce long-term maternal weight retention among obese mothers. Larger studies, with diverse populations and similar longitudinal designs, are needed to further explore this relationship.

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PARENTAL DEPRESSION AND HYPERTENSIVE DISORDERS OF PREGNANCY. Tuija Männistö*, Eero Kajantie, Risto Kaaja, Johan Eriksson, Hannele Laivuori, Mika Gissler, Anneli Pouta, Marja Vääräsmäki (National Institute for Health and Welfare, Oulu Finland)

Background: Maternal depression may increase risk of preeclampsia, but if paternal depression or depression in both parents increases this risk is unknown. **Methods**: The FinnGeDi study included all singleton births without maternal unspecified or pre-existing hypertension but with known father during 2009 in Finland (N=56,449). Maternal diagnoses of hypertensive disorders were collected from Medical Birth Registry and Hospital Discharge Registry (including all recorded diagnoses of hospital in- and outpatient visits). Parental depression data were obtained from Hospital Discharge Registry. Multinomial logistic regression estimated the odds ratios (ORs) and 95% confidence intervals (95%CIs) of hypertensive disorders associated with parental depression, adjusting for maternal age, socioeconomic and marital status. Odds of eclampsia were separately estimated due to small numbers. Sensitivity analyses restricted data to non-smoking, normal weight mothers. **Results**: Maternal and paternal depression increased odds of preeclampsia (OR=1.24, 95%CI=1.01-1.51 and OR=1.40, 95%CI=1.03-1.92, respectively). Maternal depression also increased odds of eclampsia (OR=2.91, 95%CI=1.19-7.09). Maternal depression associated with non-significant odds with gestational hypertension (OR=1.20, 95% CI=1.00-1.44), and paternal depression associated non-significantly with superimposed preeclampsia (OR=1.94, 95%CI=0.99-3.80). Depression in both parents was rare and did increase odds of hypertensive disorders of pregnancy. All results were similar among non-smoking, normal weight mothers. **Conclusion**s: Depression in mothers and fathers was associated with increased risk of preeclampsia and might also increase risk of other hypertensive disorders of pregnancy.

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PERIPARTUM DEPRESSIVE SYMPTOMS AND SUICIDAL IDEATION AMONG MOTHERS OF PRETERM AND TERM INFANTS. Sixto Sanchez*, Pedro Mascaro, Chunfang Qiu, Pedro Garcia, Yasmin Barrios, Bizu Gelaye, Sunah Hwang, Michelle Williams (Hospital Nacional Dos de Mayo, Lima Peru)

Objective: Preterm delivery (PTD) is known to have serious psychosocial implications for mothers in the US, but less is known about the burden of depression and suicidal ideation among women with high-risk pregnancies in low and middle-income countries. We investigated the prevalence of depressive symptoms and suicidal ideation among Peruvian mothers of preterm and term infants. **Methods**: This study included 215 PTD (=34 weeks) cases and 205 term (37-42 weeks) controls. In-person interviews, conducted within a day of delivery, were conducted to assess maternal depressive symptoms in the last 7 days using the Spanish-language version of the Edinburgh Postnatal Depression Scale (EPDS). Multivariable logistic regression procedures were used to estimate odds ratios (aOR) and 95% confidence intervals (CI) for the risk of depression and suicidal ideation adjusting for the following confounders: maternal age, parity, education, and use of prenatal care. **Results**: The prevalence of possible depression (EPDS =13) was 18.6% among PTD cases, and 5.4% among term controls (P-value<0.001). Suicidal ideation was endorsed by 11.6% of PTD cases and 4.9% among controls (P-value=0.01). In the adjusted model, PTD cases had a 4.7-fold increased odds (95% CI 2.24-9.70) of depression during the peripartum period, as compared with term controls. The corresponding aOR for suicidal ideation was 2.64 (95%CI: 1.21-5.75). **Conclusion**s: Mothers of preterm infants have a high burden of depressive symptoms and suicidal ideation. Clinical, programmatic, and policy interventions are needed to improve the mental health of mothers of preterm infants.

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AGE AT MENARCHE AND INFLAMMATORY FACTOR LEVELS IN YOUNG ADULTHOOD. Serena C. Houghton*, Brian W. Whitcomb, Alayne G. Ronnenberg, Carrie Nobles, Sofija E. Zagarins, Biki B. Takashima-Uebelhoer, Joycelyn M. Faraj, Elizabeth R. Bertone -Johnson (University of Massachusetts, Amherst, MA United States)

Inflammatory factors appear to play a role in menstrual cycle and reproductive function. However, it is unknown whether the timing of menarche influences immune status during the reproductive years. The purpose of this study was to examine the association between age at menarche and inflammatory marker levels in young adults. Regularly menstruating women aged 18-30 who participated in the UMass Vitamin D Status Study (n=277) provided a blood sample during the mid-luteal phase of their menstrual cycle. Age of menarche was self-reported and categorized into <12, 12-13 and >13 years. Inflammatory markers were measured in serum, including interleukin (IL)-1, IL-2, IL-4, IL-5, IL-6, IL-7, IL-8, IL-10, IL-12, IL-13, tumor necrosis factor alpha, granulocyte macrophage colony stimulating factor (GMCSF), interferon-gamma (IFN-gamma) and high sensitivity C-reactive protein. In generalized linear models adjusted for body mass index, alcohol intake, oral contraceptive use, smoking status and race, IL-7 and IFN-gamma levels were positively associated with age at menarche (P for trend ≤0.05). Adjusted geometric mean IFN-gamma levels across categories of age at menarche were 1.72, 2.01 and 3.19 pg/mL (P=0.03) and 1.25, 1.49 and 2.18 pg/mL (P=0.05) for IL-7 respectively. In addition, IL-13 and GMCSF levels were marginally higher in women with later age at menarche (p for trend =0.05-0.09). In subanalyses adjusted for serum 25-hydroxyvitamin D levels (n=176), results were significant for IL-7, IL-13, GMCSF and IFN-gamma (P<0.05 for all). For example, the adjusted geometric mean IFN-gamma levels across categories of age at menarche were 1.13, 1.27 and 3.78 pg/mL (P=0.001). Our results suggest that inflammation levels in young adults may be associated with age at menarche. These relations merit further evaluation in prospective studies.

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ASSOCIATION BETWEEN DEPO PROVERA USE AND PREVALENT FIBROIDS IN YOUNG AFRICAN AMERICAN WOMEN. Quaker E. Harmon*, Donna D. Baird (National Institute of Environmental Health Sciences, Durham, NC United States)

Uterine fibroids are benign tumors that have a lifetime risk of more than 80% among African American women. Although biological evidence suggests that progesterone promotes fibroid growth, cross-sectional studies suggest that the use of Depo-Provera (a progesterone only contraceptive) may be protective. We examined the association between Depo Provera use over the life course and prevalent fibroids. The Study of Environment, Lifestyle and Fibroids (SELF) is a 5-year prospective study of risk factors for fibroids among African American women. Young women age 23-34, without a clinical diagnosis of fibroids, were enrolled and underwent a transvaginal ultrasound to detect prevalent fibroids. Log linear regression models were used to estimate the association between use of Depo Provera and prevalent fibroids. In this young urban population of 1696 women, use of Depo Provera was common (43% were current or past users) and prevalent fibroids were found in 22%. Women who had ever used Depo Provera had a reduced risk of fibroids (RR 0.7, 95% CI (0.6-0.9)) adjusting for age, parity, age at menarche and socio-economic variables. The protection was strongest among women who had used Depo Provera for at least 2 years (RR 0.6, 95% CI (0.4-0.8)). Data on time since last use suggested that risk reduction lasts for years. These results provide evidence that use of Depo Provera among young women may reduce their risk of fibroids. A potential mechanism is through inhibition of folliculogenesis and the resulting low endogenous estrogen levels.

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IS BODY SHAPE FROM ADOLESCENCE THROUGH ADULTHOOD ASSOCIATED WITH ENDOMETRIOSIS OR UTERINE FIBROIDS? Uba Backonja*, Zhen Chen, Liping Sun, Germaine M. Buck Louis (National Institute of Nursing Research, Eunice Kennedy Shriver National Institute of Child Health & Human Development, University of Wisconsin-Madison, North Bethesda United States)

Body shape is associated with gynecologic diseases, such as apple-shaped women being at increased risk of developing polycystic ovarian syndrome. The purpose of this study was to determine if body shape from adolescence through adulthood is associated with odds of an endometriosis or uterine fibroids diagnosis. Women 18-44 years old were recruited 2007-2009 from 14 clinical sites. Endometriosis (n=152), fibroids (n=75) or normal pelvis (n=142) denotes post-surgical diagnosis. Women reported shapes in the past (5-year intervals starting at ages 15-19 years) and at age of enrollment using diagrams (apple, pear, straight, hourglass). Most women reported having an hourglass shape at ages 15-19 regardless of diagnosis (endometriosis 48.7%, fibroids 39.2%, normal pelvis 35.0%). Women with endometriosis or fibroids were less likely to change from one shape to another any time from adolescence through adulthood than women with a normal pelvis ($p<0.05$). Women whose shape changed had decreased odds of an endometriosis diagnosis versus those who did not (adjusted odds ratio (AOR) 0.52; 95% CI, 0.31-0.85). There was a trend of increased odds of an endometriosis diagnosis for women who remained an hourglass versus other shapes (AOR 1.48; 95% CI, 0.72-3.04). There was a trend for lower odds of a fibroids diagnosis for women whose shape changed (AOR 0.57; 95% CI, 0.29-1.12), and higher odds of a fibroids diagnosis for women who stayed an apple (AOR 1.66; 95% CI, 0.23-12.1) or straight (AOR 1.89; 95% CI, 0.58-6.19) shape. Women whose shape changed from adolescence through adulthood had lower odds of an endometriosis but not fibroids diagnosis. Staying an hourglass shape may increase women's odds of being diagnosed with endometriosis, an estrogen dependent disease, as high estrogen levels are associated with hourglass characteristics. It is unclear why staying an apple or straight shape may be associated with fibroids.

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PATTERNS OF HEALTH INSURANCE COVERAGE AROUND THE TIME OF PREGNANCY AND ASSOCIATED CHARACTERISTICS AMONG WOMEN IN 29 STATES. Brenda Le*, Denise D'Angelo, Mary Elizabeth O'Neil, Indu Ahluwalia, Leslie Harrison, Letitia Williams (Centers for Disease Control and Prevention, Atlanta, GA United States)

Health insurance coverage instability negatively affects quality of care and health outcomes. Women of reproductive age are vulnerable to gaps in coverage as it may impact access to prenatal care. Pregnancy Risk Assessment Monitoring System (PRAMS) data are used to describe insurance coverage by characteristics of women who had delivered live-born infants in the US in 2009. PRAMS is a state- and population-based surveillance system designed to collect data on maternal experiences before, during, and after pregnancy. PRAMS uses mailed surveys with telephone follow-up for data collection. Data are weighted for sample design, nonresponse, and noncoverage. Data from 29 states (n=36,916) with a weighted response rate of >65% were analyzed. The dependent variable, insurance coverage, is classified into 3 nominal categories: stable-private (53%), stable-Medicaid (16%), and unstable coverage (31%). Stable-private and stable-Medicaid are defined as having either private insurance or Medicaid coverage across 3 time periods (the month before pregnancy, during prenatal care, and at the time of delivery); otherwise coverage is classified as unstable. Multinomial logistic regression was used to assess relationships (ORs) between women's characteristics and stability in insurance coverage. Results show that women in the three groups differ. Of note is the difference between stable-Medicaid and unstable groups. Hispanics, older women, primiparae, and those with no first trimester prenatal care are more likely to report unstable coverage than stable-Medicaid. Conversely, blacks, unmarried women, those with less than a high school diploma, and income below 200% of the poverty level are at higher odds of having stable-Medicaid than unstable coverage. Women with unstable coverage are not the most impoverished, but are most likely to experience late access to care.

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PREMENSTRUAL SYNDROME AND DYSMENORRHEA: SYMPTOM TRAJECTORIES OVER 13 YEARS IN YOUNG ADULTS. Hong Ju*, Mark Jones, Gita Mishra (School of Population Health, University of Queensland, Brisbane QLD Australia)

Objectives: To ascertain the prevalence of premenstrual syndrome (PMS) and dysmenorrhea in young women and the trend of change of the symptoms over time. **Methods**: 9,671 women, aged 22-27 years in 2000, from Australian Longitudinal Study on Women's Health (ALSWH) using random sample from national Medicare database, were followed every three years for 13 years. Prevalence, trend and symptom trajectories were examined. **Results**: The prevalence of PMS varied across survey wave between 33-41% and that of dysmenorrhea 21-26%. The probabilities of reporting PMS and dysmenorrhea were 0.75 (95% CI 0.73, 0.76) and 0.70 (95% CI 0.68, 0.72), respectively, among women who reported them in three previous surveys. Four symptom trajectories were identified for both conditions, with normative (22.1%), late onset (21.9%), recovering (26.5%) and chronic (29.5%) for PMS; and normative (38.3 %), low (28.0 %), recovering (17.2 %) and chronic (16.5 %) for dysmenorrhea. At baseline, women who were unemployed, current smokers, and with early age at menarche were more likely to be in the chronic group for both symptoms, and those who use OCPs were more likely to be in the normative groups. Furthermore, women who used illicit drugs in the last 12 months or were separate/divorced were more likely to be in the chronic group for PMS, whereas women who were obese and with no formal education were more likely to be in the chronic group for dysmenorrhea. **Conclusion**: PMS and dysmenorrhea are common among young women. Both are relatively stable at a population level but exhibit considerable individual variation. Women who previously had these conditions were more likely to continuously report them. PMS was experienced by 80% of women at some stage during their reproductive life and it tended to be a long-lasting problem for many. Whereas although 60% of the women experienced dysmenorrhea, only a small proportion reported it chronically. Smoking and illicit drugs use, and smoking and obesity were associated with persistent PMS and dysmenorrhea respectively.

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PREVALENCE AND RISK FACTORS OF DYSMENORRHEA: CONCURRENCE OF RESULTS FROM A COMPREHENSIVE REVIEW AND LONGITUDINAL DATA. Hong Ju*, Mark Jones, Gita Mishra (School of Population Health, University of Queensland, Brisbane QLD Australia)

Background: Dysmenorrhea is a common menstrual complaint with a major impact on women's quality of life, work productivity and healthcare utilisation. Method: 1) A comprehensive review was performed on longitudinal or case-control or cross-sectional studies with large community-based samples to accurately determine the prevalence and/or incidence and risk factors of dysmenorrhea. 2) Data from Australian Longitudinal Study on Women's Health (ALSWH) were used to examine its prevalence and risk factors among Australian women from 2000 to 2012. **Results**: The review included 15 studies. The prevalence of dysmenorrhea varies between 16-91% in women of reproductive age, with severe pain in 2-29%. Women's age, parity and use of oral contraceptives (OCPs) were inversely associated with dysmenorrhea, and high stress increased the risk of dysmenorrhea. The effect sizes were generally modest to moderate (ORs from 1 to 4). Inconclusive evidence was found for modifiable factors such as smoking, obesity, diet, and depression. ALSWH data revealed that 21-26% of women suffered from severe pain, with a modest decline in prevalence over time. The data confirmed the findings from the review on the associations between parity (OR 0.49, 95% CI 0.45-0.54), OCP use (OR 0.62, 95% CI 0.58-0.66), and high stress (OR 1.84, 95% CI 1.62-2.09) with dysmenorrhea. Furthermore, obesity (OR 1.21, 95% CI 1.10-1.32), heavy smoker (OR 1.44, 95% CI 1.19 -1.73), early menarche (OR 1.24, 95% CI 1.11-0.37) and depression (OR 1.41, 95% CI 1.31-1.51) increased the risk, whereas higher education (OR 0.79, 95% CI 0.70-0.90) decreased the risk of dysmenorrhea. **Conclusion**: Dysmenorrhea is prevalent among women of reproductive age, however severe pain limiting daily activities is less common. Both the review and ALSWH data confirm that dysmenorrhea improves with parity and use of OCPs, and worsens with high stress. Evidence from longitudinal data also suggests a positive association between obesity, smoking, lower education, depression and dysmenorrhea.

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THE STUDY OF ENVIRONMENT, LIFESTYLE & FIBROIDS (SELF), AN ULTRASOUND-BASED PROSPECTIVE STUDY. Donna Baird*, Ganesa Wegienka, Christie Barker-Cummings, Quaker Harmon, Kristen Upson (National Institute of Environmental Health Sciences, National Institutes of Health, Research Triangle Park, MD United States)

Uterine fibroids are common in reproductive-age women, and many with the condition experience major symptoms of bleeding and pelvic pain. Fibroids are the leading indication for hysterectomy in the US, with annual costs estimated at up to $34 million. These benign tumors develop 10-15 years earlier in African American women than in US white women, but the reasons for this marked health disparity are unknown. No prior study has investigated fibroid risk factors with a prospective design to identify fibroid incidence and measure fibroid growth with periodic research-quality ultrasound. We enrolled 1696 African American women 23-34 years of age who had not been previously diagnosed with fibroids. 1319 of them were free of fibroids on a baseline ultrasound. We describe the study design, characteristics of participants, and study progress with the aim of encouraging potential collaborations. Subsequent ultrasound examinations will be conducted at approximately 20-month intervals with the expectation of identifying approximately 400 incident cases and measuring fibroid growth in identified fibroids. Extensive questionnaire and biospecimen data (blood, urine, vaginal swabs) are collected at baseline and at each follow-up visit to examine numerous possible risk factors, but two environmental factors will be examined as primary hypotheses: 1) vitamin D status based on serum 25(OH)D levels and 2) reproductive tract infection history based on self-report and serology. Genetic factors will also be evaluated. The first follow-up is nearly 70% complete (to be completed Fall 2014), and we anticipate continued high retention rates.

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THE USE OF PREGNANCY-RELATED DATA FOR PREDICTING WOMAN'S LONG-TERM HEALTH PROGNOSIS. Naoko Sakamoto*, Reiko Horikawa, Naoko Arata (Juntendo University School of Medicine, Bunkyo, Tokyo Japan)

Background: In Japan, once an expectant woman learns of her pregnancy, she must submit a "Pregnancy Notification Form" to the municipal office in the city of her residence. She will then receive a "Maternal and Child Health Handbook (MCHH)". This handbook is used for recording and storing the following: (i) the expectant mother's pregnancy-related health records; (ii) information pertaining to childbirth; and (iii) the child's immunization records and developmental status after birth. Objective: The objective of this study was to determine the association between pregnancy-related data recorded in the MCHH—such as blood pressure; urinary protein and sugar levels during pregnancy; gestational age; and weight at birth—and a woman's long-term health prognosis after approximately 20 to 45 years. **Methods**: A total of 1,034 women participated in the MCHH study. The past and current medical history of the participants was obtained by questionnaire. Logistic analysis was performed on the data from 480 participants with complete past and current medical records. **Results**: The average age of the participants was 63.6±5.0 years. Regarding pregnancy-induced hypertension, an association was observed with stroke (OR=3.4 [95% CI, 1.2–9.6; P=0.02]). As for blood pressure, the participants were divided into 4 groups and the quartiles were compared. An association was observed between the high systolic blood pressure group (Q4) and hypertension (OR=2.8 [95% CI, 1.5–5.0; P=0.001]). Hypertension was also associated with the high diastolic blood pressure group (Q4) (OR=2.1 [95% CI, 1.2–3.7; P=0.007]), while urinary protein was found to be associated with kidney disease. When a negative result was used as a reference, a positive urinary protein result (=++) had an OR of 12.9 (95% CI, 1.2–142.6; P=0.04). When a negative result was used as a baseline, a positive urinary sugar result (=++) had an OR of 4.8 (95% CI, 1.2–18.7; P=0.025).

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OUTCOMES OF CHRONIC DISEASE SCREENING AND REFERRAL STUDY AMONG LOW INCOME WOMEN AT A FAMILY PLANNING CLINIC. Cheryl Robbins*, Thomas Keyserling, Stephanie Pitts, Larry Johnson, Sherry Farr (Centers for Disease Control and Prevention, Atlanta, GA United States)

Low-income women of reproductive age have greater rates of chronic disease and related risk factors compared with higher income women. Family planning clinics serving low income women are well positioned to screen and identify chronic disease, but little is known about the outcomes of referrals in these settings. The study objective was to screen 462 women for chronic disease (hypertension, diabetes, and dyslipidemia), smoking, and obesity in a North Carolina family planning clinic and describe referral outcomes (2011-2012). Clinical staff referred women with newly diagnosed chronic disease and current smoking or obesity according to standard of care protocols. Research staff documented receipt of clinical care from referral sources. We used Fisher's exact tests to examine differences in sociodemographic and clinical characteristics between screened and rescreened women, and paired t-tests to compare blood pressure, A1c, and blood lipids from screening and rescreening (2-tailed, $p<.05$). Among 16 women with newly diagnosed chronic disease in need of referrals at baseline screening, 13/16 (81%) were referred, 4/13 (31%) completed referrals, and four were rescreened (no improvement in chronic disease). Among women who reported smoking at baseline (n=148), 129 (87%) received cessation counseling at baseline and 8/129 (6%) accepted quitline referrals. Among smokers at baseline, 53/148 (36%) were rescreened and 11/53 (21%) reported non-smoking at that time. Among 188 obese women at baseline, 12% scheduled nutrition appointments, but only one attended. Mean weight increased among 70/188 rescreened obese women ($p<.05$). No statistical differences were found on baseline variables between rescreened women (n=167, 36%) and those who were not rescreened (n=295, 64%). Few women completed referrals. Future research should investigate the barriers and facilitators to referral completion among low income women.

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RELIABILITY OF ULTRASOUND TOMOGRAPHY ASSESSMENT OF SOUND SPEED AS A SURROGATE OF BREAST DENSITY. Zeina Khodr*, Mark Sak, Ruth Pfeiffer, Neb Duric, Mark Sherman, Gretchen Gierach (National Cancer Institute, Bethesda, MD United States)

Background: High mammographic density (MD) is strongly and consistently related to increased breast cancer risk, but standard methods of assessment have several limitations including: 2-D representation; distortion due to breast compression; use of ionizing radiation; and sensitivity to machine settings. Ultrasound tomography (UST) is a novel imaging method that averts these limitations by measuring sound speed (SS; km/s), which is directly related to MD. We evaluated the reproducibility of UST SS measures within a study measuring breast density changes among women prescribed tamoxifen, based on personal risk or diagnosis of breast cancer. **Methods**: One expert and 5 recently trained raters independently measured UST SS, from baseline and follow-up scans, for 22 participants in The Ultrasound Study of Tamoxifen (2011-2012) to assess inter-rater reliability. Four raters repeated measures to assess intra-rater reliability. A random effects model was used to calculate the percent variation in SS attributed to subject, scan, rater, and repeat reads. We estimated the intraclass correlation coefficient (ICC) for SS measures calculated by our expert rater. **Results**: Contributions of factors to SS variance in order of magnitude were: differences between subjects (86.0%); baseline versus follow-up scans (7.5%); differences between raters (1.1%) and within raters (nearly 0%). When evaluating changes change in SS between scans, 2.7 and 0% of variation were attributed to inter- and intra-rater variation, respectively. The ICCs for our expert rater were 93.4% for SS and 70.4% for change in SS. **Conclusion**: UST provided highly reproducible measures of SS, which reflects breast density; thus, UST may have utility in assessing change in density over time without the limitations of mammography.

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PREMENSTRUAL SYNDROME AND SUBSEQUENT HYPERTENSION IN A PROSPECTIVE STUDY. Elizabeth Bertone-Johnson*, Brian Whitcomb, Janet Rich-Edwards, Susan Hankinson, JoAnn Manson (University of Massachusetts, Amherst, MA United States)

While multiple studies have assessed how maternal pregnancy complications may predict future risk of hypertension and cardiovascular disease, few have evaluated how other aspects of reproductive health are associated with chronic disease risk. Up to 20% of premenopausal women meet clinical criteria for premenstrual syndrome (PMS), a disorder characterized by moderate to severe luteal phase symptoms that substantially interfere with normal life activities and interpersonal relationships. While the etiology of PMS remains largely unclear, many pathways underlying hypertension and cardiovascular disease are also implicated in the occurrence of PMS, including dysfunction of the renin-angiotensin-aldosterone system and vitamin D deficiency. We evaluated prospectively whether women experiencing PMS in their reproductive years had an elevated risk of subsequently developing hypertension. Participants were women enrolled in PMS Sub-Study of the Nurses' Health Study II, and included 1257 women meeting established criteria for moderate-to-severe PMS and 2463 age-matched controls experiencing few menstrual symptoms. Follow-up for incident hypertension began at the time of PMS diagnosis or reference year (between 1993 and 2005) and continued until June, 2009. Over these 16 years, new diagnoses of hypertension were self-reported by 278 women with PMS and 418 women without PMS. After adjustment for age, smoking, body mass index, physical activity, DASH diet and other hypertension risk factors, women with PMS had a hazard ratio (HR) for incident hypertension of 1.50 (95% confidence interval(CI) =1.24–1.81) vs. women without PMS. The risk associated with PMS was highest for hypertension occurring before age 40 (HR=3.64; 95%CI=1.87 –7.09). This is among the first studies to suggest that PMS may be an early sentinel of risk of hypertension. These observations warrant replication in other prospective studies.

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DEVELOPMENT AND VALIDATION OF A 9-YEAR MORTALITY INDEX FOR POSTMENOPAUSAL WOMEN 50 AND ABOVE. Monika Izano, Dejana Braithwaite* (University of California, San Francisco, San Francisco, CA United States)

Background: Mammography screening of older women with limited life-expectancy may increase the risk of immediate harms without providing any benefits. Predicting mortality risk is therefore important for optimizing screening decisions among older women. We propose a new index that incorporates performance measures in addition to self-reported physical functioning in predicting the 9-year mortality risk of community-dwelling post-menopausal women. **Methods**: Demographics, lifestyle measures, prevalent disease, medication use, anthropometrics, vital signs, and physical function of 22,675 postmenopausal participants of the Breast and Bone Follow-up Study of the Fracture Intervention Trial were assessed from 1990 to 1992. We used best-subsets logistic regression to develop a prognostic index for 9-year mortality, and the Random Forest algorithm for missing data imputation and variable importance evaluation. **Results**: We identified 9 independent risk factors of 9-year mortality: age, smoking, regular activity, history of stroke, history of heart disease, Timed Up and Go test (TUGT), the 20-Item Short-Form Health Survey, ability to walk one block, and perceived health. Nine-year mortality risk ranged from 4% in those with 0-5 points to 38% in those with ≥14 points in the development cohort, and from 4% in those with 0-5 points to 35% in those with ≥14 points in the validation cohort. The discrimination of the model was 0.730 and 0.734 in the development and validation cohorts respectively. In addition to established factors such as age, BMI, abdominal adiposity, smoking, measures of comorbidity and physical functional, our variable importance analyses identified health status measures such as the TUGT and Grip Strength Test, and reproductive measures such as age at first birth and age at menopause as important predictors of 9-year mortality. **Conclusion**s: This prognostic index accurately stratifies postmenopausal women into groups at varying risk of mortality.

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MAPPING THE METABOLIC SYNDROME COMPONENTS DURING THE MENOPAUSAL TRANSITION: A MULTI-ETHNIC STUDY. Jennifer Lee*, Elizabeth Ward, Wesley Johnson, Ellen Gold (Stanford Medical Center, Stanford, CA United States)

The constellations of components of the Metabolic Syndrome (MetS) that occur during midlife in a woman offer a composite of her cardiovascular (CV) condition and risk of CV disease. We hypothesized that the constellations of MetS components, in women who develop MetS during the menopausal transition (MT), depend on race/ethnicity, behavioral factors, and MT stage. The Study of Women Across the Nation (SWAN) followed pre-/early perimenopausal women as they underwent the MT. MetS diagnosis meant having at least 3 of 5 components: triglyceride >150mg/dL (hTG), HDL-cholesterol < 50mg/dL (lHDL-C), fasting glucose >=100mg/dL (hGluc), waist circumference > 88cm (80cm for Asians) (Obese), and blood pressure >130/85mmHg (HTN). We included 2,367 women, who did not have MetS at baseline. In women who developed MetS (median followup = 7 years), frequencies of all observed MetS component constellations by race/ethnicity (Caucasian, African American, Hispanic, Japanese, Chinese) and MT stage (pre-, early peri-, late peri-, post-menopause, hormone therapy) were assessed at MetS diagnosis. Discrete time Cox regression models identified factors associated with risk of developing the most frequent constellations of MetS components. Models included age, study site, alcohol use, MT stage, race/ethnicity, physical activity (PA), current smoker, and fiber intake. Of the 159 women who developed MetS in the MT, 7.5% had no MetS components at baseline; the most frequent components were obesity (47%) and lHDL-C (45%). The most frequent constellations at MetS diagnosis were: Obese/hTG/lHDL-C (23% of those who developed MetS); Obese/HTN/lHDL-C (21%); Obese/HTN/hTG (14.7%); and Obese/HTN/hGluc (14.7%). In multivariable models, greater PA conferred a 20% lower risk for the two most frequent constellations (Hazard Ratio (HR) 0.79, 95% CI 0.6-0.99 and HR 0.77, 95% CI 0.6-0.97, respectively). Current smokers had a greater risk (HR 2.64, 1.11-6.29) of having Obese/hTG/lHDL-C than non-smokers. African Americans had a lower risk (HR 0.05, 0.01-0.37) of having Obese/hTG/lHDL-C than Caucasians. In women who develop MetS during the MT, their specific constellations of MetS components were associated with race/ethnicity and behaviorally modifiable factors.

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CHARACTERISTICS OF WOMEN WHO DO NOT SEEK HEALTHCARE FOR THEIR VULVAR PAIN: EVIDENCE OF SELECTION BIAS IN CLINIC-BASED STUDIES OF HORMONAL CONTRACEPTION AND VULVODYNIA. Ruby HN Nguyen, Christine Veasley, Katherine Kelsey, Robin Reese, Bernard L Harlow* (University of Minnesota, Minneapolis, MN United States)

The overwhelming majority of literature about chronic vulvar pain (CVP) of unknown etiology (vulvodynia) is based on subjects selected from clinic-based populations. Yet half of women with CVP do not seek care and virtually nothing is known about these women. These clinic-based studies investigating causal factors of vulvodynia may be subject to false interpretation due to selection bias. An example may be hormonal contraceptive (HC) use and whether it increases the risk of vulvodynia. Clinic-based studies find increased risk and nearly all population-based studies find no risk. To better understand this potential bias, we explored factors associated with not seeking care by analyzing a cross-sectional population-based study of women 18 – 40 years old from Minneapolis/St. Paul responding to a mailed women's health screener (n=29,582) between 2010 – 2013. We identified 3,670 women with CVP consistent with vulvodynia of which 1,805 (49.2%) had never sought care for their vulvar pain. Compared to those who sought care, non-healthcare seekers were younger but also more likely to have vulvar pain onset after a period of pain-free intercourse or pelvic exams (secondary onset), which is associated with improved prognosis over primary-onset sufferers. Those who never sought care were also significantly less likely to experience comorbid gynecologic issues such as severe dysmenorrhea and irregular menses. After adjustment for age and menstrual regularity, compared to those with CVP who sought care, non-healthcare seekers with CVP were 31% less likely to have ever used HCs ($p<0.01$), more likely to be older at initiation ($p=0.02$), and used HCs for a shorter duration ($p=0.02$). We provide the first empirical data showing that clinic-based samples may systematically exclude women with less severe CVP and who have less exposure to HC, and therefore may inflate risk of CVP as a consequence of HC exposure.

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HISTORY OF UTERINE LEIOMYOMATA AND RISK OF ENDOMETRIAL CANCER IN BLACK WOMEN. Lauren A. Wise*, Todd R. Sponholtz, Julie R. Palmer, Lynn Rosenberg (Slone Epidemiology Center at Boston University, Boston, MA)

Background: Black women have a lower incidence of endometrial cancer than white women, but their mortality rates from the cancer are higher. Previous studies suggest a higher risk of uterine malignancies among women with a history of uterine leiomyomata (UL), benign neoplasms of the myometrium. The nature of this relation is particularly relevant for black women because they have 2-3 times the incidence of UL and their rates of hysterectomy due to UL have been decreasing over time. **Methods**: We investigated the association between self-reported physician-diagnosed UL and endometrial cancer incidence in the Black Women's Health Study, a prospective cohort study. We followed 47,121 participants with intact uteri from 1995 to 2013. UL diagnoses were reported at baseline and every two years thereafter. Endometrial cancer was reported on biennial questionnaires and confirmed by pathology data from medical records or cancer registries. Cox regression was used to derive incidence rate ratios (IRRs) and 95% confidence intervals (CI). **Results**: There were 207 incident endometrial cancer cases during 625,307 person-years of follow-up. In multivariable models, history of UL was associated with a 45% increased incidence of endometrial cancer compared with no history (CI: 1.08, 2.94). IRRs (CIs) for UL diagnosed at ages <30, 30-39, and ≥40 were 1.76 (0.86, 3.63), 2.29 (1.49, 3.53), and 1.28 (0.91, 1.77), respectively. IRRs (CIs) for time since UL diagnosis of <5, 5-9, and ≥10 years were 1.85 (1.23, 2.78), 0.94 (0.59, 1.50), and 1.48 (1.00, 2.19), respectively. **Conclusion**s: Consistent with prior studies, we found an increased risk of endometrial cancer among women with a history of UL, with earlier ages at UL diagnosis predicting higher risks of endometrial cancer. However, part of the overall association may be explained by misdiagnosis of endometrial cancer or detection bias among recently-diagnosed UL cases.

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THE EFFECT OF HURRICANE SANDY ON CARDIOVASCULAR EVENTS IN NEW JERSEY. Joel Swerdel*, Teresa Janevic, Nora Cosgrove, John Kostis (Rutgers University School of Public Health and Cardiovascular Institute at Rutgers Robert Wood Johnson Medical School, Piscataway United States)

Background: Hurricane Sandy hit New Jersey (NJ) on October 29, 2012 and significantly damaged property leaving most homes and businesses in NJ without power for over 7 days. We studied the impact of this extreme weather event on the incidence of and 30 day mortality from cardiovascular events (CVE) including myocardial infarctions (MI) in NJ. **Methods**: Data were obtained from the Myocardial Infarction Data Acquisition System (MIDAS), a database of all inpatient hospital discharges with cardiovascular diagnoses in NJ including death certificates. Patients were grouped by their county of residence and each county was categorized as either High (41.5% of the NJ population) or Low impacted based on data from FEMA and other sources. We utilized Poisson regression comparing the two weeks following Sandy landfall with the same weeks from the five previous years. In addition, we used CVE data from the two weeks prior in each year as an offset to adjust for yearly changes. **Results**: While hospital admissions for CVE decreased during the two weeks in the high impact area, deaths from CVE increased by about 48 cases per week more than expected (95% Confidence Interval (CI)=34.8, 60.8) with a concomitant increase in overall 30 day mortality rate of 3.3% (95% CI=2.7%, 4.0%). In the high impact area, MI incidence increased by about 62 cases per week more than expected (95% CI=48.9, 75.1) with about 34 more deaths per week than expected (95% CI=25.2, 43.0). **Conclusion**: Hurricane Sandy was associated with substantially increased incidence of and mortality from MI. It was also associated with an increased mortality rate from CVE overall.

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MATERNAL EXPOSURE TO NITROGEN DIOXIDE, DIETARY INTAKE OF METHYL-NUTRIENTS AND CONGENITAL HEART DEFECTS IN OFFSPRING. Jeanette A Stingone*, Thomas J Luben, Suzan M Carmichael, Amy H Herring, Arthur S Aylsworth, Marlene Anderka, Lorenzo Botto, Adolfo Correa, Suzanne M Gilboa, Peter H Langlois, Bridget S Mosley, Gary M Shaw, Csaba Siffel, Andrew F Olshan, National Birth Defects Prevention Study (Icahn School of Medicine at Mount Sinai, New York, NY United States)

Previous research has led to the hypothesis that altered DNA methylation may play a role in observed associations between air pollution and adverse birth outcomes. Nutrients such as folic acid, vitamins B6 and B12, methionine and choline help regulate methylation processes and could potentially counteract their hypothesized disruption by air pollutants. We utilized the National Birth Defects Prevention Study, a population-based case-control study, to investigate the joint effects of maternal exposure to nitrogen dioxide (NO2) and dietary intake of methyl-nutrients on the odds of specific congenital heart defects in offspring. Seven-week averages of NO2 concentrations were assigned to 6946 non-diabetic mothers of cases and controls using inverse distance weighting of air pollution monitors within 50km of a woman's residential address during post-conception weeks 2-8. Nutrient intake was assessed using a food frequency questionnaire. We constructed hierarchical regression models adjusted for demographics, smoking, and alcohol use, and calculated the relative excess risk due to interaction (RERI). We observed evidence of interaction between NO2 exposure and methyl-nutrient intake on ventricular septal defects (VSD) but not other defects. For example, relative to women with the lowest decile of NO2 exposure and high methionine intake (i.e., highest three quartiles), the odds ratio for a VSD among offspring of women with the highest NO2 exposure and highest methionine intake was 1.3 (95% confidence interval, CI, 0.7,2.2) but 2.3 (95%CI 1.3,4.3) for women with the highest NO2 exposure and lowest methionine intake. This yields an RERI of 1.24 (95%CI -0.4, 2.9). A similar pattern was observed for choline but not for other nutrients. Nutrient intake during pregnancy may modify the association between exposure to NO2 and certain heart defects. The views expressed do not reflect the views/policies of the US EPA.

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CLASSIFICATION AND REGRESSION TREES FOR EPIDEMIOLOGIC RESEARCH. Katherine Gass*, Matthew Strickland, Dana Flanders, Mitch Klein, Howard Chang (Rollins School of Public Health, Emory University, Atlanta, GA United States)

Background: Identifying and characterizing how mixtures of exposures are associated with health endpoints is challenging. We demonstrate how classification and regression trees can be used to estimate joint effects from exposure mixtures. **Methods**: We illustrate the approach by investigating the joint effects of CO, NO2, O3, and PM2.5 on emergency department visits for pediatric asthma in Atlanta, Georgia. Pollutant concentrations were categorized as quartiles. Days when all pollutants were in the lowest quartile were held out as the referent group (n=131) and the remaining 3,879 days were used to estimate the regression tree. Pollutants were parameterized as dichotomous variables representing each ordinal split of the quartiles (e.g. comparing CO quartile 1 vs. CO quartiles 2-4) and considered one at a time in a Poisson case-crossover model with control for confounding. The pollutant-split resulting in the smallest P-value was selected as the first split and the dataset was partitioned accordingly. This process repeated for each subset of the data until the P-values for the remaining splits were not below a given alpha, resulting in the formation of a "terminal node." We used the case-crossover model to estimate the adjusted risk ratio for each terminal node compared to the referent group, as well as the likelihood ratio test for the inclusion of the terminal nodes in the final model. **Results**: The largest risk ratio corresponded to days when PM2.5 was in the highest quartile and NO2 was in the lowest two quartiles (RR: 1.10, 95% CI: 1.05, 1.16). A simultaneous Wald test for the inclusion of all terminal nodes in the model was significant, with a chi-square statistic of 34.3 (p=0.001, with 13 degrees of freedom). **Conclusion**s: Regression trees can be used to assess joint effects and may be useful for generating hypotheses about the health effects of exposure mixtures in epidemiologic research.

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USING BOOSTED REGRESSION TREES IN EPIDEMIOLOGIC MODELING: AN EXAMPLE PREDICTING INCIDENT CATARACTS AMONG MEDICAL RADIOLOGIC TECHNOLOGISTS. Craig S. Meyer*, Richard F. MacLehose, Jay S. Kaufman, Julian A. Wolfson, Bruce H. Alexander (University of Minnesota, Minneapolis, MN United States)

In studies of exposure-disease relationships, epidemiologists often assume homogeneous effects, which are easier to model, interpret, and present. However, effect modification across strata is likely common and substantively important, both in terms of targeting interventions and understanding the range of possible effects of the exposure. One of the challenges of evaluating effect modification is the investigation of effects within multiple strata. Diverse covariate patterns may give rise to heterogeneous effects, and standard regression modeling makes exploring and describing those effects difficult. Machine learning algorithms from the field of computer science allow relatively easy estimation of heterogeneous effects across a large number of strata. Boosted regression trees (BRT) are flexible tools used for prediction that also easily incorporate interactions. BRT models differ from more traditional regression models in that they do not estimate a single "best" model. Rather, they combine relatively simple regression trees adaptively, to optimize prediction accuracy. A BRT model is most easily conceptualized as a weighted average of predictions from many simple individual regression trees. Using data from the United States Radiologic Technologists study, we demonstrate the use of BRTs to build a prediction model of the risk of radiogenic cataract from protracted exposures to occupational ionizing radiation. Risk differences from model predictions between high and low dose exposure are calculated for possible covariate patterns. Graphical displays of the heterogeneity of risk differences are presented.

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A MULTILEVEL GEOSPATIAL ANALYSIS OF RISK FACTORS FOR LYME DISEASE. Kiersten Kugeler*, Jennifer Peel, Katherine Feldman, Paul Mead (Centers for Disease Control and Prevention and Colorado State University, Fort Collins, CO United States)

Lyme disease is the most common vector-borne disease in the United States, yet risk factors for human infection remain poorly defined. We classified all 94,303 households in Howard County, Maryland, according to history of reported Lyme disease during 2001-2011. Land use and land cover type were assessed at the household level; other environmental and socio-demographic factors were assessed at the neighborhood level (census block group). Multilevel logistic regression models were used to describe variation in risk across space and examine associations of explanatory factors with Lyme disease risk. Nearly 2% (n=1672) of geocoded households had a history of Lyme disease. Approximately 8% of total variation in Lyme disease risk occurred across neighborhoods; 64% of this variation was explained by variables assessed at the neighborhood level; household land use and land cover explained 40%. Lyme disease risk was associated with low density residential development (adjusted odds ratio [aOR]: 1.9; 95% confidence interval [CI]: 1.5-2.3), a dominant vegetation type of red and white oak forest (aOR: 1.3; 95% CI: 1.1-1.6), and a higher proportion of forest in the neighborhood (aOR per interquartile range [IQR] increase [16%]: 1.4; 95% CI: 1.1-1.7). Compared to houses without Lyme disease, case households were located in neighborhoods of higher average home value (aOR per IQR increase [$255,600]: 1.5; 95% CI: 1.2-1.8). Variables measured at the neighborhood level accounted for more of the spatial variation in risk than did household characteristics, yet unmeasured individual level behavior likely explains the most disease risk. This is the first analysis to associate human Lyme disease with a specific forest type. Multilevel models may help define risk factors for Lyme disease as well as the scale at which they act.

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PRE-DIAGNOSTIC SCHOOL-BASED SYNDROMIC SURVEILLANCE SYSTEM EARLY: DETECTED CASES OF ENTEROVIRUS - AND INFLUENZA-LIKE ILLNESS IN TAIPEI, TAIWAN. Ting-Chia Weng*, Ta-Chien Chan, Hsien-Tang Lin, Chia-Kun Jasper Chang, Wen-Wen Wang, Yu-Roo Chu, Allen Wen-Hsiang Chiu, Muh-Yong Yen, Chwan-Chuen King (National Taiwan University, Taipei Taiwan)

School children may transmit pathogens with cluster cases on campus and in families. In response to the 2009 influenza A (H1N1) pandemic, Taipei City government officials developed a Web-accessed Infectious Disease Syndromic Surveillance for School children (WIDSSS). The pre-diagnosis at school was submitted at first as common pediatric disease syndrome-groups and then re-submitted after the confirmation by physicians. We retrieved these data from January 2010 to August 2011 for spatio-temporal analysis and compared the temporal trends with cases obtained from both the Emergency Department based Real-time Outbreak and Disease Surveillance (ED-RODS) and the National Health Insurance Database (NHID). Among totally 19,334 cases, the majority of the reported disease syndrome-groups were enterovirus-like illness (EVLI) [77.6%, n=14,995] and influenza-like illness (ILI) [15.8%, n=3,046]. The pre-diagnosis information from schools was highly consistent with physician diagnoses for EVLI (97.8%) and ILI (98.9%). Spatio-temporal analysis observed the patterns of EVLI and ILI diffuse from suburban districts to central Taipei but from different origins. EVLI and ILI were detected two weeks before the ED-RODS at peaks. For EVLI age-specific trends, the WIDSSS had high correlation ($p<0.01$) with the NHID in preschool and primary school children through semesters in 2010. This novel system can early identify suspected cases of EVLI and ILI from pre-diagnostic surveillance at schools. The timely surveillance of mild EVLI/ILI cases integrated with spatial diffusion analysis can help public health decision-makers who and where to target for enhancing surveillance and for prevention measures to minimize later and severe cases. Our experiences demonstrate the usefulness of school children syndromic surveillance in metropolitan to minimize future threats of pediatric infectious diseases.

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CHILDREN PARTIALLY IMMUNIZED AT TWO YEARS OF AGE: ARE THEY SELECTIVELY IMMUNIZING OR FAILING TO COMPLETE THE VACCINE SERIES? Shannon MacDonald*, Christopher Bell, Kimberley Simmonds (University of Calgary Department of Pediatrics, Calgary Canada)

Children who are only partially immunized by two years of age remain susceptible to vaccine preventable disease. This is a larger group than those who receive no vaccines. We sought to characterize this 'partially immunized' population to determine whether they are (1) 'selectively' immunizing by opting out of specific vaccines (i.e. receiving no doses of ≥1 vaccines but completing other vaccine series) or (2) 'incompletely' immunizing (i.e. receiving ≥1 doses of a multi-dose vaccine, but not completing the series). This retrospective cohort study linked vital statistics birth registration data to a population-based immunization repository to assess immunization rates at age two for the 2008 birth cohort in Alberta, Canada. Of the 43,881 children in the cohort, 71.3% were completely immunized by age two, 23.8% were partially immunized, and 4.9% had received no vaccines. Of the children partially immunized, 8.3% (n=868) were 'selectively' immunized and 91.7% (9,584) were 'incompletely' immunized. Of the 868 selectively immunized children, most were only missing one (82.0%) or two (14.2%) vaccines. Of those refusing only one vaccine, 87.4% opted out of varicella, compared to 11.8% for Measles-Mumps-Rubella (MMR), 0.56% for Meningococcal, and 0.28% for Pneumococcal vaccines. Of those refusing two vaccines, refusal of MMR and Varicella vaccines accounted for 90.2%. Of the children who were incomplete for the multi-dose vaccines (n=9,584), the most commonly incomplete vaccines were those requiring 4 doses. Future work includes investigating whether these children are on 'alternative' schedules that delay completion until after two years, or if these children remain unprotected due to personal or systemic factors that prevent completion of the vaccine series. Understanding the characteristics of partially immunized children will enable more targeted interventions to improve uptake in this group.

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AFRICAN AMERICAN RACE AND HIV VIROLOGIC SUPPRESSION BEYOND DISPARITIES IN CLINIC ATTENDANCE: A CAUSAL MEDIATION ANALYSIS APPROACH. Chanelle Howe*, Sonia Napravnik, Stephen Cole, Jay Kaufman, Adaora Adimora, Beth Elston, Joseph Eron, Michael Mugavero (Brown University, Providence, RI United States)

Racial disparities in clinic attendance may contribute to racial disparities in plasma HIV-1 RNA levels among HIV+ patients in care. Inverse probability weighted modified Poisson regression models as well as data on 1,481 African American (AA) and Caucasian patients receiving care at the University of North Carolina Center for AIDS Research HIV clinic between 1/1/99 and 8/1/12 were used to estimate the association between AA race and HIV virologic suppression (i.e., undetectable RNA) when racial disparities in clinic attendance are lessened. Clinic attendance was measured as the proportion of scheduled clinic appointments attended (i.e., visit adherence) or the proportion of six 4-month intervals with at least one attended scheduled clinic appointment (i.e., visit constancy). Sixty-four percent of patients were AA, 69% were male. The median (quartiles) age and CD4 count at the first clinic visit were 40 (33; 46) years and 333 (129; 539) cells/microl, respectively. During the two years after their first visit, 36% of patients attended all of their scheduled appointments, while 20% of patients had at least one attended scheduled appointment during all of the six 4-month intervals. Sixty-two percent of RNA measures taken two to three years after the first visit were suppressed. In weighted analyses accounting for patient characteristics, the risk ratio (RR) for achieving suppression comparing AAs to Caucasians was 0.91 (95% confidence limits: 0.85, 0.98). Lessening disparities in adherence or constancy lowered disparities in suppression by up to 44.4% and 11.1%, respectively. Interventions that lessen disparities in adherence may be more effective in eliminating disparities in suppression than interventions that lessen disparities in constancy. Given that gaps in care were limited to be no more than two years for both attendance measures, the impact of lessening disparities in adherence may be overstated.

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ESTIMATING THE CAUSAL EFFECT OF PREP FOR HIV-1 PREVENTION. Pamela Murnane*, Elizabeth Brown, Deborah Donnell, Nelly Mugo, Andrew Mujugira, Connie Celum, Jared Baeten (University of Washington, Seattle, WA United States)

Background: Daily oral antiretroviral pre-exposure prophylaxis (PrEP) is a novel strategy for HIV-1 prevention, yet results across randomized trials range from null to 75% efficacy, likely primarily due to differing adherence across studies. Using the principal stratification framework, in which a post-randomization variable (e.g., adherence) is both predictive of the outcome and can be predicted by baseline covariates, we aimed to estimate the causal effect of PrEP among compliers. **Methods**: Data were from a randomized trial of PrEP which demonstrated 75% efficacy for tenofovir/emtricitabine PrEP compared to placebo in intention-to-treat analysis. Tenofovir concentrations were measured on plasma samples 6 months after enrollment in a random cohort of 200 participants, as a marker of adherence, and tenofovir was detected in >80% of samples. Within this cohort, we built a logistic model with baseline characteristics to predict the probability of plasma tenofovir levels consistent with daily use, and estimated the area under the curve (AUC). We predicted the probability of adherence for all PrEP and placebo participants, using the coefficients from the logistic model and observed covariates. We estimated the effect of PrEP in the full cohort with Cox regression including arm, the predicted probabilities, and their interaction. **Results**: The AUC in our prediction model was 0.76. The median predicted probability of adherence was 0.72 (interquartile range [IQR] 0.55-0.84) among participants assigned PrEP and 0.71 (IQR 0.56-0.83) among placebo participants. For a predicted probability of adherence = 1, efficacy was 84% (95% CI 46-95) and for a probability of 0.9, efficacy was 81% (95% CI 52-93). **Conclusion**s: The effect of daily PrEP on HIV-1 prevention among those with a high probability of adherence, based on baseline characteristics only, was >80%, modestly higher than intention-to-treat.

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ESTIMATING THE ASSOCIATION BETWEEN DURATION OF COMBINATION ANTIRETROVIRAL THERAPY (CART) BEFORE DELIVERY AND SMALL FOR GESTATIONAL AGE (SGA) AMONG HIV-INFECTED ZAMBIAN WOMEN ELIGIBLE FOR CART. Angela Bengtson*, Carla Chibwesha, Mwangela Mubiana-Mbewe, Allen Wilcox, Daniel Westreich, Muntanga Mapani, Patrick Musonda, William Miller, Jeffrey Stringer, Benjamin Chi, Audrey Pettifor (University of North Carolina, Chapel Hill, Chapel Hill, NC United States)

Controversy exists about the impact of cART on fetal growth and timing of delivery. Estimates of SGA based on US or European populations may not accurately reflect the distribution of birthweight in developing countries. Using data from HIV-infected pregnant women in Lusaka, Zambia, we investigated the association between duration of cART before delivery and SGA among women who were cART-naïve, eligible for treatment (CD4 count ≤350), and delivered a singleton infant between 2009-2013. Birthweights from HIV-uninfected Zambian women who delivered at 40 weeks gestational age (GA) were used to create Zambia-specific SGA percentiles. GA was estimated using an algorithm and based on last menstrual period and fundal height. Duration on cART was categorized as ≤8, 9-20, 21-36 weeks during pregnancy or eligible but never initiated treatment. Log-binomial and Poisson regression with a robust variance estimator was used to estimate risk ratios (RR) for the association between duration on cART and SGA and adjusted for number of antenatal visits, age, BMI, CD4 count, education, hemoglobin, malaria, parity, syphilis, tuberculosis and prior preterm birth. Of the 9,270 women who met the inclusion criteria, 556 (7.6%) experienced a SGA birth. The majority of women (64%) never initiated cART; 16 % were exposed to cART for ≤8 weeks, 18% for 9-20 weeks and 2% for 21-36 weeks. Compared to cART-eligible women who never initiated treatment, the RR for SGA was 1.95 (95% CI 0.85, 4.45) for 21-36 weeks, RR 1.45 (95% CI 1.02, 2.06) for 9-20 weeks, and RR 0.75 (95% CI 0.48, 1.18) for ≤8 weeks. Our results suggest a trend towards longer duration of cART increasing the risk of SGA, but should be interpreted with caution due to the imprecision of estimates. Further work on the impact of cART on fetal growth using country-specific standards is needed to determine if longer duration of cART increases the risk of SGA.

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MATERNAL AGE OF MENARCHE AND BODY MASS INDEX: EVIDENCE FROM HONG KONG'S "CHILDREN OF 1997" BIRTH COHORT. Tsz Chun Lai*, Gabriel M Leung, Shiu Lun Au Yeung, Shi Lin Lin, Catherine Mary Schooling (Lifestyle and Life Course Epidemiology Group, School of Public Health, Li Ka Shing Faculty of Medicine, The University of Hong Kong, Hong Kong Hong Kong)

Earlier age of menarche is associated with obesity and cardiovascular diseases, with some evidence from Western settings that maternal age of menarche is associated with higher infant and child body mass index (BMI). In a developed non-Western setting with a very recent history of economic development, we examined the association of maternal age of menarche with BMI and height at different growth phases. We used generalised estimating equations in Hong Kong's population representative birth cohort "Children of 1997" (n=8327) to examine the adjusted association of maternal age of menarche (=11 years, 12 – 13years, 14 – 15years and =16years) with BMI and height z-score in infancy, childhood and at puberty. Multiple imputation was used for missing data. Our evidence showed that earlier maternal age of menarche was not associated with higher BMI during infancy or childhood but was associated with higher BMI during puberty [12 - 13years -0.079 (95% confidence interval (CI) -0.149 to -0.009), 14 – 15years -0.134 (95 % CI -0.248, -0.021) and =16years -0.196 (95 % CI-0.412, 0.021) compared to =11 years]. Similar trends were also evident for height z-score [12 – 13years -0.062 (95 % CI -0.119, -0.006), 14 – 15years -0.146 (95% CI -0.232, -0.059) and =16years -0.269 (95% CI -0.408, -0.131) compared to =11 years]. In a non-Western developed setting where mothers grew up in very different environments from their children earlier maternal age of menarche was only associated with higher BMI and greater height at puberty, suggesting that maternal age of menarche may influence tempo of growth at puberty rather than throughout growth.

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ANTIBIOTIC USE IN MID-TO-LATE PREGNANCY AND CESAREAN SECTION DELIVERY ARE ASSOCIATED WITH INCREASED OBESITY RISK IN OFFSPRING AT 5 AND 7 YEARS OF AGE. Noel Mueller*, Robin Whyatt, Lori Hoepner, Sharon Oberfield, Frederica Perera, Andrew Rundle (Columbia University, New York, NY United States)

Antibiotic use late in gestation and cesarean section delivery may lead to differences offspring gut microbiome through maternal-fetal microbiota exchange at birth. These differences may persist into childhood, and have been linked with obesity. In this light, we hypothesized that i) antibiotic use later in the gestational period and ii) cesarean section delivery are prospectively associated with higher risk of offspring obesity at 5 and 7 years in the Mothers and Newborn Study in Northern Manhattan and South Bronx. Antibiotic use and delivery mode were determined by medical record. Age- and sex-specific BMI z scores were derived using the CDC macro. Obesity was defined as BMI z ≥ 95th percentile. Of 511 children with complete age 7 BMI data, we excluded 10 missing mode of delivery, 32 missing gestational age, 16 born prematurely, 11 missing maternal pre-pregnancy BMI, and 5 with unreliable birth weight, leaving 437 in the age 7 year analyses. Regression models were adjusted for maternal age, ethnicity, pre-pregnancy BMI, maternal receipt of public assistance, parity, birth weight, sex, and gestational antibiotic use or delivery mode. After adjustment, gestational antibiotic use during 2nd or 3rd trimester was associated with increased risk of offspring obesity at age 5 [RR=1.42 (95%CI: 0.95-2.13)] and 7 years [RR=1.81 (1.34-2.46)]; yet 1st trimester antibiotic use was not [RR=0.93 (0.41-2.12) and RR=0.72 (0.24-2.18), respectively]. Cesarean section was also associated with increased risk of obesity at age 5 (RR=1.44; 0.99-2.09) and 7 years (RR=1.43; 1.04-1.97). Elective and emergency cesarean sections were combined, as their associations with obesity did not differ. These findings suggest antibiotic use in mid-to-late pregnancy and cesarean section delivery increase offspring risk of childhood obesity. Further study is needed to determine if alterations in gut microbiome underlie these associations.

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LIFETIME SOCIOECONOMIC POSITION AND COGNITIVE DECLINE: THE ARIC NEUROCOGNITIVE STUDY. Mehul Patel*, Benjamin Capistrant, Priya Palta, Michelle Snyder, Thomas Mosley, Laura Coker, Gerardo Heiss (University of North Carolina at Chapel Hill, Chapel Hill, NC United States)

The role of lifetime socioeconomic position (SEP) on cognitive decline in older adults is not well-established. We estimated race-specific associations of cumulative, lifetime SEP and cognitive change from 1990-2013 in 4,735 Black and White Atherosclerosis Risk in Communities (ARIC) cohort members with life course SEP and cognitive assessments. Measures of childhood, early adulthood, and middle age SEP (education, occupation, household income, home ownership) were combined into a summary score and categorized by race-specific tertiles into high, middle, and low SEP groups. Three cognitive tests (Delayed Word Recall, Digit Symbol Substitution, and Word Fluency) were administered at 3 study visits (in 1990-92, 1996-98, and 2011-2013). We standardized and averaged cognitive test scores to a composite measure of cognitive function. Primary outcomes were race-specific z scores based on baseline means and standard deviations. Race-specific cognitive change by SEP groups was estimated with linear regression using generalized estimating equations, including a linear spline for follow-up time with a knot at 6 years (approximate time of the second testing visit). We adjusted for gender, baseline age (centered at 55 years), and their interactions with follow-up time variables. In 55-year old, White men, the estimated 20-year change in cognitive z score among the high SEP group was -1.0 (95% confidence interval (CI) -1.1, -1.0). There were no significant differences in cognitive change by SEP for Whites. In Black counterparts, 20-year cognitive change slightly varied by SEP: low = -0.6 (95% CI -0.7, -0.5); middle = -0.7 (95% CI -0.8, -0.6), and high = -0.8 (95% CI -0.9, -0.6). Similar change estimates were found in women. In conclusion, cumulative, lifetime SEP was largely unrelated to long-term cognitive decline from middle age to older adulthood. Differential attrition by SEP may have influenced these findings.

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THE INFLUENCE OF EARLY GROWTH AND SOCIO-ECONOMIC STATUS ON HEARING AT AGE 61-63 YEARS: NEWCASTLE THOUSAND FAMILIES STUDY. Mark Pearce*, Kay Mann, Fiona Pearson, Adrian Davis, Adrian Rees (Newcastle University, Newcastle upon Tyne United Kingdom)

Almost three million people are affected by hearing loss worldwide. Early growth is suggested to influence later hearing status, although early socio-economic status (SES) may be more important. We investigated whether associations exist between factors in early life, such as gestation, birth weight, housing conditions and SES and hearing function at age 61-63 years in the Newcastle Thousand Families Study (NTFS). The NTFS is a birth cohort of all 1142 children born in May and June 1947 to mothers resident in Newcastle upon Tyne, UK. Their health, growth and development was followed through childhood, with further detailed follow-ups at various points in adulthood. During the most recent follow-up, 346 study members underwent audiological testing with measurements taken at seven frequencies between 250Hz and 8kHz in octave steps and at 3kHz and 6kHz. Females had between 6 to 11 dB significantly better hearing function than males at 3kHz, 4kHz, 6kHz and 8kHz ($p<0.001$, all frequencies). No significant associations between gestational age, birth weight, standardised birth weight and hearing function at any frequency were found. SES at birth was significantly associated with hearing function at frequencies above and including 1kHz. Hearing function was better for those in more advantaged classes and worse for those in the least advantaged classes, compared to those from the middle class. These associations remained after the adjustment for sex, hearing aid use, ever experiencing workplace dust and workplace loud noise. Good housing conditions at birth were significantly associated with the higher hearing function frequencies at 2kHz, 6kHz and 8kHz. Our findings do not support the hypothesis that early growth is related to later hearing function. However, early housing conditions and SES were associated with hearing, suggesting that some of the antecedents of impaired hearing may lie early in life.

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IMMORTAL PERSON-TIME AND INTENTION TO TREAT ANALYSIS: BIOLOGIC VS. PUBLIC HEALTH EFFECTS. Sunni Mumford*, Enrique Schisterman, Stephen Cole, Daniel Westreich, Robert Platt (Eunice Kennedy Shriver National Institute of Child Health and Human Development, Rockville, MD United States)

Although the standard recommendation is to exclude immortal person-time (i.e., time during which the outcome could not have occurred) from the denominators of disease rates, there are scenarios where we argue that immortal person-time should be included. In particular, we draw an analogy between including immortal person-time and intent-to-treat (ITT) analyses of randomized trials, and excluding immortal person-time and compliance-corrected analysis of these same trials. Like the ITT approach, exclusion of immortal person-time deals with an issue of 'noncompliance' or misclassification, in this case with compliance to time scales (the time at risk versus time exposed). Though the ITT and immortal person-time scenarios have an important difference in that the ITT is based on randomization, the question of how to deal with this misclassification or noncompliance is a critical issue in both cases that impacts interpretation of research findings and questions that can be answered. Excluding immortal person-time is appropriate when addressing questions of the biologic or mechanistic effects of an exposure, whereas the ITT-type approach answers questions regarding effects of an exposure under observed compliance patterns or effects of potential interventions in populations which include immortal person-time. The choice of approach directly affects the causal question being answered and subsequent inference, with potential implications for public health. When interested in estimating treatment effects that allow and account for potential noncompliance, we argue that immortal person-time should not be excluded. We use estimation of time-to-pregnancy as an illustrative example and show that although the ITT-type analysis may underestimate the biological fecundity of the population, it may also yield an answer to a question that is of more interest to couples seeking pregnancy.

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ERROR IN MATERNAL RECALL OF TIME-TO-PREGNANCY. Rose Radin*, Elizabeth Hatch, Kenneth Rothman, Ellen Mikkelsen, Henrik Sorensen, Anders Riis, Lauren Wise (Boston University, Boston, MA United States)

Background: Epidemiologic studies of fecundability often use a retrospective design, which introduces potential for error in recalled time-to-pregnancy (TTP). A prior prospective study found that after 10 years, 49% of mothers recalled TTP with error>1 month. Higher gravidity and longer attempt time were associated with under-estimated TTP. **Methods**: We quantified the measurement error of TTP recalled in the first trimester of pregnancy relative to prospective TTP (gold standard), using data from the Snart Gravid Study in Denmark, 2007-2011. The analysis included 424 women with <1 month of attempt time at study entry and who became pregnant within 12 months of follow-up. Recalled TTP was reported in months. We defined prospective TTP as the interval from the first day of the menstrual cycle at the start of the pregnancy attempt, to the middle of the cycle when pregnancy occurred, rounded to the nearest month. We defined recall error as recalled TTP minus prospective TTP, and used linear regression models to assess the extent to which recall error was associated with attempt time, age, and gravidity. **Results**: Recall error ranged from -9 to 3 months with a median of 0 and a mean of -0.25 months (95% CI: -0.36,-0.12). The prevalence of reports with >1 month difference between TTPs was 11% (95% CI: 8, 14). The average change in recall error associated with a one-month increase in attempt time was -0.25 months (95% CI: -0.30,-0.20). Recall was similar in gravid and nulligravid women and in women age <30 and ≥30. **Conclusion**s: When recalled in the first trimester of pregnancy, error in TTP was on average small. Underestimation of TTP increased with longer attempt times.

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HOW LONG AFTER MISCARRIAGE SHOULD WOMEN WAIT BEFORE TRYING TO BECOME PREGNANT AGAIN? Karen Schliep*, Luchin Wong, Enrique Schisterman, Jean Wactawski-Wende, Janet Townsend, Anne Lynch, Noya Galai, David Faraggi, Neil Perkins, Sunni Mumford, Aijun Ye, Bob Silver (Epidemiology Branch, Division of Intramural Population Health Research, Eunice Kennedy Shriver National Institute of Child Health and Human Development, Rockville, MD United States)

Obstetricians often recommend waiting 3 months after a miscarriage before attempting to conceive. However, there is little data to support this recommendation, and previous research has been biased by restricting analyses to only women who achieve pregnancy. Our objective was to investigate time to pregnancy (TTP) and TTP leading to live birth among varying inter-trying intervals defined as time from last pregnancy loss to time started trying to become pregnant. We performed a secondary analysis of the Effects of Aspirin in Gestation and Reproduction (EAGeR) randomized controlled trial (2006–2012). 1074 women, aged 18–40 and actively trying to conceive, with 1–2 prior losses and whose last pregnancy was a loss, were recruited from 4 geographically diverse US medical centers and followed for up to 6 menstrual cycles. TTP was defined as time starting to try to conceive until date of conception; couples who withdrew or did not achieve pregnancy were censored. Cox proportional hazard regression models adjusting for age, race, BMI, education, time it took to achieve previous pregnancy, and gestational age of previous loss were used to evaluate fecundability odds ratios (FOR; <1.0 denoting reduction in fecundity or longer TTP; >1.0 denoting enhanced fecundity or shorter TTP). Mean gestational age of prior loss among women in our sample was 5.4 ± 0.7 weeks (range: 3–15 weeks). 677 (63.0%) women had an hCG positive pregnancy test, of whom 518 (48.2%) went on to have a live birth. There were no differences in TTP or TTP leading to live birth between women who started trying 0 to 3 months after last loss (adjusted FOR=1.2; 95% confidence interval (CI): 1.0, 1.6; and adjusted FOR=1.2, 95% CI: 0.9, 1.5, respectively) compared to women who waited longer than 3 months to start trying. The traditional recommendation to wait at least 3 months after a pregnancy loss before attempting to conceive may be unwarranted.

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RANDOMIZED CLINICAL TRIAL OF PRECONCEPTION LOW DOSE ASPIRIN USE AND PREGNANCY RATE: THE EAGER TRIAL (2006-2012). Enrique Schisterman*, Karen Schliep, Robert Silver, Joseph Stanford, Noya Galai, Laurie Lesher, Jean Wactawski-Wende, Anne Lynch, Janet Townsend, Neil Perkins, David Faraggi, Sunni Mumford (Epidemiology Branch, Division of Intramural Population Health Research, Eunice Kennedy Shriver National Institute of Child Health and Human Development, Rockville, MD United States)

Our objective was to evaluate whether low dose aspirin (LDA) initiated preconception (81 mg/day) is associated with improved pregnancy rates among women with a previous loss. This prospective block-randomized double-blind placebo-controlled trial recruited women with 1–2 prior losses, aged 18–40 actively trying to conceive. Women were stratified by site and eligibility stratum: 1) original: women with 1 documented loss <20 weeks gestational age (GA) during the past year, or 2) expanded: women with 1–2 documented losses regardless of GA or time since loss. Participants were followed for up to 6 menstrual cycles with pregnancy identified via hCG urine test. Relative risk (RR) of achieving pregnancy in the LDA and placebo groups were compared using a chi-square test based on the intent-to-treat principle. 1228 women were randomized: 615 LDA and 613 placebo. LDA versus placebo was associated with increased pregnancy rates overall (410 [75.4%] vs. 382 [68.8%]; RR: 1.10 [95% confidence interval (CI): 1.02, 1.18]) and within the original stratum (196 [79.3%] vs. 173 [68.4%]; RR: 1.16 [95% confidence interval (CI): 1.04, 1.29]), but not the expanded stratum (214 [72.1%] vs. 209 [69.2%]; RR: 1.04 [95% confidence interval (CI): 0.94, 1.15]). Our results indicate that among women with 1–2 prior losses, daily LDA initiated preconception may improve the probability of achieving pregnancy over the course of 6 menstrual cycles. Our findings also show that the effect of preconception-initiated LDA may be stronger among women with a single documented loss at <20 weeks' gestation during the previous year.

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ADVERSE CHILDHOOD EVENT EXPERIENCES, MENSTRUAL CYCLE CHARACTERISTICS, AND FERTILITY DIFFICULTIES. Marni Jacobs*, Emily Harville, Arti Shankar, Renee Boynton-Jarrett (Tulane University, New Orleans, LA United States)

Recent research suggests that stressful childhood events may influence fertility, however, the mechanism by which this occurs is unclear. The present study assessed whether stressful childhood experiences are associated with reported infertility, and whether any association might be mediated through disturbances in the menstrual cycle. 631 reproductive-aged women participating in a study of stressful life experiences and reproductive outcomes completed the Adverse Childhood Experience (ACE), the Child Trauma Questionnaire (CTQ), and the Truamatic Events Inventory (TEI), and also reported on difficulties conceiving and characteristics of their menstrual cycles. Logistic regression was used to assess the odds of infertility and menstrual cycle disturbances associated with stressful childhood events, controlling for demographic factors such as: age, BMI, race, education, and income. Analysis focused on experiences that occurred before age 13. Increasing ACE and CTQ scores were associated with higher likelihood of infertility (aOR = 1.17, 95% CI 1.07 – 1.27, and aOR = 1.22, 95% CI 1.04 – 1.42, respectively), and the effects were strongest when considering the sexual abuse, physical abuse, and substance use subscales (aOR = 1.81, 95% CI 1.03 – 3.19, aOR = 1.41, 95% CI 1.13 – 1.76, and aOR = 1.58, 95% CI 1.17 – 2.14, respectively). Associations were similar for a history of amenorrhea, however, no association was seen with irregular menstrual patterns. The TEI was not associated with any of the outcomes considered. These findings indicate that stressful life experiences during childhood may influence later fertility, potentially through disturbances in the menstrual cycle, as indicated by periods of amenorrhea.

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EARLY GYNECOLOGIC SURGERY AND BREAST CANCER RISK AMONG BLACK AND WHITE WOMEN IN THE U.S. SOUTH. Whitney Robinson*, Chiu Kit Tse, Andrew Olshan, Melissa Troester (University of North Carolina at Chapel Hill, Chapel Hill, NC United States)

Background: Premenopausal hysterectomy, especially when accompanied by bilateral oophorectomy, may be associated with reduced risk of later breast cancer. Although hysterectomy rates declined 28% between 1980 and 2004, it is unclear how these trends may affect breast cancer risk in diverse populations. **Methods**: Using the Carolina Breast Cancer Study, a population-based case-control study of breast cancers diagnosed in North Carolina between 1993 and 2000, we examined associations between gynecologic surgery (bilateral oophorectomy, hysterectomy with partial oophorectomy, or hysterectomy with no or unknown oophorectomy) before age 45 years ("early") and breast cancer diagnosis (ages: 50-74 years; n=819 cases). Multivariable-adjusted models controlled for sampling, age, family history, education, alcohol use, smoking history, age at menarche, parity/age at first full-term pregnancy, and lactation. **Results**: Among controls, early surgery was more common among older Black women (32.0%) than Whites (24.9%) as was early oophorectomy (13.0% vs 7.2%). Bilateral oophorectomy was associated with reduced cancer risk among Blacks (adjusted odds ratio [OR]=0.55 [95% confidence interval (CI)]: 0.33-0.92) and, to a lesser extent, among Whites (OR=0.73 [0.40-1.32]). Among Blacks, results were stronger after restricting to non-HRT (hormone replacement therapy) users: OR=0.48 (0.26-0.88). Among White non-HRT users, effect estimates were imprecise because HRT use following oophorectomy was nearly universal among Whites (92%, versus 55% among Blacks). Results were similar but less pronounced for other surgeries. **Conclusion**: Among Black Southern women, historically high rates of early surgery and lower use of HRT after surgery may have artificially lowered breast cancer rates. As hysterectomy rates decline, breast cancer incidence may increase among older Black women.

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THE INTERACTION BETWEEN EARLY-LIFE BODY SIZE AND PHYSICAL ACTIVITY ON THE RISK OF BREAST CANCER. Hannah Oh*, Caroline Boeke, Rulla Tamimi, Stephanie Smith-Warner, Molin Wang, Walter Willett, A. Heather Eliassen (Departments of Epidemiology and Nutrition, Harvard School of Public Health; Channing Division of Network Medicine, Brigham and Women's Hospital, Boston, MA United States)

While early-life body leanness is associated with increased risk of breast cancer, early-life physical activity may reduce the risk of breast cancer. We examined whether the excess breast cancer risk among lean girls is modified by their levels of prior, concurrent, and future physical activity. We conducted a prospective analysis among 74,723 women in the Nurses' Health Study II with follow-up 1997-2011 (2,651 breast cancer cases). Participants recalled their body size at ages 5, 10, and 20 years in 1989 using a 9-level pictogram (level 1-9: most lean to most overweight). In 1997, they reported their adolescent levels of physical activity (ages 12 -13 and 14-17 years). Cox proportional hazards models were used to estimate the overall association of body size with the risk of breast cancer and to assess interactions of adolescent physical activity with body size at three different age periods (5-10, 10-20, and 20 years). Models were adjusted for childhood and adult risk factors for breast cancer and likelihood ratio tests were performed to determine statistical significance of the interactions. Regardless of their levels of adolescent physical activity, early-life body leanness (level 1-2 vs. 4.5+) was consistently positively associated with the risk of breast cancer. The association was slightly attenuated among those who were physically active (60+ MET-hr/wk) during adolescence compared to those who were physically inactive (<30 MET-hr/wk) (multivariate relative risk=1.32, 95% confidence interval=1.00-1.75 vs. 1.64, 1.30-2.08), but the interaction was not statistically significant (p=0.74). The results were similar for body size at three different age periods and none of the interactions was statistically significant. Being lean at young ages is a risk factor for breast cancer among both inactive and active girls. Although not significant, some interaction with physical activity cannot be excluded.

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VITAMIN D AND INCIDENCE OF BREAST CANCER IN AFRICAN AMERICAN WOMEN. Julie R. Palmer*, Hanna Gerlovin, Yvette C. Cozier, Edward A. Ruiz-Narvaez, Lauren A. Wise, Stephen A. Haddad, Michael F. Holick, Lynn Rosenberg (Slone Epidemiology Center at Boston University, Boston, MA United States)

Experimental evidence suggests that higher circulating levels of 25-hydroxy vitamin D (25[OH]D)may be protective against cancer, possibly through regulation of cell division and apoptosis. Epidemiologic studies of 25(OH)D in relation to risk of breast cancer have yielded conflicting findings. Vitamin D deficiency is particularly common in African Americans, who experience high rates of aggressive breast cancers. We assessed the relation of vitamin D status to breast cancer incidence in a prospective cohort of African American women (Black Women's Health Study). We first created and validated a prediction model for 25(OH)D based on plasma levels in 506 study participants using repeated split sample validation (randomly selected 75% training/25% testing). After 100 replications, the best-fitting model included terms for vitamin D supplementation, body mass index, dietary vitamin D intake, and cigarette smoking, with an average concordance statistic for classification as above/below recommended level of 25(OH)D of 0.68 (SE 0.06). Including physical activity, geographic region, or skin pigmentation/vitamin D receptor SNPs did not improve the fit. We then computed a predicted value for all BWHS participants and estimated hazard ratios (HR) for the highest quartile of predicted 25(OH)D relative to all others, since approximately 25% of plasma samples had values of at least 30ng/mL (accepted cut-point for vitamin D sufficiency). In 16 years of follow-up, 1,319 cases of breast cancer occurred among 50,118 BWHS participants. The HR for the highest quartile of predicted 25(OH)D relative to the lowest three quartiles was 0.83 (95% confidence interval 0.72-0.96) after control for age and other breast cancer risk factors. The findings suggest that African American women who have sufficient levels of circulating 25(OH)D may have a reduced risk of breast cancer relative to those who are vitamin D deficient.

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INDOOR AIR POLLUTION EXPOSURE FROM USE OF INDOOR STOVES AND FIREPLACES IN ASSOCIATION WITH BREAST CANCER. Alexandra J. White*, Susan L. Teitelbaum, Steven D. Stellman, Jan Beyea, Susan E. Steck, Irina Mordukhovich, Kathleen M. McCarty, Jiyoung Ahn, Alfred I. Neugut, Pavel Rossner, Jr., Regina M. Santella, Marilie D. Gammon (Department of Epidemiology, University of North Carolina at Chapel Hill, Chapel Hill, NC United States)

Previous studies suggest that polycyclic aromatic hydrocarbons (PAHs) may adversely affect breast cancer risk. Indoor air pollution from use of indoor stoves and/or fireplaces is an important source of ambient PAH exposure. However, the association between PAHs from indoor stove/fireplace use and breast cancer risk is unknown. We hypothesized that indoor stove/fireplace use would be positively associated with breast cancer and differ by material burned, and the duration and timing of exposure. We also investigated interactions with glutathione *S*-transferases *GSTM1*, *T1*, *A1* and *P1* polymorphisms. Population-based, case-control resources (1,508 cases-1,556 controls) were used in unconditional logistic regression models to estimate adjusted odds ratios (OR) and 95% confidence intervals (CI). Breast cancer risk was increased among women reporting ever burning synthetic logs (which may also contain wood) in the home (OR=1.45, 95%CI: 1.17, 1.80), but not for ever burning wood alone (OR=0.93, 95%CI: 0.79, 1.08). For synthetic log use, longer duration (>7 years; 7-16.7 years OR=1.69, 95%CI 1.14, 2.50), older age at exposure (>20 years; OR=1.44, 95%CI: 1.16, 1.78) and =2 variants in *GSTM1*, *T1*, *A1* or *P1* (OR=1.81, 95%CI: 1.24, 2.63) were associated with increased risk. Burning wood or synthetic logs are both indoor PAH exposure sources; however positive associations were only observed for burning synthetic logs, which was stronger for longer exposures, adult exposures, and in women with multiple GST variant genotypes. Therefore, these findings should be interpreted with care and require replication.

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URINARY BISPHENOL A-GLUCURONIDE AND POSTMENOPAUSAL BREAST CANCER IN THE POLISH BREAST CANCER STUDY. Britton Trabert*, Roni T. Falk, Jonine D. Figueroa, Barry I. Graubard, Montserrat Garcia-Closas, Jolanta Lissowska, Beata Peplonska, Stephen D. Fox, Louise A. Brinton (National Cancer Institute, Bethesda, MD United States)

Given widespread and continuous human exposure, concerns regarding a possible link between bisphenol A (BPA) and breast cancer have been mounting but studies in human populations are lacking. Measurement of BPA is complicated by its short half-life and the potential for assay contamination. To overcome this, we utilized a newly developed assay to measure, for the first time, the relationship between the major urinary BPA metabolite (BPA-glucuronide (BPA-G)) and postmenopausal breast cancer risk using overnight urines collected within a large population-based case-control study conducted in Warsaw and Lodz, Poland between 2000 and 2003. We further explored the association of BPA-G levels with known postmenopausal breast cancer risk factors in our controls. Creatinine-adjusted urinary BPA-G levels were measured in 575 postmenopausal cases and 575 controls matched on age and study site. Among controls, geometric mean BPA-G levels were compared across categories of breast cancer risk factors using linear regression models. Odds ratios (OR) and 95% confidence intervals were estimated using conditional logistic regression. Mean BPA-G levels among controls were higher among women reporting extended use of menopausal hormones, a prior screening mammogram, and residence in Warsaw. After adjustment for these factors, there was, however, no linear relationship of BPA-G levels to breast cancer risk (p-trend=0.59), despite an unexpected elevation in risk in the second quartile [OR (95% CI): 1.70 (1.15-2.52) vs. first quartile]. There was no evidence for a disease effect according to BPA-G levels when we stratified by other postmenopausal breast cancer risk factors, including body mass index and parity, or by estrogen receptor (ER) status. Within the context of this case-control study, our findings suggest that urinary BPA-G levels in adult women do not contribute meaningfully to postmenopausal breast cancer risk.

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THE SHORT-TERM IMPACTS OF EARNED INCOME TAX CREDIT DISBURSEMENT ON HEALTH. David Rehkopf*, Katherine Strully, William Dow (Stanford University, Stanford, CA United States)

Background: There are conflicting findings regarding long- and short-term effects of income on health. While higher average income is associated with better health, there is evidence that health behaviors and mortality worsen in the short-term following income receipt. Prior studies revealing such negative short-term effects of income receipt have focused on specific subpopulations and examined only a limited set of health outcomes. **Methods**: The United States Earned Income Tax Credit (EITC) is an income supplement tied to work, and is the largest poverty reduction program in the U.S. We utilize the fact that EITC recipients receive large cash transfers in the months of February, March and April in order to examine associated changes in health outcomes that can fluctuate on a monthly basis. Our research design approximates a natural experiment since the timing of EITC transfers is independent of individuals' characteristics. We examine associations with 30 outcomes in categories of diet, food security, health behaviors, cardiovascular biomarkers, metabolic biomarkers and infection and immunity among 6925 individuals from the U.S. National Health and Nutrition Survey. **Results**: There are substantial and statistically significant positive and negative short-term impacts of income transfers. While there were negative impacts on metabolic factors among women, most other impacts were positive, including those for food security, smoking and trying to lose weight. **Conclusion**s: While the short-term impacts of EITC income are not universally health promoting, on balance there are more health benefits than detriments.

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THE IMPACT OF PUBLICLY FUNDED, SCHOOL-BASED HUMAN PAPILLOMAVIRUS (HPV) VACCINATION ON CERVICAL DYSPLASIA AND ANOGENITAL WARTS: A STUDY USING THE REGRESSION DISCONTINUITY DESIGN. Leah Smith*, Erin Strumpf, Jay Kaufman, Aisha Lofters, Michael Schwandt, Linda Levesque (McGill University, Montreal Canada)

The human papillomavirus (HPV) vaccine has been available in North America since 2006, yet there is limited information on its real-world health benefits. Therefore, we assessed the impact of Ontario's Grade 8 HPV Immunization Program on the risk of cervical dysplasia and anogenital warts (AGW) in adolescent girls. Using population-based administrative health and immunization databases, we identified a cohort of all girls in grade 8 in 2005/06-2006/07 (program ineligible) and 2007/08-2008/09 (program eligible). Vaccine exposure (three doses) was ascertained during grades 8-9, and outcomes were ascertained during grade 10 until March 31 of grade 12. Using the Regression Discontinuity Design (a quasi-experimental, instrumental variable-based approach), we employed one- and two-stage local linear regressions to estimate the causal impact of the HPV vaccination program (program impact) and of actual vaccine receipt (vaccine impact) on the incidence of dysplasia and AGW between eligibility groups. The cohort comprised 221,014 girls (51% ineligible, 49% eligible). Baseline covariates and follow-up (4.6 years) were similar between groups. 1.0% of ineligible girls were exposed compared with 50.6% of eligible girls. 2470 cases of dysplasia and 489 cases of anogenital warts were identified. We observed protective effects of program eligibility and vaccination on dysplasia: -2.82 cases per 1000, 95% confidence interval (CI) -4.84, -0.81 and -6.96 cases per 1000, 95% CI -11.94, -0.20, respectively. While not statistically significant, results also suggest an absolute reduction in AGW risk attributable to the program (-0.77 per 1000, 95% CI -1.68, 0.14) and to vaccination (-1.90 per 1000, 95% CI -4.15, 0.34). Results were robust to sensitivity analyses. Our study provides strong evidence that publicly funded HPV vaccination in Canada is reducing the risk of cervical dysplasia and AGW in girls as young as 14-17 years.

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ADJUSTMENT FOR NON-IGNORABLE HIV TESTING REFUSAL IN ZAMBIA: AN INSTRUMENTAL VARIABLE FRAMEWORK. Eric Tchetgen Tchetgen, Kathleen Wirth* (Harvard School of Public Health, Boston, MA United States)

The instrumental variable (IV) design is a well-known approach for unbiased evaluation of the effect of an exposure in the presence of unobserved confounding. We present an IV approach for regression analysis when the outcome is missing not at random. A valid IV for a missing outcome must predict a person's propensity to have an observed outcome, without directly influencing the outcome itself. Under an additional assumption that the magnitude of selection bias is independent of the IV, we show that the population regression in view is nonparametrically identified. We use the proposed IV design to estimate HIV prevalence among adult Zambian men while adjusting for highly selective non-participation in the survey's HIV testing component. As instruments we employed interviewer identity and an indicator for whether or not a household was visited on the first day of data collection within a cluster. Given that both the interviewer deployed to a household and the timing of that visit are determined at random (or by a known algorithm), these factors are unlikely to directly influence a man's HIV status. In total, 7,116 eligible men had complete information from a household interview. Of those with complete information, only 5,145 (72%) agreed to HIV testing. Fifty-four interviewers conducted ≥50 household interviews and 36% of households were reached on the first day of data collection within a cluster. Both of these factors were highly associated with HIV testing non-participation (P<0.001). Compared with a crude HIV prevalence of 12.2% (95% CI: 11.2%-13.1%), adjustment using the proposed IV approach yielded a prevalence of 21.1% (95% CI: 16.2%-25.9%), indicating significant selection bias in the crude analysis. Inverse-probability weighting and multiple imputation gave results similar to the crude analysis indicating that standard methods to account for missing data may be inappropriate in this context.

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REVIEW OF PARTIAL AND POINT IDENTIFICATION RESULTS USING INSTRUMENTAL VARIABLE TYPE ASSUMPTIONS. Sonja Swanson*, James Robins, Miguel Hernan (Harvard School of Public Health, Boston. MA United States)

Studies using instrumental variable (IV) methods rely on strong assumptions to present a point estimate for the average treatment effect (ATE), yet epidemiologists may be unaware of how combinations of IV -type assumptions lead to partial or point identification. We reviewed the identification results under IV-type assumptions presented in the statistical, epidemiological, and econometric identification literature, and synthesized the results into a common notation and description of underlying assumptions. We primarily considered identification of the ATE for dichotomous treatments and outcomes. Without data or assumptions, we know nothing about the ATE (bounds: [-1, 1]). With no assumptions, observed data cuts the width of these bounds in half. Under the exclusion restriction and independence assumptions (i.e., the IV -type assumptions), the identification region may be smaller. Assuming marginal versus joint independence results in different expressions for the bounds, although in practice the bounds may often be equal. Bounds under the IV-type assumptions may be quite wide; combining these with further assumptions will be discussed. In particular, further assuming additive or multiplicative effect homogeneity leads to point identification, although the point estimates will differ when the effect is non-null. Examples of bounds and point estimates for the ATE under these various sets of assumptions will be presented, with discussion of when these assumptions may be more or less reasonable in practice. Causal inference relies on a trade-off between making strong, untestable assumptions, and making more conservative assumptions that may not readily inform public health practice. Estimating the ATE under several sets of IV-type assumptions makes clear how much our conclusions rest upon the assumptions being made.

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CHANGING RESIDENCE DURING PREGNANCY: IMPLICATIONS FOR STUDIES OF GEOGRAPHICALLY-BASED EXPOSURES. Michelle Pearl*, Steve Graham, Charlene Sacramento, Jennifer Ahern (Sequoia Foundation, Richmond, CA United States)

Geographically-based exposures during pregnancy, such as neighborhood social context and air pollution, are typically based on residential addresses from certificates of live birth. Relying on residential information at the time of delivery to reflect exposure earlier in pregnancy may lead to misclassification due to residential mobility. We compare address from birth records with address from prenatal screening (<20 weeks gestation), and explore the impact of exposure misclassification on associations of neighborhood poverty with preterm birth. Addresses from birth records and state-wide prenatal screening records were geocoded and linked to census tract data for a cohort of 408,759 prenatally-screened singleton live-births delivered in 5 Southern California counties during 2000 to 2007. Prenatal residence differed from birth residence for 23.7% of births (median distance 2.8 miles), with 85% corresponding to a different census tract. Location changes were less common among very preterm births, as expected due to shortened opportunity for moving, and more common among mothers who were primiparous, African American, age less than 25 years, with less than college education, or public insurance. Tract poverty levels were within 5 percentage points for over half of changed locations, and similar proportions moved to higher and lower poverty tracts. Estimated relative risks of preterm birth (<37 weeks) associated with living in a high poverty neighborhood were similar for birth and prenatal screening addresses, stratified by race-ethnicity. Among African Americans, exposure misclassification using birth addresses masked a relation of high neighborhood poverty and very preterm birth (<32 weeks). Although most results were similar for both sources of residential address, almost a quarter of mothers changed residence, suggesting that the impact of residential address change cannot be assumed to be inconsequential.

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DIET COST AND RISK OF CARDIOVASCULAR DISEASE: DOES DIET COST MEDIATE THE ASSOCIATION BETWEEN SOCIOECONOMIC STATUS AND CARDIOVASCULAR DISEASE RISK? Colin D Rehm*, Lesley F Tinker, Andrea Z LaCroix, Ching-Yun Wang, Adam Drewnowski (University of Washington, Seattle, WA United States)

Diet cost has been implicated as an important determinant of diet quality. However, no prospective studies have evaluated whether diet cost is associated with risk of cardiovascular disease (CVD). A prospective cohort study among 47,683 women 49-64y using data from the Observational Study and the control arm of the Dietary Modification trial of the Women's Health Initiative was conducted to evaluate the association between diet cost and risk of CVD. This study had two aims: 1) to examine the association between diet cost and CVD and; 2) to determine the extent by which the socioeconomic gradient in CVD was explained by diet cost. To estimate diet costs, a national food price database was linked to the WHI food frequency questionnaire. The outcome was defined as the first occurrence of the following: myocardial infarction, coronary heart disease, carotid artery disease, congestive heart failure, ischemic stroke, receipt of coronary artery bypass graft/percutaneous transluminal coronary angioplasty or death due to CVD. Cox proportional hazards models examined the association between diet cost and CVD risk after adjusting for covariates associated with both diet cost and CVD (e.g., age, smoking and income among others). 1,208 cardiovascular events were observed. After adjusting for covariates, a 50% increase in energy-adjusted diet costs was associated with a 19% reduced risk of CVD (hazard ratio 0.81; 95% CI 0.72, 0.92). A strong socioeconomic gradient in CVD risk was observed. Diet cost explained 12-19% of the association between income/education and CVD. As the first report to observe an association between diet cost and CVD these results need to be compared to other studies. Examining upstream factors in CVD risk, including diet costs, expands our understanding of socioeconomic disparities in health, while also exploring the consequences of the contemporary food environment on health.

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INTERVENING ON NEIGHBORHOODS TO REDUCE ALCOHOL-RELATED HOMICIDE: SIMULATING IN-SILICO COUNTERFACTUALS. Magdalena Cerdá*, Katherine Keyes, Melissa Tracy, Sandro Galea (Columbia University, New York, NY United States)

Restriction of alcohol outlets and investment in community policing have been proposed as promising approaches to reduce alcohol-related homicide. Application of these approaches would require large-scale policy changes that are difficult to manipulate experimentally. In order to provide data that can inform such efforts, we conducted experiments to test the influence of two interventions on alcohol-related homicide: a) citywide restriction of alcohol outlets; and b) increase in community policing in neighborhoods with higher-than-average rates of homicide. We developed an agent-based model including 60,000 agents matched to the demographic composition of New York City and arranged in a grid divided into 59 neighborhoods. The model was informed by more than 20 empirically-based parameters assessing a complex network of social ties, neighborhood characteristics, alcohol use, and victimization and perpetration. Under no intervention, the median prevalence of alcohol-related violent victimization was 1.4 (95% CI: 1.3, 1.4) and alcohol-related homicide was 3.1 per 100,000 (95% CI: 2.4, 4.2). Restricting alcohol outlets by 50% across the city reduced alcohol-related victimization (prevalence: 1.2 (1.1, 1.2)); it was necessary to restrict outlets by 90% to reduce alcohol-related homicide (prevalence: 1.9 (1.5,2.3). Targeted increase in community policing in the most violent neighborhoods decreased alcohol-related homicide (after 100% increase, prevalence was 1.9 (1.7, 2.3); 200% increase, 1.8 (1.2, 2.1); 300% increase, 1.6 (1.4, 2.1)), although it did not reduce non-fatal victimization. Targeted policies such as community policing, that intervene to reduce violent fatalities in the most violent neighborhoods, may be promising approaches to reduce alcohol-related homicide. In contrast, alcohol outlets would have to be almost completely eliminated to have a comparable impact on alcohol-related homicide.

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NEIGHBORHOOD ETHNIC COMPOSITION AND CHANGE IN BODY MASS INDEX OVER TIME AMONG HISPANIC AND CHINESE IMMIGRANTS: MULTI-ETHNIC STUDY OF ATHEROSCLEROSIS. Félice Lê-Scherban*, Sandra S. Albrecht, Theresa L. Osypuk, Brisa N. Sánchez, Ana V. Diez Roux (University of Michigan, Ann Arbor, MI)

High body mass index (BMI) is a major cardiovascular disease risk factor, and higher BMI has been related to longer length of U.S. residence among immigrants. One promising contributing factor is the ethnic composition of the neighborhoods in which immigrants reside; sparse, mostly cross-sectional, evidence is mixed. We investigated whether changes in neighborhood ethnic composition were related to changes in body mass index (BMI) among immigrants over a median 9-year follow-up, incorporating information about residential moves and using an econometric fixed effects approach to tightly control for confounding by time-invariant characteristics. Data came from a cohort of Chinese (n = 642) and Hispanic (n = 784) immigrants from the Multi-Ethnic Study of Atherosclerosis, aged 45-84 years at baseline. Neighborhood racial/ethnic composition was characterized using census-tract-level % Asian for Chinese participants and tract % Hispanic for Hispanic participants (neighborhood coethnic concentration). In covariate-adjusted longitudinal fixed effects models, as hypothesized, decreasing neighborhood coethnic concentration was associated with increasing BMI, although results were imprecise: within-person increases in BMI associated with an interquartile range decrease in coethnic concentration were 0.15 kg/m^2 ([95% confidence limits] 0.00, 0.30) among Chinese and 0.17 kg/m^2 (-0.17, 0.51) among Hispanic participants. Results did not differ between those who moved during follow-up and those who did not. Residential neighborhoods are an important aspect of immigrant assimilation and may play a key role in shaping chronic disease risk among immigrants.

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SOCIAL MOBILITY AND ADIPOSITY IN A RECENTLY TRANSITIONED POPULATION OF HONG KONG: EVIDENCE FROM THE FAMILY COHORT. Sushma Kavikondala*, Michael Y Ni, Tai hing Lam, Mary C Schooling, Gabriel M Leung (The University of Hong Kong, Pok Fu Lam Hong Kong)

Background: While social mobility, particularly downward movement in social hierarchy, has been associated with adiposity in long-term industrialized populations, evidence from recently transitioned populations is inconsistent. In a recently developed population from Hong Kong we examined the association of social mobility, assessed using life course socio-economic position (SEP) trajectories, with general adiposity, proxied by body mass index (BMI) and central adiposity, proxied by waist circumference and waist-hip ratio (WHR). **Methods**: In a cross-sectional study of 2,965 adults from 1,554 households, aged 20-80 years from the population-based FAMILY Cohort (Wave 2; 2012-13), we used multilevel linear regression models, adjusted for age, smoking status, use of alcohol, physical activity and family functioning, to assess the association of SEP trajectories with BMI, waist circumference and WHR using four combinations of low and high SEP in childhood (fathers' occupation at age 10 years) and adulthood (highest attained education). Multilevel models account for the hierarchical structure of our data, where individuals are nested within households, allowing for household level variation in the outcomes. We assessed whether the associations varied by sex or age from the heterogeneity across strata and the significance of the relevant interaction term in an adjusted model including interactions of sex or age. **Results**: Association of life course SEP with adiposity varied by sex (p-value <0.01). Compared to men with consistently low SEP, upwardly mobile men had higher BMI (0.82, 95% confidence interval (CI) 0.15 to 1.49) as did men with consistently high SEP (0.83, 95% CI 0.20 to 1.45), who also had larger waist circumference (1.99 centimetre (cm), 95% CI 0.40 to 3.50). In women, upward social mobility was negatively associated with adiposity; women with consistently high SEP had the lowest WHR (-0.02, 95% CI -0.03 to -0.01) and waist circumference (-2.44 cm, 95% CI -3.87 to -1.00). **Conclusion**s: This study shows that social mobility and social disadvantage have sex-specific associations with particularly central adiposity in the recently transitioned population of Hong Kong. Accumulation of disadvantage across the life course was associated with central adiposity in women but not men. Exposures during puberty could be a mechanism driving such sex-specific associations.

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OBESITY, NUTRITION, LIFESTYLE,A ND DIABETES INCIDENCE IN DIFFERENT ETHNIC GROUPS: THE MULTIETHNIC COHORT. Gertraud Maskarinec*, Simone Jacobs, Yukiko Morimoto, Marci Chock, Andrew Grandinetti, Laurence N. Kolonel (University of Hawaii Cancer Center, Honolulu, HI United States)

Background. Persons with Asian and Pacific Islander ancestry experience a high risk of type 2 diabetes. Using the Hawaii component of the Multiethnic Cohort (MEC), we evaluated the contribution of body mass index (BMI) and other risk factors to ethnic disparity in diabetes incidence for participants of Japanese (J), Chinese/Korean (CK), Filipino (F), Mixed Asian (MA), Part-Asian (PA), Native Hawaiian (NH), and white (W) ancestry. **Methods**. After excluding subjects with prevalent diabetes or missing data, 89,198 cohort members were part of this analysis. New cases were identified through 2 questionnaires and a linkage with 2 health plans. We applied Cox regression analysis, stratified by age, to estimate hazard ratios (HR) and 95% confidence intervals (95%CI) for 3 models: 1. adjusted for sex and education; 2. BMI added; and 3. physical activity, smoking, as well as intake of total energy, alcohol, red meat, dietary fiber, regular sodas, and coffee also included. **Results**. After 12 yrs of follow-up, 11,218 incident cases were identified with an overall incidence rate of 10.6 per 1,000 pyrs. Mean BMI was lowest in CK, J, and F (22.4, 23.5, 23.9 kg/m2) and higher in MA, W, PA, and NH (24.4, 24.6, 26.1, 27.7 kg/m2). In Model 1, the HRs by ethnicity as compared to whites ranged between 1.9 (CK), 2.1 (J, MA), 2.2 (F), 2.5 (NH), and 2.6 (PA). When BMI was added to the model, the relative risk estimates for J, F, CK, and MA increased by 28, 23, 42 and 8%, respectively, but declined by 17 and 31% in PA and NH. In the fully adjusted Model 3, the risk estimates for ethnicity were attenuated in all groups (6-14%), but the reduction was stronger in women than men. The respective HRs were 2.4 for J, CK, and F, 1.9 for MA and PA, and 1.6 for NH. **Conclusion**. Asian Americans have a higher risk of type 2 diabetes than whites despite their lower BMI; the excess risk cannot be explained by nutritional and lifestyle factors.

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ADHERENCE TO HEALTHY LIFESTYLE AND THE RISK OF GESTATIONAL DIABETES. Cuilin Zhang*, Deirdre Tobias, Jorge Chavarro, Wei Bao, Sylvia Ley, Frank Hu (NICHD/National Institutes of Health, Bethesda, MD United States)

Objective: It is pivotal to identify modifiable factors and to quantify their potential impact on the primary prevention of gestational diabetes (GDM), an increasingly common pregnancy complication. We assessed the association of a combination of healthful prepregnancy lifestyle factors (i.e. maintaining a healthy body weight, consuming a healthy diet, exercising regularly, and not smoking) with GDM risk. Method: A prospective cohort study was conducted in Nurses' Health Study II, United States among 20,136 singleton live births reported from 14,437 participants free of chronic disease. **Results**: Incident first time GDM was reported in 823 pregnancies. Each lifestyle factor was independently associated with GDM risk. The combination of three low risk factors (i.e. being a nonsmoker, engaging in ≥150 minutes per week of moderate to vigorous physical activity, and being among the top 2 quintiles of the Alternate Healthy Eating Index (AHEI)-2010 adherence score) was associated with a 41% lower risk of GDM compared to all other pregnancies (RR=0.59, CI=0.48, 0.71). Additionally having a pre-pregnancy body mass index <25 kg/m2 was associated with a 52% lower risk of GDM compared to all other pregnancies (RR=0.48, CI=0.38, 0.61). Compared to pregnancies that did not meet any of the low risk lifestyle factors, those meeting all four criteria had an 83% lower GDM risk (RR=0.17, CI=0.12, 0.25). An estimated 48% of all GDM pregnancies could have been avoided if women adhered to all four pre-pregnancy lifestyle factors (PAR% (95% CI): 47.5% (35.6%, 56.6%). Similar PAR% (i.e. 49.2%) was observed when we derived it based on distributions of the four low risk factors from the US National Health and Nutrition Examination Survey (NHANES) (2007-2010) data. **Conclusion**s: Our findings indicate that nearly half of all GDM events may be preventable through adherence to healthy lifestyle practices during pregravid period.

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EDUCATION AND NATIVITY: LIFECOURSE ORIGINS OF TYPE-2 DIABETES AND METABOLIC SYNDROME. Adina Zeki Al hazzouri*, Mary Haan, Allison Aiello (University of California San Francisco, San Francisco, CA United States)

Background: The obesity epidemic accompanied with advanced age poses a unique challenge to the United States, and is further exacerbated by social disparities. US minority groups, especially Latinos of Mexican descent, are disproportionately affected by the epidemic. **Methods**: We used data from the Sacramento Area Latino Study on Aging, a cohort of elderly Mexican Americans, to examine the role of education and country of birth in the life course origins of type-2 diabetes and metabolic syndrome (and its components e.g. large waist circumference). Participants were either born in the US or born in Mexico. At baseline, we assessed the presence of metabolic syndrome and type-2 diabetes according to established clinical guidelines for a total of 1,789 participants (age range: 60-101, 49% US born). Participants reported their life course exposure to education, including: parental education as a surrogate for childhood environment and their educational achievement as a surrogate for adulthood environment. **Results**: In fully-adjusted models for US born, compared to subjects who maintained low education status across the life course, those who attained high education in adulthood had 35% lower odds of type-2 diabetes regardless of their parental education (OR=0.65; 95%CI=0.43; 0.99). For the Mexican-born, compared to subjects who maintained low education status across the life course, those who maintained high education status had 55% lower odds of having large waist circumference (OR=0.45; 95% CI=0.23; 0.88). We found no association between education and metabolic syndrome. **Conclusion**s: While adulthood educational attainment was associated with the presence of type-2 diabetes; both parental education and adulthood education attainment were associated with having large waist circumference. Preventive efforts should target children and schools especially those who are foreign-born.

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RECENT DEVELOPMENTS IN CAUSAL MEDIATION ANALYSIS. Arijit Nandi* (McGill University, Montreal CANADA)

Methods for mediation have been expanding rapidly and applications of these methods have become increasing numerous. Such methods allow one to assess the importance of different pathways in explaining effects. The methods also can help identify auxiliary interventions that may help to block the effect of an exposure when it is not possible to intervene directly on the exposure itself. This session will highlight some of the recent developments in mediation analysis that are of practical relevance for epidemiology. The presentations in the session will help address some of the prior limitations of former methods and will cover extension of existing methods to new settings that are common and important in epidemiology. Software tools to implement these new methods will be discussed. The methods in the session will be illustrated with a number of examples from perinatal, environmental, and genetic epidemiology.

Speakers:

- *Introduction*
  Jay Kaufman
- *Mediation Analysis with Multiple Mediators*
  Stijn Vansteelandt
- *Mediation Analysis with Multiple Mediators: An Application to the Sudy of Adolescent Eating Disorders*
  Bianca De Stavola
- *Unmeasured Confounding and Measurement Error in Mediation Analysis*
  Saskia le Cessia
- *A Unification of Mediation and Interaction: A Four-way Decomposition*
  Tyler VanderWeele

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THE ROLE OF EPIDEMIOLOGY IN TOBACCO CONTROL AND PRODUCT REGULATION: LOCAL, NATIONAL, AND INTERNATIONAL PERSPECTIVES. Benjamin Apelberg* (U.S. Food and Drug Administration, Center for Tobacco Products)

Annually, smoking causes over 400,000 deaths in the U.S. and five million deaths globally. The role of epidemiology in tobacco research has shifted from assessing the health risks of smoking and benefits of cessation to the evaluation of novel tobacco products and the population health impacts of policies and regulations. The purpose of this symposium is to discuss the role of traditional and novel epidemiologic approaches in driving evidence-based decision-making at the local, national, and international levels. Dr. Michael Johns will present on the use of epidemiology to inform and evaluate tobacco control policy in New York City, including local population surveys and mathematical modeling techniques. Dr. Benjamin Apelberg will discuss ongoing research designed to inform FDA's regulatory authority over the manufacturing, marketing, and distribution of tobacco products, including the use of modeling and web analytics and initiation of a new national, cohort study. Mr. David Phillips will describe an approach to generating cross-country comparable estimates of smoking cessation rates in order to assess the impacts of tobacco control globally. We believe this symposium will be of great interest to epidemiologists interested in methods, social and chronic disease epidemiology, and the translation of research into policy and will provide insight on key challenges and opportunities in the application of epidemiologic research to tobacco control and tobacco product regulation.

Speakers:

- *Using Epidemiologic Methods to Guide and Evaluate Comprehensive Tobacco Control in New York City*
  Michael Johns, New York City Department of Health
- *The Use of Epidemiology to Inform FDA Tobacco Product Regulation*
  Benjamin Apelberg, U.S. Food and Drug Administration, Center for Tobacco Products
- *Trends in Tobacco Smoking Cessation in High Income Countries, 1985-2010*
  David Phillips, Institute for Health Metrics and Evaluation, University of Washington

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CHALLENGES IN MEASURING FERTILITY POTENTIAL, ITS TEMPORAL AND GEOGRAPHIC VARIATION AND IMPLICATIONS FOR ADULT HEALTH. Shanna Swan*, Niels Erik Skakkebaek (Icahn School of Medicine at Mount Sinai, New York, NY)

The classic definition of fertility is demographic, obscuring the concept of fertility potential or fecundity, and limited the identification of its determinants and consequence of impaired fertility. This symposium is consistent with both the early origins of health and disease and the use of evolving life course methods to understand the implications of impaired fecundity for the health and well being of populations. This symposium will discuss alternative measures of fecundity and their strengths and limitations; environmental influences on fertility potential; trends in male and female fecundity and their implications for adult health. This international panel of speakers was selected to represent a range of perspectives, a balance we hope will stimulate discussion from attendees.

Speakers:

- *Impaired Male Fertility; Determinants, Trends and Implications for Adult Dealth*
  Niels Erik Skakkebaek. Department of Growth and Reproduction, Rigshospitalet, DK
- *The "Current Duration" Approach to Characterizing Human Fecundity: Its Sensitivity to Environmental Exposures and a Comparison with other Study Designs*
  Remy Slama. INSERM, Team of Environmental Epidemiology, FR (with Niels Keiding and Rene Eijkemans)
- *Do Environmental Factors Impact IVF Outcomes?*
  Shelley Ehrlich. University of Cincinnati
- *ART as an Important Part of the Solution to the Demographic Demise in Europe*
  Søren Ziebe. Fertility Clinic, Rigshospitalet, DK.

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WHAT DO WE KNOW AND HOW DO WE KNOW IT? George Kaplan* (University of Michigan, Department of Epidemiology, Ann Arbor United States)

While it has been almost 20 years since the storm generated around Gary Taube's attack on epidemiology, the run-off from that attack continues, even among those who should know better. Adding to this, the recent work of Ioannides and his colleagues illustrates vividly how even the gold-standard RCT is not above reproach. The intent of this symposium is not to repulse epidemiology's critics, but rather to take seriously some of the barriers to knowledge that we face, and to discuss the development of new approaches to "knowing" in epidemiology. Following an introduction that will lay out some of the issues, Robert Kaplan from the OBSSR/NIH will report on his analyses of the loss of signal strength in randomized clinical trials across a wide variety of health problems (tight control of type 2 diabetes, hormone replacement therapy, adverse effects of some cancer screening tests, treatment of arrhythmias, treatment of anemia, etc.), the reasons for this decline, and how new approaches might be necessary. Then Maria Glymour from UCSF will discuss recent advances in analysis of causal processes that might help us better "know," and their strengths and limitations. Sandro Galea from Columbia will follow with illustrations of the value for etiologic and policy studies of in silico dynamic simulation of the complex processes that produce patterns of health and disease, and the challenges posed by such approaches. Finally, a discussant (TBN) will take on the challenge of integrating these approaches into epidemiologic research.

Speakers:

- *Adventures in Misdirection: What We Think We Know, and Why We Think We Know it*
  Sandro Galea
- *Revisiting the Mechanistic Model of Noncommunicable Disease*
  Robert Kaplan
- *Expanding the Toolbox for Inference: Will Quasi-experimental Approaches Help?*
  Maria Glymour
- *Discussant*
  George Kaplan

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OPPORTUNITIES FOR HUMAN MICROBIOME RESEARCH IN EPIDEMIOLOGICAL STUDIES. Ryan Demmer*, Allison Aiello (Columbia University, New York United States)

It has long been recognized that the human body is host to a complex microbial ecosystem of organisms living in and on the surface of the body. Collectively, microbial cells and the genes encoded by their collective genomes (microbiome) outnumber our human cells and genes by several orders of magnitude. It has been hypothesized that the microbiome may play a role in human health and disease through a variety of mechanisms such as metabolic capability, altered immunity or shaping physiological response to stress. For example, it has recently been shown that obesity in humans is related to changes in the relative abundances of gut bacteria from the two dominant bacterial phyla. Moreover, these traits are transmissible provoking new insights regarding the notion of "communicability" of classically defined "noncommunicable" chronic diseases. Moreover, animal models suggest that social stress leads to imbalances in gut bacteria and subsequent depressive behavior. Taken together, novel hypotheses regarding associations between chronic comorbidities such as depression, diabetes and obesity could emerge. In this symposium, we will describe the important measurement and analytical methods that have been recently developed to study the human microbiome. We will further provide compelling examples of how these methods are being used to advance our understanding of human health and disease and share insights about the future role of epidemiology in understanding the interface between microbes and humans.

Speakers:

- *Introduction*
  Allison Aiello and Ryan Demmer
- *Generating Microbiomic Data and a Vignette from Research Regarding Interactions between the Gut Microbiome and Human Nutrition*
  Meredith Hullar
- *Analytical Approaches for Microbiomic Data and a Vignette from Gut Microbiome Research*
  Antonio González Peña
- *Implications for Microbiome Research in Epidemiology and Future Directions*
  Levi Waldron

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ARTHRITIS, CHRONIC INFLAMMATION AND PHYSICAL FUNCTIONING IN THE THIRD NATIONAL HEALTH AND NUTRITION EXAMINATION SURVEY. Hind Beydoun*, David Archer, Alan Zonderman, May Beydoun (Graduate Program in Public Health, Eastern Virginia Medical School, Norfolk, VA United States)

Although chronic inflammation has been linked to many degenerative conditions, including arthritis, few studies have examined biomarkers of chronic inflammation in relation to specific aspects of physical functioning in elderly people, independently of physician-diagnosis for osteoarthritis (OA) or rheumatoid arthritis (RA). We examined the relationship of serum concentrations of C-reactive protein (CRP) and fibrinogen with individual scores and total score on a 12-item physical functioning scale, before and after controlling for sex, age, education, race/ethnicity, area of residence, poverty income ratio, marital status, smoking status, body mass index and arthritis status in this cross-sectional study of 4,606 participants from the Third National Health and Nutrition Examination Survey who were 60 years and older. Whereas log-transformed CRP and fibrinogen levels were significantly related to arthritis only in women, both men and women diagnosed with arthritis had more difficulty performing activities of daily living compared to those not diagnosed with arthritis. With few exceptions, multiple ordinal logistic models suggested that log-transformed CRP and fibrinogen levels were significantly associated with indicators of diminished physical functioning after controlling for key confounders. Multivariable linear regression models suggested that overall physical functioning was strongly associated with log-transformed CRP (adjusted b=+0.68, 95% CI: +0.42, +0.94) and fibrinogen (adjusted b=+1.66, 95% CI: +0.89, +2.42) levels, with no significant interaction by sex or race/ethnicity and between inflammatory biomarkers. In contrast, this was modified by arthritis status, with a stronger association observed among individuals diagnosed with RA or no arthritis versus those diagnosed with OA. In conclusion, CRP and fibrinogen can predict diminished physical functioning in elderly people, especially among those having RA or no arthritis.

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EARLY CHILDHOOD ADVERSITY AND IMMUNE RESPONSE IN WHITEHALL II. Jennifer Brite*, Bamini Jayabalasingham, Allison E. Aiello, Jos A. Bosch, Andrew Steptoe, Jennifer B. Dowd (City University of New York School of Public Health at Hunter College, Epidemiology and Biostatistics, New York, NY United States)

Early life adversity (ELS) may be associated with immune dysregulation across the life course, but few studies have been able to link ELS to markers of immune function in later life. Herpesvirus infections, once acquired, are maintained in a latent state in the human host. Reactivation of these latent viruses and the ensuing increase in antibody titer is thought to reflect a weakened ability of the immune system to keep these infections under control. The present study examined the association between ELS and cytomegalovirus (CMV) and Epstein-Barr (EBV) antibody titers in a subsample of the U.K Whitehall II study cohort (n=543; ages 53-76) who participated in the 2008 Heart Scan study. ELS was dichotomized as exposure to any of the following: loss of mother, father, sibling, or other close family member before the age of 16; separation from mother for 1 year before age 16; parental mental illness or drug use; or harsh punishment or physical abuse. Models were adjusted for age, sex, and education level. Contrary to the limited previous evidence, we found no significant association between ELS and EBV [β=-0.12 (95% CI: -0.32, 0.09)] or CMV [β=0.03 (95% CI: (-0.17, 0.24)] antibody titer in this sample. Future work may examine the impact of early-life adverse exposures on immune dysregulation in different contexts and test the importance of timing and severity of exposures.

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HERPESVIRUSES, INFLAMMATION, AND LEUKOCYTE TELOMERE LENGTH IN THE WHITEHALL II HEART SCAN STUDY. Bamini Jayabalasingham*, Jennifer Brite, Allison E. Aiello, Jos A. Bosch, Andrew Steptoe, Jennifer B. Dowd (CUNY School of Public Health at Hunter College, New York, NY United States)

Telomere length is an indicator of cellular aging. Given the role of latent herpes infections in immune aging, this study explored the potential role of Epstein-Barr virus (EBV) and cytomegalovirus (CMV) in modulating telomere length and telomerase activity. Participants were from the 2008 Heart Scan study (n=543; ages 53-76), a subsample of the U.K Whitehall II study cohort. We explored if, consistent with previous findings for CMV, EBV seropositivity and antibody titer (a marker of viral reactivation) would be associated with shorter telomere length or lower telomerase activity. We also examined the potential role of inflammatory or hemostatic markers (CRP, fibrinogen, IL-6 and von Willebrand factor) in mediating such associations. CMV seropositivity was associated with an increase in von Willebrand factor. Interestingly, this association was strengthened in the case of co-infection with CMV and EBV. Higher von Willebrand factor was also associated with lower telomerase activity, but there was no evidence that Von Willebrand factor mediates the association between CMV and telomerase activity. In contrast to previous findings for CMV, neither EBV seropositivity nor antibody titer was associated with telomerase activity or telomere length, suggesting specificity for previously identified CMV-telomerase associations. Overall, we found CMV infection and von Willebrand factor to be independent determinants of telomerase activity. The effects of CMV on hemostatic/inflammatory activity may be moderated by co-infection with EBV.

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GARDENING FOR HEALTH: INVESTIGATING THE RELATIONSHIP BETWEEN TYPES OF PHYSICAL ACTIVITY AND DEPRESSION AMONG OLDER ADULTS. Spruha Joshi*, Stephen J. Mooney, Andrew G. Rundle, John R. Beard, Magdalena Cerdá (Columbia University, New York, NY United States)

Previous longitudinal studies on physical activity and depression among older adults have not examined the impact that specific types of physical activity have on depression. The purpose of this study was to examine the longitudinal relation between physical activity patterns and subsequent depression in a population-based sample of older adults. Participants were 2454 individuals, from the New York City Neighborhood and Mental Health in the Elderly Study II, a 3-year longitudinal study of New York City residents aged 65 to 75 years old at baseline. Past month depression was measured using the Patient Health Questionnaire, a 9-item symptom severity scale for depression. Physical activity levels were measured using the Physical Activity Scale for the Elderly (PASE). Subjects were categorized into one of three physical activity classes using latent class analysis: home/garden (i.e. individuals whose physical activity included yard work, gardening, and home repairs), active (i.e. walking and sports/athletic activities), and inactive. The relationship between physical activity (total score and class membership) at baseline and depression at wave 2 was estimated using generalized estimating equations. Models adjusted for baseline depression, disability, chronic health conditions, stressful life events, neuroticism, and body mass index. The total PASE score was not associated with depression at wave 2. However, specific types of physical activity were associated with depression. Respondents in the home/garden activity latent class had significantly lower odds of depression at wave 2 (adjusted odds ratio: 0.32, 95% confidence interval: 0.13-0.78) than respondents in the inactive latent class. The results suggest that type of physical activity may matter: among older adults, gardening, yard work and home repairs, rather than other types of physical activity, were associated with reduced risk of depression.

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POOR MENTAL HEALTH IMPACTS MEMBER EXPERIENCES AND SATISFACTION. Cynthia Hommer, Shirley Musich, Sara Wang, Timothy Wells*, Kevin Hawkins, Jürgen Unützer, Richard Migliori, Charlotte Yeh (Optum, Ann Arbor, MI United States)

Objective: To estimate the impact of poor mental health and treatment on member satisfaction and experiences, among older adults with an AARP® Medicare Supplement Insurance Plan insured by United Healthcare Insurance Company (for New York residents, United Healthcare Insurance Company of New York) and Medicare Part D coverage. The association between poor mental health, treatment for a mental disorder, and health literacy was also evaluated. **Methods**: Respondents were asked to rate their mental health as "Poor", "Fair", "Good", "Very Good" or "Excellent". Those who self-reported either "Poor" or "Fair", were considered having poor mental health. Self-reported poor mental health was identified among 10,461 adults 65 years and older who completed a Consumer Assessment of Healthcare Providers and Systems survey. Treatment was documented from medical and pharmaceutical claims. Survey responses were used to estimate satisfaction and experiences with care received. Multivariable regressions were used to measure the impact of poor mental health and treatment on member experiences and satisfaction with healthcare services received. **Results**: Seven percent self-reported poor mental health, with 50% lacking claims-based treatment evidence. Self-reported poor mental health was associated with significantly lower member satisfaction and experiences with care received. Additionally, those with poor mental health had 60% reduced health literacy relative to those with good mental health. Treatment documented in medical and pharmacy claims was associated with increased member satisfaction and experiences for several domains. There were substantial 'mismatches' between self-reported treatment of depression and treatment documented in pharmacy or claims data. **Conclusion**s: Poor mental health and depression are common in older adults and often co-morbid with other chronic conditions. Poor mental health was associated with lower member satisfaction, and was often untreated. Poor health literacy may be a factor in this low treatment rate. Future efforts should focus on engagement and educational approaches for subgroups less likely to be treated for poor mental health.

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ASSESSING THE AGREEMENT BETWEEN 3-METER AND 6-METER WALK TESTS IN 136 COMMUNITY-DWELLING OLDER ADULTS. Jennifer Lyons*, Lisa Fredman (Boston University School of Public Health, Boston, MA United States)

Walking speed is an important marker of physical function in older adults that is measured in both clinical and home-based settings. While course length is often shorter in home-based settings, speed is presented in meters/second (m/s) regardless of distance. A single study compared walking speed over different course lengths, but used distances that were too long for home-based assessments. We compared walking speeds over shorter courses. A total of 136 older community-dwelling adults (mean age = 76.4 years) completed two consecutive trials each of 3- and 6-meter walking courses, the order of which was randomly assigned, for a total of four trials. We calculated Lin's Concordance Correlation Coefficients (CCC) to evaluate the agreement between the two course distances and the effect of order on walking speed. We ran sensitivity analyses to determine how each course length affected the clinical cutoff for disability (1 m/s). Average walking speed was slower for the shorter course (3-meter: 0.82 m/s, 6-meter: 0.94 m/s) and faster for the second trial than for the first trial of each course (3-meter: 0.81 vs. 0.84, 6-meter: 0.94 vs. 0.95). We found high concordance between the first and second trials for both the 3-meter (CCC = 0.91) and 6-meter (CCC = 0.92) courses, and higher concordance between the second trials (CCC = 0.78) of the 3- and 6-meter courses than for the first (CCC = 0.69). A significantly higher proportion of participants were classified as walking less than 1 m/s using the 3-meter course (78.7%) than the 6-meter course (64.0%) ($p<0.01$). While the 3- and 6-meter courses had excellent test-retest reliability, we found faster walking speed in later trials and significant differences in walking speed by course length. These results suggest the utility of practice trials and adjusting for course length when combining walking speed measurements between different course lengths.

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MEDIATORS OF THE CAUSAL PATHWAY TO MORTALITY IN OLDER ADULTS WHO USE ANTIPSYCHOTICS. John Jackson*, Deborah Blacker, Tyler VanderWeele, Sebastian Schneeweiss (Brigham and Women's Hospital and Harvard Medical School, Boston, MA United States)

OBJECTIVE: This study used causal mediation analysis to quantify how much of the mortality difference between first and second-generation antipsychotics (FGAs and SGAs) is mediated by stroke, ventricular arrhythmia, acute myocardial infarction, venous thromboembolism, pneumonia, other bacterial infections, and hip fracture. **METHODS**: A cohort of new antipsychotic users (9,609 FGAs and 20,029 SGAs) enrolled in Medicare and statewide pharmacy assistance were followed for 180 days or until death. Covariates and medical events were assessed using inpatient billing claims. For the individual and combined set of medical events (mediators), we estimated the total, direct and indirect effects of antipsychotic type (FGA versus SGA) on mortality using the risk ratio scale, their 95% confidence intervals, and the percent mediated on the risk difference scale. A maximum likelihood approach and predictive value weighting were used to address potential misclassification of the medical events in claims data. **RESULTS**: There were 4,418 deaths, 1,077 cardiovascular events, 873 infectious events, and 572 hip fractures. The crude risk for each medical event ranged from 0.48% to 2.42%. Mortality was higher among FGA than SGA users (total effect, RR=1.15; 95%CI 1.08, 1.23). After accounting for the low sensitivity in detecting medical events (modeled as 0.5, non-differential), the proportion mediated for combined events increased to 21%—ranging from 2% to 6% individually—but the combined indirect effect did not reach statistical significance (RR=1.03; 95%CI 0.97, 1.09). Similar results were obtained under a differential misclassification model allowing for lower sensitivity 0.3) among those who died during follow-up. **CONCLUSIONS**: The adverse events considered here partially explained the mortality difference between FGA and SGA users. Other pathways or residual bias in the total or indirect effects may contribute to this finding.

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RATINGS OF OCCUPATIONAL COGNITIVE ACTIVITY ARE ASSOCIATED WITH COGNITIVE FUNCTIONING AMONG COLLEGE EDUCATED OLDER ADULTS. Cyrus M. Kosar*, Douglas Tommet, Aleksandra Kuczmarska, Eva Schmitt, Sharon K. Inouye, Richard N. Jones (Hebrew SeniorLife, Boston, MA United States)

Background: Education is a powerful predictor of most health outcomes. This includes cognitive functioning, where education level is often used as a marker of cognitive reserve. Recent cohort gains in level of education diminish variance and potentially erode explanatory power. Occupation, also putative reserve marker, is often not collected or not optimally used to measure cognitive abilities. Our goal was to determine whether a simple rating of on-the-job cognitive activity is associated with cognitive function beyond the effect of education. **Methods**: We matched the self-reported occupations of 523 non-demented older adults to the Dictionary of Occupational Titles (DOT). We used the rating of job-required reasoning ability to capture on-the-job cognitive activity. Linear regression was used to analyze differences in a composite measure of cognitive function given job-related cognitive activity. The analysis was stratified by education and gender. **Results**: The sample (mean age=77 ± 5 years, 59% female, 93% white) distribution of job-required reasoning ability was 2% low, 35% medium, 52% high and very 12% high. Relative to those with low or medium reasoning ability, subjects with high and very high levels had higher cognitive function by 0.25 and 0.40 standard deviation (SD) units respectively ($p<.001$). Within college-educated subjects (n=240), those with high and very high reasoning ability were higher in cognitive function by 0.23 ($p=.07$) and 0.30 ($p<.05$) SD units. These associations were consistent by gender, but were only found among subjects who completed college. **Conclusion**: A simple rating of job activity is associated with cognitive function within college-educated subjects. Job activities may become an important factor in explaining health outcomes within highly-educated elders.

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DIETARY ANTIOXIDANT INTAKE AND ITS ASSOCIATION WITH COGNITIVE FUNCTION IN AN ETHNICALLY DIVERSE SAMPLE OF US ADULTS. May Beydoun*, Marie Fanelli-Kuczmarski, Melissa Kitner-Triolo, Hind Beydoun, Jay Kaufman, Marc Mason, Michele Evans, Alan Zonderman (NIA/NIH/IRP, Baltimore, MD United States)

Dietary antioxidants can inhibit reactions accompanying neurodegeneration, and thus prevent cognitive impairment. We describe associations of dietary antioxidants with cognitive function in a large biracial population, while testing moderation by sex, race and elevated depressive symptoms (EDS) and mediation by depressive symptoms. This was a cross-sectional analysis of 1,274 adults aged 30-64y at baseline in the Healthy Aging in Neighborhoods of Diversity across the Life Span (HANDLS) study, Baltimore City, MD. Cognitive performance in the domains of memory, language/verbal, attention, spatial, psychomotor speed, executive function, and global mental status were assessed. The 20-item Center for Epidemiologic Studies Depression Scale (CES-D) scale measured depressive symptoms and a score≥16 indicated elevated depressive symptoms (EDS). Total carotenoids and vitamins A, C and E, per 1,000 kcal was calculated from two 24-hr recalls administered in-person by trained dietary interviewers. Among key findings, one standard deviation (SD~2.02 mg/1,000kcal) higher vitamin E was associated with a higher score on verbal memory, immediate recall, [β=+0.56, 95%CI: (+0.19, +0.93), p=0.003] and better language/verbal fluency performance [β=+0.49 (95% CI:+0.18, +0.80), p=0.003]. Women with higher vitamin E intake [β=+0.64 (95%CI: +0.23, +1.05), p=0.002] had better performance on a psychomotor speed test, whereas higher vitamin A (1 SD=541 RE/1,000 kcal) was linked to better visuospatial functioning among non-depressed individuals [β=-1.08 (95%CI: -1.77,-0.39), p=0.002]. The vitamin E-verbal memory association was partially mediated by depressive symptoms (proportion mediated=13-16%). These findings suggest that future cohort studies and dietary interventions should focus on associations of dietary vitamins A and E with cognitive decline, specifically for domains of verbal memory, verbal fluency, visuospatial and psychomotor speed.

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CONTRIBUTIONS OF SLEEP DURATION AND SLEEP QUALITY TO BODY COMPOSITION AMONG OLDER ADULTS FROM SIX MIDDLE-INCOME COUNTRIES: RESULTS FROM THE STUDY ON GLOBAL AGEING AND ADULT HEALTH (SAGE). Theresa Gildner*, Melissa Liebert, Paul Kowal, Josh Snodgrass (University of Oregon, Eugene, OR United States)

Changes in sleep architecture often occur in older adults. Previous studies have documented associations between sleep duration, sleep quality, and obesity risk in older individuals, yet few studies have examined these trends in lower-income countries. The present cross-sectional study uses nationally representative datasets from six countries to examine these relationships. Several hypotheses related to body composition and sleep patterns were tested using data from the World Health Organization's Study on global AGEing and adult health (SAGE). This longitudinal study draws on samples of older adults (>50 years old) in six middle-income countries (China, Ghana, India, Russian Federation, South Africa, and Mexico). Self-report data measured sleep quality and sleep duration over the previous two nights, and body mass index (BMI) and waist circumference(WC) values were measured to examine body composition. Linear regressions were used to examine the relationship between sleep patterns and body composition while controlling for lifestyle factors. Women in all countries exhibited significantly higher obesity rates than men ($p < 0.05$). Longer sleep durations in both sexes were significantly associated with lower BMI and WC measures ($p < 0.05$). Low sleep quality and increasing age did not significantly contribute to increased obesity risk. Surprisingly, low sleep quality was significantly associated with decreased male BMI and WC in China and India ($p < 0.01$). This study documented an association between short sleep duration and increased obesity risk, which is important given the growing global rates of obesity-related disease.

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THE STUDY ON GLOBAL AGEING AND ADULT HEALTH (SAGE): GLOBAL TRENDS IN OBESITY AMONG OLDER ADULTS IN LOW- AND MIDDLE-INCOME COUNTRIES. Melissa A. Liebert*, Paul Kowal, Somnath Chatterji, Kirstin N. Sterner, J. Josh Snodgrass (University of Oregon, Eugene, OR United States)

Obesity has emerged as a worldwide health concern, yet limited information is available about its prevalence in lower income countries. The present study uses data from the Study on global AGEing and adult health (SAGE) with nationally-representative samples of older adults (=50 years old) to examine the prevalence of obesity in six countries (China, Ghana, India, Mexico, Russia, South Africa). Height, weight (for body mass index [BMI]), and waist circumference (WC) were measured. Weighted prevalence estimates were calculated for standard BMI categories (underweight, normal, overweight, obese) and WC categories (normal, increased risk) by sex and country. Independent samples t-tests and one-way ANOVAs were used to assess sex and age differences in continuous BMI and WC. Among men, there are major differences by country in prevalence of underweight (0.5% in Mexico to 40.3% in India) and obesity (4.3% in India to 39.3% in South Africa), as well as the prevalence of increased risk WC (17.3% in Ghana to 62.1% in Mexico). In women, there is substantial variation by country in prevalence of underweight (0.7% in Mexico to 38.7% in India) and obesity (8.4% in India to 52.7% in South Africa), plus higher increased risk WC (51.9% in India to 91.0% in Mexico). Women have higher mean BMI than men in all countries (P<0.001). Women in Ghana and South Africa have significantly higher WC levels than male counterparts (P<0.001); men have significantly higher WC levels than women (P<0.001) in Mexico. Significant differences in BMI and WC are seen by age groups in Mexico, Ghana, and India, where individuals 80+ have lower BMI compared to the other age categories. High obesity levels are identified in older adults from Mexico and South Africa, but a burden of underweight remains for India. Support: NIH NIA Interagency Agreement YA1323-08-CN-0020 with the World Health Organization; NIH R01-AG034479; University of Oregon

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THE EFFECTS OF CHILDHOOD IQ AND OCCUPATIONAL PROFILE ON THE TRIAD OF IMPAIRMENT IN LATE-LIFE: A STUDY OF THE ABERDEEN BIRTH COHORT OF 1936 (ABC1936). Dorota Chapko*, Roger T. Staff, Christopher J. McNeil, Lawrence J. Whalley, Corri Black, Alison D. Murray (Aberdeen Biomedical Imaging Centre, University of Aberdeen, United Kingdom)

Background: The "triad of impairment" has been proposed to describe co-occurrence of cognitive, emotional and physical functioning deficits in late life. Differences in occupational profiles may be associated with different health outcomes. The structure of these relationships is unclear. **Methods**: Cross-sectional analysis of a subsample of ABC1936 with complete data (n=326). Data was collected on participants' cognitive ability (fluid intelligence, spatial ability, mental speed and verbal memory/learning), physical functioning (walk time and self-reported physical ability), depressive symptoms and main life-time occupation. Occupational complexity, in terms of working with data/people/things and employment stress were classified using external scales. We used structural equation modelling to test our hypothesis: we assumed that occupational measures and the triad of impairment can be summarized by two latent variables OP and TOI. Principal component analysis was performed to extract the first un-rotated principal components 'g' and 'pf' for general intelligence and physical functioning respectively. The model assumes that OP has a direct effect on TOI and that childhood ability (CIQ) has a direct effect on OP and TOI. **Results**: No relationships between the individual indicators over and above the effects of latent variables were found. The final model demonstrated a good fit to the data (CFI = 0.981 and RMSEA = 0.052). All causal relationships hypothesised by the model were significant. OP had a direct effect on TOI with a standardised regression weight of .294. CIQ had a total standardised regression weight of .71 of which .58 was direct and .13 indirect. **Conclusion**: Occupations with greater complexity (people/data) and higher social status and employment stress have a significant influence on TOI independent of CIQ. CIQ is the predominant influence on TOI, both directly and indirectly via OP.

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SELF-RATED HEALTH AND MORTALITY IN A PROSPECTIVE CHINESE ELDERLY COHORT STUDY IN HONG KONG. Chen Shen*, C Mary Schooling, Wai Man Chan, Jiang Xiu Zhou, Janice M Johnston, Siu Yin Lee, Tai Hing Lam (School of Public Health, The University of Hong Kong, Hong Kong)

In the West, self-rated health (SRH) reliably predicts death although associations may vary by socioeconomic position. Conceptualizations of health and the cause-composition of mortality may be contextually specific. Little is known as to how SRH predicts death in non-western settings or whether age- and self-comparative SRH predict death equally. Multivariable Cox regression analysis was used to assess the adjusted associations of age-comparative and self-comparative SRH with death from all- and specific-causes and whether the associations varied by sex, age or education using a population-based prospective cohort of 66,820 Chinese (65+ years) enrolled from July 1998 to December 2001 at all the 18 Elderly Health Centers of the Hong Kong Government Department of Health, and followed until May 31, 2012. During an average of 10.9 years follow-up, 19,845 deaths occurred with 6336 from cancer. Compared with better age-comparative SRH, worse age-comparative SRH was positively associated with of death from all-causes (hazard ratio (HR) 1.68, 95% confidence interval (CI) 1.59, 1.77), cardiovascular disease (HR 1.83, 95% CI 1.66, 2.02), stroke (HR 1.93, 95% CI 1.63, 2.29), ischemic heart disease (HR 1.77, 95% CI 1.51, 2.08), cancer (HR 1.17, 95% CI 1.06, 1.30) and respiratory disease (HR 2.25, 95% CI 2.01, 2.52), adjusted for age and sex. Similarly adjusted, self-comparative SRH was not associated with higher risk of mortality. Age-comparative SRH predicted death in older people from a non-western setting although the association was less marked than in western settings and did not vary by socioeconomic position.

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ASSOCIATION OF SERUM URIC ACID WITH COGNITIVE DECLINE AND DEMENTIA HOSPITALIZATION: THE ARIC STUDY. Alvaro Alonso*, Nicolai Buhr, Rebecca Gottesman, Richey Sharrett, Fareed Suri, Thomas Mosley (School of Public Health, University of Minnesota, Minneapolis, MN United States)

Background: The role of serum uric acid (SUA) in the development of cognitive decline and dementia is unclear. SUA is a risk factor for cardiovascular disease, which itself is associated with dementia. However, SUA's antioxidant properties may also prevent oxidative damage, a possible mechanism in the etiology of dementia. **Methods**: We studied 11,079 individuals enrolled in the Atherosclerosis Risk in Communities (ARIC) Study, aged 46-70. SUA was measured at baseline in 1990-92, when a cognitive assessment using Delayed Word Recall, Digit Symbol Substitution, and Word Fluency tests was performed. A repeated cognitive assessment was done 6 years later in 9610 participants. Hospitalizations with dementia diagnosis codes were ascertained through 2009. Associations of quartiles of SUA with cognitive decline and incident dementia hospitalization were assessed with linear regression models and Cox proportional hazards model, respectively, adjusting for potential confounders. **Results**: During a mean follow-up of 17 years, 446 hospitalizations with dementia diagnosis codes were identified. After adjustment for sociodemographic variables, cardiovascular risk factors, kidney function, and APOE genotype, higher levels of SUA were associated with lower risk of dementia (hazard ratio: 0.62, 95% confidence interval 0.46-0.85 comparing top to bottom quartile). Individuals in the highest quartile of SUA levels, compared to those in the lowest quartile, had less cognitive decline as measured by the Digit Symbol Substitution test (multivariable beta coefficient: 0.49 correct symbols, 95% confidence interval 0.03-0.95). No association was observed between SUA and other cognitive tests. **Conclusion**: Higher levels of SUA were associated with a lower risk of incident hospitalized dementia in later life and less cognitive decline in some domains.

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RESIDENTIAL RACIAL SEGREGATION AND MORTALITY AMONG AFRICAN AMERICAN, WHITE, AND HISPANIC URBAN BREAST CANCER PATIENTS IN TEXAS, 1995-2009. Sandi Pruitt*, Simon Craddock Lee, Jasmin Tiro, Lei Xuan, John Ruiz, Stephen Inrig (University of Texas Southwestern Medical Center, Dallas, TX United States)

Purpose: We examined 1) Whether residential racial/ethnic segregation was associated with mortality among urban breast cancer patients; and 2) If the association of residential segregation and mortality varied by patient race/ethnicity (r/e). **Methods**: Using Texas Cancer Registry data, we examined all-cause and breast-cancer mortality of 109,749 female African American (AA), Hispanic, and White breast cancer patients =50 years, living in metropolitan statistical areas (MSA) and diagnosed 1995-2009. We measured racial (AA) and ethnic (Hispanic) segregation of patient's neighborhood compared to their larger MSA using the Location Quotient measure. Shared frailty Cox proportional hazard models nested patients within residential neighborhoods (census tract) and controlled for patient race, age, diagnosis year, tumor stage, grade, histology, and county-level mammography availability. **Results**: Greater AA and Hispanic segregation were adversely associated with cause-specific and all-cause mortality. For example, in adjusted models including all patients, Hispanic segregation was associated with cause-specific mortality (aHR: 1.08 95% CI: 1.05-1.11). Compared to whites, AA were more likely to die from both causes and Hispanics were more likely to die from breast-cancer; adjusting for neighborhood segregation modestly attenuated these disparities. Hispanics vs. whites were less likely to die from all-causes; adjusting for neighborhood segregation did not modify this association. When examined separately by patient r/e, associations varied: residential segregation was either adversely associated with mortality or was not significant. **Discussion**: Residential segregation may contribute to r/e mortality disparities but adverse effects of segregation may differ by patient r/e. More research is needed to understand the complex relationships of residential segregation, patient r/e and mortality among cancer patients.

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STATIN USE AND RISK OF PROSTATE CANCER IN THE SOUTHERN COMMUNITY COHORT STUDY. Elizabeth D. Kantor*, Loren Lipworth, Jay H. Fowke, Lorelei A. Mucci, Lisa B. Signorello (Harvard School of Public Health, Department of Epidemiology, Boston, MA United States)

Prostate cancer is the most commonly diagnosed cancer among men in the United States, and it is important that we identify effective preventive strategies. Epidemiologic studies suggest that statin use may be inversely associated with risk of prostate cancer, though results have not been entirely consistent. Furthermore, though African-American men have a higher risk of prostate cancer than white men, most prior studies on statins have focused on predominantly white populations. We therefore evaluated the association between statin use and prostate cancer risk in the Southern Community Cohort Study (SCCS). Study participants include 31,808 men (68% of whom were African-American) aged 40-79 at baseline. Statin use was assessed at study enrollment by a series of questions about history of high cholesterol and current use of specific cholesterol-lowering medications. Between study enrollment (2002-2009) and December 31st, 2011, 576 prostate cancer cases were diagnosed, including 320 low-grade cancers (Gleason scores <7 or Gleason 3+4) and 89 high-grade cancers (Gleason scores >7 or Gleason 4+3). Analyses were conducted using multivariate-adjusted Cox regression, accounting for history of high cholesterol and other potential confounding factors. Persons reporting current statin use experienced a non-significant 18% lower risk of prostate cancer risk than non-users (Hazard Ratio [HR]: 0.82; 95% CI: 0.61, 1.12). Results were similar for high-grade and low-grade cancers (p-difference: 0.52) and did not differ by race (p-interaction African-American versus white: 0.43). Results from this cohort suggest no strong association between use of statins and prostate cancer risk overall, and further suggest that this association does not vary by race.

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PRENATAL AND FIRST YEAR OF LIFE PESTICIDE EXPOSURES AND ACUTE LYMPHOBLASTIC LEUKEMIA IN CHILDREN – A CALIFORNIA STATEWIDE CASE-CONTROL STUDY. Andrew Park*, Julia Heck, Fei Yu, Myles Cockburn, Beate Ritz (University of California, Los Angeles, Los Angeles, CA United States)

Background: Agricultural pesticides are widely used in California. In a state-wide population based case-control study, we examined the association between ambient pesticide exposures to childhood acute lymphoblastic leukemia (ALL) during pregnancy and in the first year of life. **Methods**: Cases were children less than age 6 taken from California Cancer registry records of diagnoses in 1988-2007, and linked to California birth certificates. Controls were frequency matched by birth year using a 20:1 sampling ratio from birth certificates. Using our GIS-Based Residential Ambient Pesticide Estimation System (GRAPES), individual ambient pesticide exposures were assigned by birth address or residence at diagnosis within a 500m radius from the field of pesticide application. GRAPES uses California Department of Pesticide Regulation's pesticide use reports overlaid on the Public Land Survey System's land use reports to assign the application location. We used unconditional logistic regression and semi-Bayes hierarchical logistic regression to estimate the effects of individual pesticides and pesticide classes on ALL. The analyses were adjusted for birth year, neighborhood socioeconomic index, mother's race, and urban/rural status. **Results**: Exposure in the first year of life to propargite (group B) and diuron (known/likely), according to EPA classification, was associated with increased odds for childhood ALL (OR: 1.19, 95% CI: 0.89, 1.59, OR: 1.21 95% CI 0.92, 1.60). Metam sodium (likely) showed an association with ALL (OR: 1.61, 95% CI: 1.10, 2.36). Exposure to benfluralin (suggestive evidence of carcinogenicity with insufficient data in humans) was also associated with ALL (OR: 1.78 95% CI: 1.01, 3.14). **Conclusion**s: Our findings support the current EPA classifications of propargite and diuron as carcinogens and suggest metam sodium and benfluralin as potential carcinogens for childhood ALL.

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RELATIONSHIP BETWEEN AMBIENT ULTRAVIOLET RADIATION AND NON-HODGKIN LYMPHOMA HISTOLOGIC SUBTYPES: A U.S. POPULATION-BASED STUDY OF RACIAL AND ETHNIC GROUPS. Elizabeth Cahoon*, Ruth Pfeiffer, David Wheeler, Juan Arhancet, Shih-Wen Lin, Bruce Alexander, Martha Linet, Michal Freedman (National Cancer Institute, Bethesda, MD United States)

Studies of ultraviolet radiation (UVR) exposure and risk of non-Hodgkin's lymphoma (NHL) have been inconsistent and few have examined this relationship across specific NHL subtypes or different race/ethnicities. We evaluated the associations between UVR exposure and subtype-specific incidence of NHL for whites, Hispanics, and blacks. 187,778 cases of NHL diagnosed between 2001 and 2010 were included from the Surveillance, Epidemiology, and End **Results** Program. Estimates of satellite-based ambient UVR were linked to counties of residence. Incidence rate ratios (IRRs) and 95% confidence intervals (CIs) were calculated for UVR quintiles using Poisson regression, adjusted for sex, age group, year of diagnosis group, race/ethnicity, and registry. Incidence was lower for the highest quintile of UVR for the following lymphomas: chronic lymphocytic leukemia/small lymphocytic (CLL/SLL) (IRR= 0.87, 95% CI: 0.77, 0.97), mantle cell (IRR= 0.82, 95% CI: 0.69, 0.97), lymphoplasmacytic (IRR= 0.58, 95% CI: 0.42, 0.80), mucosa-associated lymphoid tissue (IRR= 0.74, 95% CI: 0.60, 0.90), follicular (FL) (IRR= 0.76, 95% CI: 0.68, 0.86), diffuse large B-cell (DLBCL) (IRR= 0.84, 95% CI: 0.76, 0.94), peripheral T-cell (PTCL), other (IRR= 0.76, 95% CI: 0.61, 0.95), and PTCL not otherwise specified (PNOS) (IRR= 0.77, 95% CI: 0.61, 0.98). Inverse trends were found for FL and DLBCL. Interaction by race/ethnicity was detected for CLL/SLL, FL, Burkitt lymphoma, PNOS, and mycosis fungoides/Sezary syndrome. The B-cell lymphomas demonstrated significant protective relationships in both whites and Hispanics, but not in blacks. In contrast, the T-cell lymphomas suggested the most protective relationship among blacks. Our findings strengthen the case for a protective effect of UVR, support a modest etiologic heterogeneity between NHL subtypes, and suggest effect modification by race/ethnicity for several NHL subtypes.

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SUNLIGHT EXPOSURE AND PROSTATE CANCER RISK: A CASE-CONTROL STUDY IN MONTREAL, CANADA. Jennifer Yu*, Jerome Lavoue, Cheryl E. Peters, Anne-Marie Nicol, Paul A. Demers, Marie-Elise Parent (Department of Environmental and Occupational Health, Universite de Montreal/ INRS-Institut Armand Frappier, Laval Canada)

Objective: To investigate the association between sunlight exposure during leisure time and at work, and prostate cancer (PCa) risk. **Methods**: In the context of a case-control study set among the French population in Montreal, Canada, interviews were conducted with 1,904 incident PCa cases diagnosed between 2005 and 2009, and 1,962 population controls. Questionnaires elicited the frequency and duration of engagement in any outdoor recreational activity during adulthood, as well as a description of each job held over the lifetime. A cumulative index of sunlight exposure was developed based on the number of leisure-time outdoor events. Another was derived from the duration and level of sunlight occupational exposure in each job held based on a Canadian job-exposure matrix. Logistic regression was used to estimate the association between each sunlight exposure index and PCa. Potential confounding factors considered included age, ancestry, family history of PCa, PCa screening, education, solar protection, body mass index and physical activity. **Results**: 2.9% of cases and 2.7% of controls had never been exposed to sunlight during leisure time; corresponding values for unexposed during work time were 80.2% and 78.8%, respectively. Men never exposed to sunlight during leisure-time had an OR of 1.32 (95% CI: 0.82-2.14), as compared with men in the upper quartile category for the number of sunlight exposure leisure events; ORs were 1.11, 0.91 and 1.00 for the first to the third quartiles of exposure. Using men never exposed to sunlight at work as referents, the ORs for those with low and high workplace exposures were 0.85 and 0.88, respectively. Combining leisure and work-time exposures resulted in ORs for PCa close to unity, with no evidence of a dose-response pattern. **Conclusion**: Our findings provide little evidence for an association between sunlight exposure during adulthood and PCa development.

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GENE-GENE AND GENE-ENVIRONMENT INTERACTIONS IN THE ASSOCIATION BETWEEN ALCOHOL DRINKING, ORAL HYGIENE, AND RISK OF HEAD AND NECK CANCER. Jeffrey Chang*, Jenn-Ren Hsiao, Sen-Tien Tsai, Tung-Yiu Wong, Chun-Yen Ou, Sheen-Yie Fang, Ken-chung Chen, Cheng-Chih Huang, Wei-Ting Lee, Hung-I Lo, Jehn-Shyun Huang, Jiunn-Liang Wu, Chia-Jui Yen, Wei-Ting Hsueh, Yuan-Hua Wu, Ming-Wei Yang, Forn-Chia Lin, Jang-Yang Chang, Kwang-Yu Chang, Shang-Yin Wu, Hsiao-Chen Liao, Chen-Lin Lin, Yi-Hui Wang, Ya-Ling Weng, Han-Chien Yang (National Health Research Institutes, Tainan Taiwan)

Our study examined the interaction between alcohol drinking, poor oral hygiene (a factor strongly associated with overgrowths of oral microorganisms), ADH1B, and ALDH2 in the risk of head and neck cancer (HNC), accounting for both the systemic (by human metabolism) and the local production (by oral microorganisms) of acetaldehyde from ethanol in alcoholic beverages. Interviews were conducted to collect data on alcohol drinking and dental care habits from 436 HNC cases and 514 controls. Genotyping was performed for ADH1B rs1229984 and ALDH2 rs671. Carriers of the fast ADH1B and fast ALDH2 genotypes did not have an increased risk of HNC due to alcohol drinking (odds ratio (OR) = 0.7, 95% confidence interval (CI) = 0.3-1.6). In contrast, the risk of HNC associated with alcohol drinking was increased for fast ADH1B carriers who also possess the slow/non-functional ALDH2 genotypes (OR = 6.6, 95% CI = 2.8-15.6). Poor oral hygiene plays a key role in the risk of HNC for carriers of the slow ADH1B genotype with a strong positive association between alcohol consumption and HNC risk for those with poor dental care (OR = 8.9, 95% CI= 2.4-32.5) but a weak association for those with good dental care (OR = 1.5, 95% CI= 1.5-4.2). By assessing gene-gene and gene-environment interactions between alcohol consumption, dental care, ADH1B, and ALDH2, our study was able to provide a more complete picture of the underlying biological mechanism for the association between alcohol consumption and HNC risk.

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GENETIC SUSCEPTIBILITY TO HEAD AND NECK CANCERS IN A SAMPLE OF INDIANS AND CANADIANS. Akhil Soman Thekke Purakkal*, Belinda Nicolau, Rajiv Sarin, Eduardo Franco, Nicolas Schlecht (McGill University, Montreal Canada)

Squamous cell carcinomas of the head and neck (SCHNC) are a major public health problem in both developing and developed countries. They account for 20% and 3% of all cancer cases in India and Canada, respectively. Inter-individual variability due to susceptibility to genetic polymorphisms in candidate genes involved in carcinogen metabolism has been linked to SCHNC risk. The prevalence of these genetic polymorphisms and risk association with these cancers are population specific. The aim of this study is to investigate the association between CYP1A1, CYP2A6, CYP2E1, CYP2D6, GSTP1, GSTT1 and GSTT1 genetic polymorphisms and SCHNC risk in a sample of Indians and Canadians. The data for this study is draw from the Indian (cases=100, controls=121) and Canadian (cases=92, controls =82) sites of international multicenter hospital based case-control study; "Head and Neck Cancer (HeNCe) Life Study". Questionnaire and life grid techniques collected retrospective information on several domains of exposures. Exfoliated epithelial cells were collected from the oral cavity using mouthwash and brush biopsy protocols. Gene and allele specific PCR assays followed by DNA sequencing were performed for genotyping the genetic variants. Unconditional logistic regression was used to estimate the odds ratios (OR) and 95% confidence intervals (CI) for candidate gene in relation to SCHNC, adjusting for age and sex. Analysis with dominant model of CYP1A1*2C allelic variant presented an OR =1.74, 95% CI: 0.9-3.26 for Indian and OR=2.27, 95% CI: 0.9-55 for Canadian populations for carriers of this allele compared to non-carriers. These preliminary results suggest that CYP1A1*2C carriers have an increased risk of SCHNC in both Indian and Canadian population.

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GENOME-WIDE ANALYSIS OF GENE-FOLATE AND GENE-FOLIC ACID INTERACTIONS FOR COLORECTAL CANCER RISK. Mengmeng Du*, Mathieu Lemire, Jane Figueiredo, Cornelia Ulrich, Sonja Berndt, Hermann Brenner, Graham Casey, Andrew Chan, Jenny Chang-Claude, Loic Le Marchand, Polly Newcomb, John Potter, Martha Slattery, Emily White, Kana Wu, W. James Gauderman, Eric Jacobs, Ulrike Peters, Li Hsu (Fred Hutchinson Cancer Research Center, Seattle, WA United States)

Background: Folate-associated one-carbon metabolism (FOCM) is important in colorectal carcinogenesis. Studies examining gene-environment interaction (GxE) with folate and folic acid have focused on single nucleotide polymorphisms (SNPs) in candidate genes in the FOCM pathway. To identify novel GxE, we examined genome-wide SNP interactions with folate and folic acid intake for colorectal cancer (CRC) risk.**Methods**: To study interactions between ~2.7 million SNPs with folate and folic acid, we examined 6,679 CRC cases and 7,341 controls. We calculated folate intake from dietary sources (including folic acid in fortified foods) and folic acid intake from supplements. To test for multiplicative interactions, we used multivariable logistic regression as well as a new Cocktail method that included two stages: 1) A screening step that prioritized SNPs based on SNP-CRC associations or SNP-folate correlations, and 2) a weighted GxE testing step to account for multiple tests. **Results**: Per quartile increase in intake, total folate (as dietary folate equivalents) was associated with reduced CRC risk (OR=0.91, 95% CI: 0.88-0.94). We did not observe statistically significant SNP interactions with total folate. For dietary folate intake, interaction with rs6919916 (6q22.31/near TBC1D32) reached genome-wide statistical significance (P<5E-08) using logistic regression (OR=0.69, P=4.9E-08). Per quartile increase, dietary folate was associated with greater risk reduction in participants with the rs6919916-AA/AG genotype (OR=0.59, 95% CI: 0.49-0.70) compared to those with the GG genotype (OR=0.85, 95% CI: 0.76-0.96). There were no statistically significant SNP interactions with folic acid from supplements. **Conclusion**s: We identified a novel SNP interaction with dietary folate, but not with folic acid from supplements, for CRC risk—suggesting that the association of folate with CRC may be modified by common genetic variation.

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GENOMIC SEQUENCING FOR TAILORING CHEMOTHERAPY. Karolina Michniewicz* (BJC HealthCare, St. Louis United States)

Problem: The estimated benefit of chemotherapy has been traditionally based on tumor grade, size, and lymph node status. This has led to patients being under- or over-treated. Studies suggest that 60-77% of patients may be exposed to chemotherapy with little or no clinical benefit. Linking the tumor's genetic characteristics to targeted therapies may improve patient outcomes. This review evaluates the evidence surrounding patient outcomes, including tumor response, toxicity, and patient survival, when genomic sequencing is used to tailor cancer treatment. **Methods**: We systematically searched, quality assessed, and synthesized the relevant studies. Searches were performed using Medline, Cochrane Library, Google Scholar, and Embase. Studies were included if they evaluated genomic sequencing for the tailoring of cancer treatment in patients, and presented results from clinical settings. The overall evidence is graded by weighing net benefit, potential harm, and amount and quality of evidence. **Results**: Evidence is limited and conflicting. Existing literature primarily focuses on breast or colon cancer. Literature varies from no difference in outcomes, to improved outcomes for patients who underwent genomic sequencing. **Conclusion**s: Personalized cancer therapy has promise, but lacks clinical data on therapy response. Future research should focus on comprehensive identification of genetic variations, and their ability to, alone and in combination, predict drug response, toxicity, and survival.

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INTEGRATIVE POST GENOME-WIDE ASSOCIATION ANALYSIS OF CDKN2A AND TP53 SNPS AND RISK OF ESOPHAGEAL ADENOCARCINOMA. Matthew Buas*, Lynn Onstad, David Levine, Karen Makar, Brian Reid, Thomas Vaughan, BEACON Consortium Investigators (Fred Hutchinson Cancer Research Center, Seattle United States)

The incidence of esophageal adenocarcinoma (EA) has increased significantly in recent decades. Although several major risk factors have been identified for EA and its precursor, Barrett's esophagus (BE), including reflux, Caucasian race, male gender, obesity, and smoking, less is known about the role of inherited genetic variation and its interplay with environmental factors. Using data from a recent consortium-based genome wide association (GWA) study of 2,515 EA cases and 3,207 controls, we conducted a focused post-GWA analysis of 37 germline single nucleotide polymorphisms (SNPs) located within the CDKN2A and TP53 gene loci. Genetic interrogation of these tumor suppressors was motivated by past studies which identified somatic chromosomal abnormalities at 9p (CDKN2A) and 17p (TP53) as predictors of disease progression from BE to EA. Three CDKN2A polymorphisms were found to be associated ($P<0.05$) with reduced risk of EA: kgp1852093 C>T (intron 1, OR 0.90, P=0.0121, q=0.306), rs3088440 G>A (3'UTR, OR 0.84, P=0.0186, q=0.306), and rs4074785 C>T (intron 1, OR 0.85, P=0.0248, q=0.306). None of the TP53 SNPs reached nominal significance. Secondary analysis of the three CDKN2A variants in a prospective cohort of 408 BE patients showed that two of these SNPs were similarly associated with reduced risk of progression from BE to EA: kgp1852093 (HR 0.57, P=0.0095, q=0.029) and rs3088440 (HR 0.34, P=0.0368, q=0.055). In-vitro functional follow-up studies of rs3088440 G>A, a variant located in the seed sequence of a predicted miR-663b binding site, were suggestive of a mechanism whereby the G>A base substitution may attenuate miR-663b-mediated repression of the CDKN2A transcript. Our study represents the most extensive assessment to date of CDKN2A and TP53 SNPs in relation to risk of EA, and provides evidence that constitutive genetic variation at the CDKN2A locus may influence disease susceptibility.

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SINGLE NUCLEOTIDE POLYMORPHISMS IN BASE EXCISION REPAIR PATHWAY GENES AND ASSOCIATION WITH BREAST CANCER AND BREAST CANCER SUBTYPES AMONG AFRICAN AMERICANS AND WHITES. Leila Family*, Jeannette Bensen, Melissa Troester, Michael Wu, Carey Anders, Andrew Olshan (University of North Carolina at Chapel Hill, Chapel Hill, NC United States)

Background: Genetic variation in the base excision repair (BER) pathway has been inconsistently associated with breast cancer risk in studies mostly including only Whites. Limited BER pathway coverage and potential heterogeneity by breast cancer subtype and race may explain these inconsistencies. **Methods**: Using population-based case-control data from the Carolina Breast Cancer Study (CBCS) (1,972 cases and 1,776 controls), race-stratified and subtype-specific logistic regression models were used to estimate odds ratios (ORs) and 95% confidence intervals (CIs) for the association between 31 single-nucleotide polymorphisms (SNPs) in 15 BER genes and breast cancer risk. We used SKAT, a pathway-based analytic method, to evaluate the combined SNP effects within the BER pathway. **Results**: Among Whites, our results showed a positive association for NEIL2 rs1534862 (CT/TT vs. CC; OR=1.24, 95% CI: 1.07, 1.44) and an inverse association for PCNA rs17352 (AC/CC vs. AA; OR=0.76, 95% CI: 0.63, 0.93). Among African Americans, we found a suggestive positive association for UNG rs3219275 (AT/AA vs. TT; OR=1.44, 95% CI: 1.01, 2.06) and an inverse association for NEIL2 rs8191613 (AG/AA vs. GG; OR=0.72, 95% CI: 0.52, 0.98). Tumor subtype analysis showed that NEIL2 rs1534862 was also more strongly associated with luminal and HER2+/ER- subtypes than other subtypes. SKAT analysis showed no significant combined effects between SNPs. **Conclusion**s: Results suggest that variants in the BER pathway may be associated with the risk of breast cancer by race and subtype. These include associations with NEIL2 not previously reported. Replication of findings, especially with larger African-American studies, is warranted.

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EXCESS RISK OF RECTAL SQUAMOUS CELL CARCINOMAS IN HIV-INFECTED INDIVIDUALS. Anna Coghill*, Anne Hakenewerth, Karen Pawlish, Jack Finch, Glenn Copeland, Eric Engels (National Cancer Institute, Rockville, MD)

The majority of rectal cancers in the general population are adenocarcinomas. Rectal squamous cell carcinoma is rare, representing only 1-2% of rectal tumors. In an exploratory analysis, we observed that approximately 30% of rectal cancers in HIV-infected persons in the HIV/AIDS Cancer Match (HACM) study, a linkage of US HIV and cancer registries, were squamous cell carcinomas (SCC). We therefore sought to further characterize the epidemiology of rectal SCC among HIV-infected individuals. We utilized data from 7 participating HACM registries (1996-2010) to ascertain cases of rectal SCC, other (non-squamous) rectal carcinomas, and anal cancers among HIV-infected individuals. We compared the observed number of cases to the number expected for each cancer in the general population and calculated standardized incidence ratios (SIRs), the ratio of observed to expected, overall and within strata defined by sex, age, race/ethnicity, and HIV risk category. Among HIV-infected individuals, 89 cases of rectal SCC were observed, compared with only 3 expected. HIV infection was thus associated with an excess of rectal SCC overall (SIR=30). The largest excesses were observed among males (SIR=41), especially men who have sex with men (SIR=71), and whites (SIR=47). SIRs were similar to those reported for anal cancer, both overall (SIR=32) and within demographic strata. In contrast, risk for other (non-squamous) rectal carcinoma (e.g. adenocarcinoma) was not elevated (SIR=0.88). HIV infection is associated with an excess of rectal cancer that is specific to squamous cell tumors. The pattern of excess risk is very similar to that observed for anal cancer, a tumor caused by human papillomavirus. Further work is warranted to determine whether the observed association between HIV and rectal SCC is due to misclassification of anal cancers or rather represents an etiologically distinct subset of rectal tumors.

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COMPARATIVE EFFECTIVENESS OF CONTEMPORARY ADJUVANT CHEMOTHERAPY APPROACHES AMONG OLDER RECTAL CANCER PATIENTS. Jennifer Lund*, Hanna Sanoff, Til Sturmer (Department of Epidemiology, University of North Carolina, Chapel Hill, NC United States)

Guidelines for stage II and III rectal cancer recommend neoadjuvant chemoradiation therapy (CRT) and curative resection followed by adjuvant chemotherapy. Support for adjuvant chemotherapy is based largely on extrapolations from colon cancer trials. Comparative effectiveness research on the benefits of adjuvant chemotherapy in real world rectal cancer patients is lacking. We identified a population-based cohort of 1,431 older (65+ years) non-metastatic rectal cancer patients diagnosed from 2004-2009 using the Surveillance, Epidemiology and End **Results** program (SEER)-Medicare data, who underwent neoadjuvant CRT or radiation therapy (RT) and surgery. Patterns of adjuvant chemotherapy were described using binomial regression models and the comparative effectiveness of: 1) any adjuvant chemotherapy vs. no adjuvant chemotherapy and 2) adjuvant oxaliplatin+5-fluorouracil (5-FU)/capecitabine vs. 5-FU/capecitabine on all-cause mortality was evaluated using Cox proportional hazards models after propensity score (PS) matching. In total, 744 patients (52%) received adjuvant chemotherapy; most were treated with oxaliplatin (53%). Older age, lower stage, and being widowed were associated with lower propensity for adjuvant chemotherapy. After PS matching, adjuvant chemotherapy was associated with decreased mortality (adjusted hazard ratio (aHR)=0.71, 95% confidence interval (CI): 0.57, 0.89). Among patients receiving adjuvant therapy, older age, earlier diagnosis year, lower stage, and higher census tract poverty level were associated with lower propensity for oxaliplatin therapy. The addition of oxaliplatin to 5-FU/capecitabine did not reduce mortality after PS matching (aHR=1.15, 95% CI: 0.78, 1.70). Our results suggest that older non-metastatic rectal cancer patients benefit from adjuvant chemotherapy; however, the addition of oxaliplatin may not provide incremental benefits.

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DUODENAL ULCER AND SUBSEQUENT RISK OF GASTROINTESTINAL CANCER: A NATIONWIDE COHORT STUDY. Kirstine Søgaard*, Dora Farkas, Lars Pedersen, Jenny Lund, Henrik Toft Sørensen (Department of Clinical Epidemiology, Aarhus University Hospital, Aarhus Denmark)

The majority of patients with duodenal ulcers (DU) are infected with Helicobacter pylori, but environmental factors (smoking, alcoholism, and use of non-steroid anti-inflammatory drugs) also play an important role in DU pathogenesis. In addition to the increased risk of cancer in the stomach and small intestine, there is some evidence of an association between DU and risk of other gastrointestinal cancers, though these findings are less clear. We examined the risk of all gastrointestinal cancers one year or more after DU admission. We conducted a nationwide population-based cohort study (1994-2011) of all Danes with a first diagnosis of DU (International Classification of Disease (ICD)-10 code: K26). Follow-up for cancer began one year post-diagnosis and ended December, 2011. We quantified the excess relative risk of gastrointestinal cancers among DU patients compared with the general population using standardized incidence ratios (SIRs). We included 35,737 patients with DU; median age at diagnosis was 62 years (IQR 49-75 years), and more patients were men (56%) than women. In our cohort, 7-9% of patients had a diagnosis of chronic obstructive pulmonary disease or chronic alcoholism prior to the DU diagnosis. In a subanalysis of DU diagnoses (2006-2011), concomitant use of non-steroidal anti-inflammatory drugs (within 90 days before admission) was registered in 31%. In total, 992 gastrointestinal cancers were diagnosed one or more years after DU diagnosis (median follow-up 6 years), corresponding to a cancer SIR of 1.28 (95% CI: 1.20-1.37). Particularly high relative risks were observed for oral and pharyngeal [SIR, 2.09 (95% CI: 1.74-2.50)], small intestine [SIR, 2.83 (95% CI: 1.75-4.33)], and liver cancer [SIR, 2.96 (95% CI: 2.39-3.62)]. Duodenal ulcer is associated with an increased long-term risk of several gastrointestinal cancers outside the stomach or small intestine beyond 1 year of follow-up.

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HORMONE REPLACEMENT THERAPY AND YOUNG-ONSET BREAST CANCER. Katie M O'Brien*, Chunyuan Fei, Dale P Sandler, Hazel B Nichols, Lisa A DeRoo, Clarice R Weinberg (National Institute of Environmental Health Sciences, Research Triangle Park United States)

Estrogen plus progestin hormone replacement therapy (HRT) is associated with increased risk of postmenopausal breast cancer, but few studies have examined the impact of HRT on breast cancer in younger women. We assessed the effects of estrogen plus progestin and unopposed estrogen HRT on young-onset breast cancer using the Two Sister Study (2008-2010), a sister-matched study of 1419 case sisters diagnosed with breast cancer before age 50 and 1665 control sisters. Because controls tended to be older than their case sisters, we assigned an index age to ensure comparable opportunities for exposures and used propensity scores to control for birth cohort effects on HRT use. Ever use of HRT was uncommon in both cases and controls (8% and 11%, respectively). Estrogen plus progestin was not associated with young-onset breast cancer (odds ratio [OR] = 0.83, 95% confidence interval [CI]: 0.42-1.66). Duration of use, age at first use, and recency of use did not modify this null association. Unopposed estrogen was associated with a reduction in risk (OR=0.58, 95% CI: 0.34-0.99). There was no evidence that HRT was specifically associated with invasive disease or had effects that differed by tumor estrogen receptor status. Unopposed estrogen, but not estrogen plus progestin HRT was associated with a reduced risk of young-onset breast cancer.

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PRIMARY BREAST TUMOR EXPRESSION OF P21-ACTIVATED KINASE 1 (PAK1), ADJUVANT TAMOXIFEN THERAPY, AND RECURRENCE RISK IN A PROSPECTIVE DANISH POPULATION -BASED STUDY. Thomas Ahern*, Deirdre Cronin-Fenton, Ylva Hellberg, Henrik Toft Sørensen, Stephen Hamilton-Dutoit, Timothy Lash (University of Vermont, Burlington, VT United States)

Adjuvant tamoxifen therapy approximately halves recurrence risk among estrogen receptor-positive (ER+) breast cancer patients. Unfortunately, up to half of treated women suffer a recurrence, so identifying biomarkers to predict tamoxifen failure is vital. Pak1 is a kinase that potentiates signal cascades affecting cell survival and proliferation. Pak1 can independently activate ER, causing nuclear localization and expression of pro-survival genes. We evaluated breast cancer recurrence in relation to tumor Pak1 status (cytoplasmic intensity and nuclear localization) in a Danish case-control study. The source population consisted of female residents of Jutland, Denmark who were diagnosed with non-metastatic breast cancer. Women were parsed into 2 groups. Group 1 contained women with ER+ tumors who received tamoxifen for =1 year (ER+/TAM+). Group 2 contained women with ER-negative tumors who survived for =1 year after surgery (ER-/TAM-). Cases were women who experienced any recurrence. One recurrence-free control was sampled from the risk set of each case, matched on ER/TAM group, menopausal status, date of surgery, and cancer stage. Tumors from cases and controls were placed into tissue arrays. Pak1 was assayed by immunohistochemistry and read by 2 pathologists blinded to case status. We fit conditional logistic regression models to estimate associations between Pak1 staining and recurrence within ER/TAM strata. Compared with no staining, strong cytoplasmic Pak1 intensity was not associated with breast cancer recurrence in either group (ER+/TAM+ group: adjusted odds ratio (ORadj)=0.91, 95% CI: 0.57, 1.5; ER-/TAM- group: ORadj=0.74, 95% CI: 0.39, 1.4). Associations between nuclear Pak1 positivity and recurrence were near-null in both groups (ER+/TAM+ group: ORadj=1.3, 95% CI: 0.89, 1.8; ER-/TAM- group: ORadj=1.2, 95% CI: 0.72, 1.9). The clinical utility of Pak1 as a biomarker of tamoxifen failure is low.

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ARE VEGETARIANS PROTECTED AGAINST PROSTATE CANCER? Yessenia Tantamango-Bartley*, Jason Penniecook, Jing Fan, Gary Fraser, Synnove Knutsen (Loma Linda University. School of Public Health, Loma Linda, CA United States)

Background: According to the American Cancer Society, prostate cancer accounts for about 28% of all incident cancer cases among men. Prostate cancer is the second most common cancer among men. The relationship between diet and prostate cancer is still unclear. Since people do not consume individual foods but rather combinations of them, the assessment of dietary patterns may offer valuable information when determining associations between diet and prostate cancer risk. **Methods**: We examined the association between dietary patterns (non-vegetarians, lacto, pesco, vegan, and semi-vegetarian) and prostate cancer incidence among 26,391 male participants of the Adventist Health Study-2 (AHS-2). Cancer cases were identified by matching to cancer registries. Cox-proportional hazard regression analysis was performed to estimate hazard ratios (HR), with "attained age" as the time variable. **Results**: 580 incident prostate cancer cases were identified. Vegan diets showed statistically significant protection against prostate cancer risk (HR=0.56; 95%Confidence Interval (CI): 0.37, 0.84). This protection was statistically significant for White race (HR=0.53; 95%CI: 0.33, 0.91) but not for Blacks. The multivariate HR for Black race showed similar protective point estimates among lacto-vegetarians (HR=0.63; 95%CI: 0.37, 1.06) and Vegans (HR=0.68; 95%CI: 0.31, 1.46). When analyzing the effect of vegetarian dietary patterns according to stage of disease, vegetarian diets appeared to protect against advanced disease (HR=0.75; 95%CI: 0.47, 1.18), although this was not statistically significant. **Conclusion**s: Vegan diets seem to confer lower risk for prostate cancer risk. This protection seems to be significant among Whites but not Blacks, although point estimates in Blacks were in the same direction.

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DIETARY SUPPLEMENT USE AND CANCER MORTALITY: A PROSPECTIVE COHORT ANALYSIS OF THE THIRD NATIONAL HEALTH AND NUTRITIONAL EXAMINATION SURVEY (NHANES III). Tala H.I. Fakhouri*, Jaime J. Gahche, Regan L. Bailey (Centers for Disease Control and Prevention, Hyattsville, MD United States)

Background: Dietary supplements are commonly used to prevent cancer. In this study, we examine cancer-specific mortality associated with the use of dietary supplements in a nationally representative sample of US adults. **Methods**: We prospectively followed a cohort of 8,547 participants from the Third National Health and Nutrition Examination Surveys (NHANES III 1988-1994) through December 31, 2011. Analysis included participants who were ≥40 years of age at baseline. Exposure was defined as use of either a multivitamin or a multivitamin with minerals. Cox proportional hazard regression analyses were used to determine the relative risk of cancer-specific mortality, with adjustments for birth cohort, gender, race and Hispanic origin, education, body mass index, alcohol consumption, diet quality, physical activity, and oral contraceptive use. Participants who reported a prior cancer diagnosis at baseline and those who died of cancer within 2 years of baseline were excluded. **Results**: Median time of follow-up was 18.6 years. After adjusting for potential confounders, the relative risk of cancer-specific mortality did not differ between supplement users and non-users (Hazard Ratio: 1.08, 95%CI [0.89-1.33]). Additionally, the length of dietary supplement use was not associated with reduced risk for cancer-specific mortality (p>0.05). **Conclusion**: In a nationally representative sample of U.S. adults with no prior history of cancer, dietary supplement use was not associated with reduced risk of death from cancers.

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NO ASSOCIATION OF CIRCULATING 25-HYDROXYVITAMIN D LEVELS WITH TOTAL AND SITE-SPECIFIC CANCER INCIDENCE: RESULTS FROM THE CHANCES CONSORTIUM. José Manuel Ordóñez-Mena*, on behalf of the CHANCES consortium (German Cancer Research Center, Division of Clinical Epidemiology and Aging Research, Heidelberg Germany)

BACKGROUND: The associations of 25-hydroxyvitamin D [25(OH) D] levels with total and site-specific cancer incidence have been examined in several epidemiological studies, mainly nested-case control studies with fewer results from cohort studies. Their findings overall remain inconclusive, with the exception of colorectal and breast cancer for which inverse associations have consistently been observed. **OBJECTIVE**: To assess the association of baseline serum 25(OH)D levels with total, breast, lung, prostate and colorectal cancer incidence among older adults, with particular attention to possible sex and age differences. DESIGN: Data for 25(OH)D levels and cancer incidence was available for 15,486 older adults (mean age 62.7 years) participating in 3 cohort studies from the Consortium on Health and Aging (CHANCES): ESTHER (Germany), TROMSO (Norway) and EPIC (across Europe). Cox multivariate models were used to estimate Hazard Ratios and 95% confidence intervals and meta-analysis with random effects models to pool estimates. Tests for interaction were performed to assess potential effect modification by sex, age, physical activity, smoking and obese status. **RESULTS**: During a mean 11.8 years of follow-up, 1,952 participants developed any cancer of which 378, 192, 392, 616 and 183 were breast, lung, prostate and colorectal cancer, respectively. Overall, 25(OH)D levels were not significantly associated with any of the cancer outcomes. No significant differences in cancer risk across strata for sex, age, smoking or obese status, and physical activity were observed. **CONCLUSIONS**: Our meta-analyses with individual data from three large European population-based cohort studies cast doubts on a possible role of vitamin D in cancer prevention.

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PHYSICAL ACTIVITY AND SURVIVAL AMONG MEN DIAGNOSED WITH PROSTATE CANCER. Stephanie E Bonn*, Arvid Sjölander, Fredrik Wiklund, Pär Stattin, Erik Holmberg, Henrik Grönberg, Katarina Bälter (Department of Medical Epidemiology and Biostatistics, Karolinska Institutet, Stockholm)

Background: Physical activity is a modifiable lifestyle factor which has previously been linked to reductions in all-cause mortality among cancer survivors. However, few studies have investigated the association between physical activity and prostate cancer specific mortality. The aim of this study is to study physical activity after a prostate cancer diagnosis in association to overall and prostate cancer specific mortality in a large cohort study. **Methods**: Data from 3973 men diagnosed with localized prostate cancer 1997-2002 and followed-up until 2012 was analyzed. Hazard ratios (HR) with 95% confidence intervals (95% CI) were estimated using Cox proportional hazards models to examine walking/bicycling and exercising and time to overall and prostate cancer specific death. **Results**: In total, 426 deaths of any cause and 142 prostate cancer specific deaths occurred during the follow-up. Men who reported walking/bicycling for 20-60 min/day or >60 min/day, had lower rates of overall mortality compared to men who reported walking/bicycling <20 min/day; HR: 0.73 (95% CI: 0.59-0.94) and HR: 0.66 (95% CI: 0.48-0.89), respectively. Exercising 1-2 h/week or >2 h/week was associated with a lower rate of overall mortality compared to exercising <1 h/week; HR: 0.76 (95% CI: 0.58-1.00) and HR: 0.69 (95% CI: 0.54-0.89), respectively. For prostate cancer specific mortality, walking/bicycling 20-60 min/day was associated with a decreased mortality rate compared to walking/bicycling less; HR: 0.62 (95% CI: 0.41-0.94). **Conclusion**: Men who reported higher levels of walking/bicycling and exercising had decreased rates of both overall and prostate cancer specific mortality compared to less active men.

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POLYUNSATURATED FATTY ACIDS, GENETIC SUSCEPTIBILITY, AND BREAST CANCER INCIDENCE. Nikhil Khankari*, Patrick Bradshaw, Susan Steck, Andrew Olshan, Ka He, Susan Teitelbaum, Alfred Neugut, Regina Santella, Marilie Gammon (University of North Carolina at Chapel Hill, Chapel Hill, NC United States)

Experimental studies show that ω-3 fatty acids competitively inhibit ω-6 fatty acids, and thus help to reduce inflammatory metabolites resulting from ω-6 metabolism. Despite the biologic plausibility, results from epidemiologic studies of dietary polyunsaturated fatty acid (PUFA) intake and breast cancer incidence are inconsistent among European and U.S. populations. Examining interactions between the ω-3 and ω-6 fatty acids, and genes involved in relevant pathways may help to elucidate the potential association between dietary PUFA intake and breast cancer incidence in the U.S. In a population-based case-control study conducted in Long Island, NY (1463 cases, 1500 controls), we estimated odds ratios (ORs) and 95% confidence intervals (CIs) using unconditional logistic regression. Also, we examined interactions, on the additive scale, between ω-3 and ω-6 intake, and between the ω-3 to ω-6 ratio and 18 genetic polymorphisms involved in inflammation, oxidative stress, and estrogen metabolism pathways. We found a more than additive interaction [Relative Excess Risk Due to Interaction (RERI) =0.43; 95% CI=0.09,0.78] for breast cancer incidence associated with high ω-6 and low ω-3 intake [multivariate-adjusted OR=1.21; 95% CI=0.86,1.70] compared to women who consumed low ω-6 and high ω-3 (common referent). For interactions with genes involved in inflammatory, oxidative stress, and estrogen metabolism pathways, increased risks were observed for low intake ratio of ω-3 to ω-6, regardless of genotype. Our findings indicate an increased risk for breast cancer among women with low intake of ω-3 and high intake of ω-6 compared to women with high ω-3 intake and low ω-6 intake.

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PREMENOPAUSAL PLASMA CAROTENOIDS AND FLUORESCENT OXIDATION PRODUCTS AND SUBSEQUENT BREAST CANCER RISK IN THE NURSES' HEALTH STUDIES. Julia Sisti*, Rulla M. Tamimi, Susan E. Hankinson, Walter C. Willett, Bernard Rosner, Tianying Wu, A. Heather Eliassen (1.) Harvard School of Public Health; 2.) Channing Division of Network Medicine, Department of Medicine, Brigham and Women's Hospital and Harvard Medic, Boston, MA United States)

Background: High levels of circulating carotenoids are hypothesized to reduce breast cancer risk, potentially due to their antioxidant properties. **Methods**: We examined associations between premenopausal levels of plasma carotenoids and markers of oxidative stress and risk of breast cancer in the Nurses' Health Study (NHS) and NHSII among 1030 matched case-control pairs. Levels of a- and ß-carotene, ß-cryptoxanthin, lycopene, and lutein/zeaxanthin were quantified by high-performance liquid chromatography. Three fluorescent oxidation products with different excitation/emission wavelengths (FlOP_360, FlOP_320, FlOP_400) were measured in a subset of participants by spectrofluoroscopy. Multivariate conditional logistic regression was used to estimate odds ratios (OR) and corresponding 95% confidence intervals (CI) for breast cancer by quartiles, as well as P-values for tests of linear trend. **Results**: Carotenoid measures were not linearly inversely associated with breast cancer risk, though women in the highest quartile (vs. lowest quartile) of lycopene had a 25% lower risk (OR(95% CI)=0.75 (0.58-0.98), Ptrend=0.10). This association was stronger among women postmenopausal at diagnosis (0.59 (0.38-0.91), Ptrend=0.03). Plasma FlOP levels were not associated with a higher risk of breast cancer, and contrary to expectation, women in highest quartile (vs. lowest) of FlOP_320 had a reduced risk of breast cancer (OR(95% CI)=0.72 (0.53-0.98), Ptrend=0.03). No differences by estrogen receptor status were observed. **Conclusion**: We did not observe consistent inverse associations between circulating levels of premenopausal carotenoids and breast cancer, though plasma lycopene was suggestively associated with lower risk, particularly among women postmenopausal at diagnosis. Premenopausal FlOP levels were not associated with increased risk of breast cancer, though FlOP_320 appeared to be inversely associated with risk.

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ROLE OF SOY AND GREEN TEA ON OVARIAN CANCER RISK AMONG SINGAPOREAN CHINESE WOMEN. Lorena Canales*, Lesley Butler, Woon-Puay Koh, Ai-Zhen Jin, Jian-Min Yuan (Department of Environmental and Radiological Health Sciences, Colorado State University, Fort Collins, CO United States)

Ovarian cancer accounts for 3% of all female cancers and causes more deaths than any other gynecologic cancer in the US. Intake of dietary factors high in nutrients with antioxidative and anti-inflammatory properties, such as green tea and soy, may protect against the development of ovarian cancer. Prospective data are needed to evaluate the potential effects of tea and/or soy intake on ovarian cancer risk. We examined the association between green tea, black tea, and soy intake on ovarian cancer risk in the Singapore Chinese Health Study, a prospective cohort that enrolled 63,257 Chinese men and women aged 45-74 years between 1993 and 1998. Dietary intake was assessed by in-person interviewer using a validated 165-item food frequency questionnaire. As of December 2011, 137 cohort participants developed ovarian cancer. Serous tumors were the major histologic subtype in our cohort (39%). Multivariable proportional hazards regression models were used to evaluate the associations between tea and/or soy and ovarian cancer risk. Compared with women who consumed <85.7 g/day or mean intake of soy, there was no association with consuming =85.7 g/day [hazard ratio (HR)=1.23; 95% confidence interval (CI): 0.85, 1.78]. Among postmenopausal women, the association strengthened, but remained statistically non-significant (HR=1.41; 95% CI: 0.90, 2.19). Tea drinking was not associated with ovarian cancer risk, regardless of menopausal status. Compared with tea nondrinkers, green tea drinkers had an HR of 0.83 (95% CI: 0.58, 1.19) and black tea drinkers had an HR of 1.05 (95% CI: 0.75, 1.52). A statistically significant 40% decrease in risk of developing ovarian cancer was observed with women who consumed =85.7 g/day of soy and drank green tea, compared to green tea nondrinkers. In conclusion, our prospective data suggest that together, the consumption of green tea and soy is inversely related to ovarian cancer risk.

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A 35-YEAR PERSPECTIVE (1975-2009) INTO THE LONG-TERM PROGNOSIS OF PATIENTS HOSPITALIZED WITH A FIRST ACUTE MYOCARDIAL INFARCTION. Han-Yang Chen*, Joel Gore, Jorge Yarzebski, Robert Goldberg (University of Massachusetts Medical School, Worcester, MA United States)

Background: The objectives of this study were to examine changing trends (1975-2009) in the long-term prognosis of patients discharged from all central MA medical centers after hospitalization for a first acute myocardial infarction (AMI) and to identify factors associated with an increased risk of mortality after hospital discharge. **Methods**: Data from the population-based Worcester Heart Attack Study were used. Patients discharged from all central MA hospitals (n=11-16) after a first AMI on a biennial basis between 1975 and 2009 comprised the study population (n=8,728). Multivariable logistic regression analyses were used to examine the association between time and 1 and 2-year post-discharge mortality as well as factors associated with post-discharge mortality rates. **Results**: The mean age of our study population was 66 years and 40% were women. Patients hospitalized during recent, as compared with earlier, study years were significantly older, more likely to be women, and have a history of multiple comorbidities. Use of cardiac catheterization and percutaneous coronary interventions increased markedly over time as did the use of aspirin, ACEI/ARBs, beta blockers, and lipid-lowering agents at the time of hospital discharge. The odds of dying was 40% lower within 1 year after discharge (OR=0.60, 95% CI=0.38-0.95), and 57% lower within 2 years after discharge (OR=0.43, 95% CI=0.28-0.65), among patients who survived a first AMI in more recent in comparison with earlier study years. Older age, male sex, history of several comorbidities, and development of in-hospital clinical complications were associated with increased long-term mortality rates. **Conclusion**s: The results of this community-wide investigation provide insights into the changing characteristics, management practices, long-term outcomes, and factors associated with an increased risk of dying among patients who survived hospitalization for a first AMI.

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ASSOCIATION BETWEEN TELOMERE LENGTH, INFLAMMATION AND CARDIOVASCULAR RISK. Liya Lu*, Cathy Johnman, Lianne McGlynn, Daniel Mackay, Paul Shiels, Jill Pell (Institute of Health and Wellbeing, University of Glasgow, Glasgow United Kingdom)

Background: Leukocyte telomere length is an indicator of biological aging and is associated with chronic inflammation and cardiovascular (CVD) diseases. Many studies have related shorter telomere length to CVD risk such as using Framingham risk score. The ASSIGN score is the first to incorporate Scottish Index of Multiple Deprivation (SIMD) as a CVD risk factor in Scotland. However, association between telomere attrition and ASSIGN score is unclear. Our study examined the association between telomere attrition and CVD risk estimated by ASSIGN score among Scottish adults. **Methods**: Leukocyte telomere length was measured using a quantitative PCR among 1,779 participants from the Scottish Family Health Study. We undertook a cross-sectional study of the association between ASSIGN score and telomere length. Inclusion was restricted to adults aged ≥ 18 years who were free of CVD history and had provided blood samples. Linear regression models were used to investigate the relationships between telomere length, ASSIGN score and C reactive protein (CRP) as well as interleukin-6 (IL-6) concentrations. **Results**: Of the 1,779 participants, telomere length could be measured on 1,721. Among these, ASSIGN score could be calculated on 1,065. In the linear regression analyses, telomere length declined with increasing ASSIGN score (coefficient -0.006 95%CI -0.007- -0.004, R2=0.03, p<0.001). Log telomere length decreased with increasing CRP and IL-6 concentrations in both univariate linear regression and multivariate linear regression adjusted for potential confounders (coefficient -0.022 95%CI -0.037- -0.007, R2=0.08, p=0.004 for CRP; coefficient -0.051 95%CI -0.074- -0.029, R2=0.09, p<0.001 for IL-6 respectively). **Conclusion**: Our study suggests that reduced leukocyte telomere length is associated with CVD risk assessed by ASSIGN score. It also further supports the association between telomere attrition and inflammation.

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PSYCHOMETRIC EVALUATION OF THE CHINESE VERSION OF THE MORISKY MEDICATION ADHERENCE SCALE: EVIDENCE FROM THE FAMILY COHORT. Michael Y. Ni*, Hairong Nan, Paul H. Lee, Brandford Y. Chan, Nick Ng, Donald E. Morisky, Tai Hing Lam, Gabriel M. Leung, Ian McDowell (School of Public Health, The University of Hong Kong, Hong Kong Hong Kong)

Introduction: To evaluate the factor structure and psychometric properties of the 4-item Chinese version of the Morisky Medication Adherence Scale (MMAS-4) among hypertensive patients in Hong Kong. **Methods**: The Chinese MMAS-4 was created using forward-backward translation. Scores range from 0 to 4, with higher scores indicating better medication adherence. We analyzed a subsample of randomly selected 1,809 participants from the FAMILY Cohort conducted from December 2012 to May 2013 among Hong Kong residents aged ≥ 20 years who had been prescribed antihypertensive medications. Internal consistency of the MMAS-4 was assessed using Cronbach's alpha. Construct validity was examined using factor analysis and hypothesis testing. Convergent validity was tested through correlations with depressive symptoms (PHQ-9), family support (Family APGAR), and mental health-related quality of life (SF-12). **Results**: 7.2%, 13.4%, 8.3% and 71.1% of 1,809 participants on antihypertensive medications received MMAS-4 scores of 0-1, 2, 3 and 4, respectively; the mean score was 3.37 (SD 1.14). Cronbach's alpha was 0.83. Principal component analysis showed that the four items loaded into a single factor (eigenvalue =2.79, explaining 69.6% of the total variance). MMAS-4 was associated with hypertension control with odds ratio (OR) 1.9 (95% confidence interval (CI): 1.3 to 2.7) for MMAS-4 scores 4 compared with 0-3. The MMAS-4 showed significant but negligible correlations with age (Spearman's rho [ρ]=0.07), lower depressive scores (ρ=-0.09), and higher mental health-related quality of life (ρ=0.07). MMAS-4 Scores were not associated with education, income, family support, number of chronic comorbidities, or number of antihypertensive drugs. **Conclusion**s: The results lend some support to the internal consistency of this measure and its validity in terms of association with blood pressure control. The low correlations with mental status measures suggest that the MMAS-4 is not simply an alternative measure of general psychological well-being, but is related to adherence in some other manner.

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EFFECTS OF CARDIORESPIRATORY FITNESS ON BLOOD PRESSURE TRAJECTORY WITH AGING IN A COHORT OF HEALTHY MEN. Junxiu Liu*, Yong-Moon Park, Xuemei Sui, Carl J. Lavie, Haiming Zhou, Bo Cai, Jihong Liu, Steven N. Blair (University of South Carolina, Arnold School of Public Health, Columbia, SC United States)

Background: It remains unknown whether cardiorespiratory fitness may alter the age-related trajectory of blood pressure. **Methods** and **Results**: A total of 13,953 men aged 20-90 years, free of hypertension, cardiovascular disease, and cancer, completed from 3 to 28 (mean, 3.8) follow-up medical examinations between 1970 and 2006 in a cohort from the Aerobics Center Longitudinal Study. Cardiorespiratory fitness was measured by a maximal treadmill exercise test. Diastolic blood pressure (DBP) tended to increase with age until near the end of the sixth decade, when a decreased trend was observed. In contrast, systolic blood pressure (SBP) generally tended to increase over all age periods. In multivariable analysis, SBP increased on average by 0.3 (95% CI, 0.29–0.31) mm Hg with one year increment in age after adjusting for body fat %, fitness, resting heart rate, glucose, triglycerides, cholesterol, current smoker, heavy alcohol drinker, and parental history of hypertension. DBP also had a positive age trajectory, with a 0.15 (95% CI, 0.14-0.16) mm Hg yearly increase. Overall, abnormal SBP (>120 mmHg) began to occur at about age 50 and abnormal DBP (>80 mmHg) at about age 60. Men with higher fitness levels experienced abnormal SBP later than those with low fitness levels. **Conclusion**s: Our findings underscore the potential effect modification of fitness on blood pressure trajectory with aging over the adult life span in men. It is possible that improving fitness levels might extend the normal range of SBP and DBP, and therefore delay the development of hypertension.

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RAYNAUD PHENOMENON AND MORTALITY: RESULTS AFTER 20+ YEARS OF FOLLOW-UP IN THE CHARLESTON HEART STUDY. P Nietert*, S Shaftman, R Silver, B Wolf, B Egan, K Hunt, E Smith (Medical University of South Carolina, Charleston, SC United States)

Background: Raynaud phenomenon (RP) is a vasoconstrictive condition that occurs in extremities (e.g. fingers, toes) in response to cold or stress, often occurring secondary to rheumatologic diseases. We investigated whether RP has any independent association with mortality. **Methods**: From 1987-1989, 830 participants of the Charleston Heart Study (mean age of 72) completed a validated in-person RP screening interview. Two definitions of RP were used: a broad definition that included both whitening and cyanotic color changes of the extremities and a narrow definition that only incorporated whitening. Death records through 2009 were obtained from the National Death Index. Covariate-adjusted survival models were used to compare all-cause and cardiovascular disease (CVD) mortality between subjects with and without RP. **Results**: At baseline 4.8% and 16.7% met the criteria for the narrow and broad definitions, respectively. By the end of 2009, 673 subjects had died. We identified an association between RP and all-cause mortality, particularly among older subjects. For example, the adjusted hazard ratio (HR) for 85-year olds with RP was 2.4 (95% CI: 1.2 to 5.1). The presence of RP was not significantly associated with CVD mortality among blacks; however, among whites, RP was associated with a 1.6-fold increase in the hazard associated with CVD-related death after covariate adjustment (HR: 1.6, 95% CI: 1.1 to 2.2). **Conclusion**s: RP is associated with mortality, particularly among older people. Among whites, RP is associated with increased CVD-related death. RP may be a sign or a precursor of undiagnosed vascular disease, warranting appraisal of mortality risk in clinical evaluations among older individuals.

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AUTONOMY SUPPORT, MOTIVATION AND ADHERENCE TO CARDIAC REHABILITATION. Yacob Tedla*, Leonelo Bautista, Diane Lauver (University of Wisconsin Madison, Madison, WI United States)

Introduction: Participation in cardiac rehabilitation (CR) decreases mortality, prevents re-hospitalization, and enables patients to return earlier to an active life. Unfortunately, adherence to CR remains low. Autonomy support (AS) - i.e. encouraging patients to carry out a behavior by providing a meaningful rationale and acknowledging their feelings has been shown to improve medication adherence and smoking cessation, but its role on adherence to CR has been rarely studied. Objective: to evaluate the associations between AS, motivation to exercise and attendance to exercise session of CR. **Methods**: In a cross-sectional design, we recruited 50 patients who attended for at least 1 month to a Hospital CR program. Data on AS, motivation and frequency of attendance to CR in the past 2 weeks was collected using questionnaires. We used linear regression to ascertain the association between AS and motivation, and multiple logistic regression to ascertain the association between AS and attendance to CR. Result: Patients who expressed higher motivation to exercise attended more exercise sessions of the CR program (odds ratio (OR)=13.5, p-value=.03). AS from rehabilitation staff was associated with motivation to exercise (β =.30, p-value=.043), but There was no association between AS and patients' attendance to the exercise session of the CR (OR=.67, p-value=.71). **Conclusion**: Our findings demonstrated that AS from rehabilitation personnel is associated with patients' motivation to exercise and higher patients' motivation was associated with increased rate of attendance to CR. Further study with better design and measurement is needed to ascertain these findings.

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THE ASSOCIATION BETWEEN UPPER LEG LENGTH-TO-HEIGHT RATIO AND METABOLIC SYNDROME AMONG MIDDLE-AGED USA ADULTS – RESULTS FROM THE NHANES 2009-2010. Mike Pryzbek*, Jian Liu (Brock University, St. Catharines Canada)

Objective: To examine the relationship between upper leg length-to-height ratio (ULLHR) and metabolic syndrome (MetS). **Methods**: 1402 adults (711 males and 691 females) aged 40-75 years who had no missing information on MetS components were included in this analysis. MetS was defined as having at least three of the following cardiometabolic risk factors: central obesity (waist circumference (WC)>102 cm for males and >88 cm for females), low high-density lipoprotein (HDL-C (<40 mg/dl for males and <50 mg/dl for females)), high triglycerides (TG (>150 mg/dl)), insulin resistance (fasting blood glucose (FBG)>110 mg/dl), and hypertension. ULLHR was created by dividing upper leg length by height and categorized into tertiles using age- and gender-specific cut-offs (T1 – T3, T1 as the reference). Odds ratio (OR) from multiple logistic regression was used to assess the association between ULLHR and MetS. **Results**: 34.8% of participants were categorized as having MetS (38.5% in females and 30.5% in males). Compared to T1 of ULLHR, WC was 8.6 cm lower, HDL-C was 5.9 mg/dl higher, TG were 27.8 mg/dl lower, FBG was 16.3 mg/dl lower, and SBP was 4.9 mmHg lower in T3 among women. Compared to T1 of ULLHR, WC was 3.7 cm lower and HDL-C was 5.1 mg/dl higher in T3 among men. After controlling for age, ethnicity, education, physical activity, depression status, smoking status, alcohol intake, diabetes, previous heart attack, family history of heart attack, and age of menarche (in women), the OR (95% CI) of MetS in T2 and T3 of ULLHR were and 0.52 (0.25, 1.09) and 0.38 (0.18, 0.78) for females and 0.63 (0.31, 1.30) and 0.60 (0.31, 1.01) for males, respectively. **Conclusion**: ULLHR was negatively associated with MetS, but only significant in women. Further research is needed to identify potential mechanisms.

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WORK ECONOMIC SECTORS AND CARDIOVASCULAR RISK FACTORS: CROSS-SECTIONAL ANALYSIS BASED ON THE RECORD STUDY. Antoine Lewin* (INSERM - UPMC, Paris France)

Background: Little is known on the comparative effect of work economic sectors on multiple cardiovascular risk factors. We investigated whether and how a large panel of cardiovascular risk factors varied between 11 work economic sectors. **Methods**: Data on 4331 participants from the French RECORD Study geolocated at their residence and workplace (from an independent administrative source) were analyzed. Nine outcomes were assessed: body mass index (BMI), waist circumference, systolic and diastolic blood pressure (BP), pulse pressure, total cholesterol, low-density lipoprotein (LDL) cholesterol, glycaemia, and resting heart rate. Multilevel linear regression models stratified by sex and adjusted for individual and neighborhood sociodemographic characteristics were used. **Results**: Among men, the Health and social work sector was found to be the most protective sector for BMI, waist circumference, and glycaemia (and the Construction sector and the Transport and communications sector the most unfavorable). However, men working in the Health and social work sector showed the highest systolic BP and pulse pressure. Women working in the Health and social work sector had the highest BMI, the largest waist circumference and the most elevated systolic and diastolic BP. The Commercial and repair of vehicles sector, the Transport and communication sector, and the Collective, social, and personal services sector were associated with a more favorable profile for these risk factors among women. **Conclusion**: Work economic sectors contribute to shape metabolic and cardiovascular parameters after adjustment for individual/neighborhood sociodemographic characteristics. However, patterns of associations varied strikingly according to the risk factor examined and between men and women.

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ASSOCIATION BETWEEN ARSENIC EXPOSURE FROM DRINKING WATER OR URINE AND BLOOD PRESSURE CHANGE: RESULT FROM THE HEALTH EFFECTS OF ARSENIC LONGITUDINAL STUDY. Jieying Jiang*, Mengling Liu, Faruque Parvez, Mahbub Eunus, Alauddin Ahmed, Tariqul Islam, Muhammad Rakibuz-Zaman, Rabiul Hasan, Golam Sarwar, Diane Levy, Maria Argos, Molly Scannell, Joseph Graziano, Shohreh Farzan, Habibul Ahsan, Yu Chen (Department of Population Health, New York University School of Medicine, New York, New York United States)

Background: Cross-sectional studies have shown associations of arsenic exposure and prevalence of hypertension. However, no longitudinal study has estimated the extent of blood pressure change over time that can be attributable to arsenic exposure. **Method**: We evaluated the association of arsenic exposure from drinking water and longitudinal change of blood pressure in 10,853 participants in the Health Effects of Arsenic Longitudinal Study (HEALS), with a median of 6.7 years of follow-up. Arsenic exposure was measured in well water and in urine samples at baseline and every two years since baseline. Mixed effect models were used to estimate the association of baseline well and urinary arsenic with differences in the slopes of blood pressure change over time. **Result**: Every 100 μg/L difference in baseline water arsenic was significantly associated with a more rapidly annual increase of 0.1 (95% CI 0.06-0.14) mmHg/year in SBP and a more rapid annual increase of 0.08 (95% CI 0.05-0.11) mmHg/year in DBP. For every 200 μg/g difference of creatinine-adjusted urinary arsenic at baseline, SBP and DBP raised 0.05 (95% CI 0.02-0.08) mmHg/year and 0.06 (95% CI 0.04-0.08) mmHg/year more rapidly, respectively. Stratified analyses showed that the positive association between baseline water arsenic and the slope of annual SBP or DBP change was stronger in women than men (P for interaction =0.010 and 0.001, respectively) and in never smokers than ever smokers (P for interaction =0.037 for DBP). **Conclusion**: The findings suggest that arsenic exposure at baseline increases the rate of blood pressure elevation over time. Future studies are needed to investigate other intermediate steps or biomarkers of CVD with multiple measurements.

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ASSOCIATION OF MAJOR DIETARY PATTERNS AND BLOOD PRESSURE LONGITUDINAL CHANGE IN BANGLADESH. Jieying Jiang*, Mengling Liu, Faruque Parvez, Fen Wu, Mahbub Eunus, Alauddin Ahmed, Tariqul Islam, Muhammad Rakibuz-Zaman, Rabiul Hasan, Golam Sarwar, Diane Levy, Sripal Bangalore, Joseph Graziano, Molly Scannell, Argos Maria, Habibul Ahsan, Yu Chen (New York University, NYC United States)

Background: Observational studies and clinical trials have shown associations of diet and risk of high blood pressure (BP). However, prospective studies on the association between dietary patterns and longitudinal BP change are lacking, especially in low-income populations. **Method**: We evaluated the association of dietary patterns or food groups and longitudinal change of BP in 10,389 participants in the Health Effects of Arsenic Longitudinal Study (HEALS), with a median of 6.7 years of follow-up. Dietary information was obtained through a previously validated food-frequency (FFQ) questionnaire and principal component analysis was adopted to derive dietary patterns. BP was measured at baseline and each biannually follow-up using the same method. Mixed effect models were used to estimate the association of dietary with annual change in BP over years of follow-up. **Result**: Adherence to the "gourd vegetable" dietary pattern or "balanced" dietary pattern was related to a slower rate of change in BP; each SD increase in the score for the "gourd vegetable" dietary pattern was related to a decreasing slope of systolic blood pressure (SBP), diastolic blood pressure (DBP) or pulse pressure (PP) with time by 0.08 mmHg/year, 0.04 mmHg/year, and 0.05 mmHg/year while each SD increase in the score for the "balanced" dietary pattern was related to a decreasing slope of SBP and PP with time by 0.06 mmHg/year and 0.08 mmHg/year, respectively. On the other hand, SBP or PP changed more rapidly in those adhere to "western" dietary pattern; One SD increase in "western" dietary pattern score was related to an increase of slope for SBP and PP with time by 0.07mmHg/year and 0.05mmHg/year, respectively. **Conclusion**: The findings suggest that dietary patterns or food group intakes play a role in the change of BP over time in low-income countries.

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INTERACTION BETWEEN ARSENIC EXPOSURE FROM DRINKING WATER AND GENETIC SUSCEPTIBILITY IN CARDIOVASCULAR DISEASE RISK AND CAROTID ARTERY INTIMA-MEDIA THICKNESS IN BANGLADESH. Fen Wu*, Farzana Jasmine, Muhammad G. Kibriya, Mengling Liu, Xin Cheng, Faruque Parvez, Tariqul Islam, Alauddin Ahmed, Muhammad Rakibuz-Zaman, Jieying Jiang, Shantanu Roy, Rachelle Paul-Brutus, Vesna Slavkovich, Tariqul Islam, Diane Levy, Joseph H. Graziano, Habibul Ahsan, Yu Chen (NEW YORK UNIVERSITY, New York)

Arsenic exposure from drinking water has been linked to subclinical and clinical endpoints of cardiovascular disease (CVD). However, no large-scale studies have evaluated whether the cardiovascular effects of arsenic exposure could be modified by genetic factors. We conducted 1) a case-cohort study of 447 incident fatal and nonfatal cases of CVD, including 238 cases of coronary heart disease (CHD) and 165 stroke cases, and a subcohort of 1,375 subjects randomly selected from the Health Effects of Arsenic Longitudinal Study (HEALS) in Bangladesh, and 2) a cross-sectional study of 1,078 participants in the subcohort. We evaluated whether the association of arsenic exposure with CVD risk and carotid artery intima-media thickness (cIMT) differs by 360 single-nucleotide polymorphisms (SNPs) in 18 genes related to arsenic metabolism, oxidative stress, inflammation, and endothelial dysfunction. We found significant interactions of well-water arsenic with ICAM1 rs281432 (Padj = 0.0002) and VCAM1 rs3176867 (Padj = 0.035) in CVD risk after adjustment for multiple testing. These interactions were similar for stroke risk but weaker for CHD risk. We also found that NOS3 rs2853792 and SOD2 rs5746088 were significantly related to a reduced risk of CVD and CHD, and that MTHFR rs1801133 was related to a significantly increased risk of stroke. Three SNPs (rs10883790, rs11191442, and rs3740392) in AS3MT showed nominally significant interactions with both well-water arsenic and urinary creatinine-adjusted arsenic in cIMT. Our data provide novel evidence that the cardiovascular effects of arsenic exposure may vary with some common genetic variants in genes related to arsenic metabolism and endothelial dysfunction.

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HYPERTENSION -THE HIDDEN AND THE UNTAMED BEAST: PRELIMINARY FINDINGS FROM THE DHULIKHEL HEART STUDY, NEPAL. Biraj Karmacharya*, Rajendra Koju, Archana Shrestha, Sachita Shrestha, Prabin Shakya, Chandra Yogal, Shrinkhala Shrestha, Bibush Amatya, Akina Koju, Roshan Mahato, Annette Fitzpatrick (University of Washington, Seattle, WA United States)

Hypertension (HTN), the leading risk factor for cardiovascular disease (CVD) and the most important chronic condition for global mortality and disability, disproportionately affects the low and middle-income countries. Although Nepal is experiencing health transition from infectious to non-communicable diseases, very less is known about the epidemiology of HTN and its management in the population. The Dhulikhel Heart Study (DHS), recently launched in central Nepal targeting all adults (approximately 9000) aged 18 and over, residing in the town of Dhulikhel, is one of the first population-based, prospective, longitudinal cohort studies on CVDs and risk factors in a low-income country. One of its major aims is to characterize the problem of HTN in the population and understand the barriers to HTN management. To date, preliminary baseline results are available on 302 participants (to be updated at time of presentation). The mean age of the respondents was 41.8 years (SD: 17.9) and majority were females (60.93%). A total of 131 (43.48%) were identified to have prevalent HTN (classified as previously diagnosed hypertension or current Systolic BP>140mm Hg or current Diastolic BP>90mm Hg). Almost half of the hypertensives (n=63) were unaware of the condition and were diagnosed for the first time. Males had significantly higher prevalence of HTN (54.2%) compared to females (36.41%, p=0.002). Among previously diagnosed hypertensives, 96.1% were currently taking antihypertensives. Medication adherence, calculated using the Morisky Medication Adherence Scale-8 showed that 44.9% had high adherence, 32.6% had medium, and 22.4% had low adherence. Over two-thirds (67.6%) of those on antihypertensives had poorly controlled BP. These preliminary findings suggest that in addition to being highly prevalent, HTN largely remains an undetected and among the detected a poorly -managed CVD risk factor in this population.

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MULTILEVEL DETERMINANTS OF VENOUS THROMBOEMBOLISM AMONG HOSPITALIZATIONS OF US ADULTS. James Tsai*, Althea Grant, Michele Beckman, Scott Grosse, Hussain Yusuf, Lisa Richardson (Centers for Disease Control and Prevention, Atlanta, GA United States)

Background: Venous thromboembolism (VTE) is a significant clinical and public health problem. We investigated multilevel factors comprising demographic, clinical and insurance status, preexisting medical illnesses, and hospital characteristics for VTE diagnosis among hospitalizations of US adults. **Methods**: We generated adjusted odds ratios with 95% confidence intervals (CI) and determined sources of outcome variation by conducting multilevel logistic regression analysis of the 2011 Nationwide Inpatient Sample for 6,710,066 hospitalizations of US adults nested within 1,039 hospitals. **Results**: Among hospitalizations of adults, age, sex, race or ethnicity, total days of hospital stay, primary expected payer, and operating room procedure were important determinants of VTE diagnosis; the diagnoses of following preexisting medical illnesses–acquired immune deficiency syndrome, anemia, arthritis, congestive heart failure, coagulopathy, hypertension, lymphoma, metastatic cancer, other neurological disorders, obesity, paralysis, pulmonary circulation disorders, renal failure, solid tumor without metastasis, and weight loss–were positively and independently associated with 1.04 (CI: 1.02-1.06) to 2.91 (CI: 2.81-3.00) times increased likelihoods of VTE diagnosis than among those without the corresponding illnesses. Hospitalizations of adults who were treated in urban hospitals were associated with 14-15% increased likelihood of VTE diagnosis compared to those treated in rural hospitals. Approximately 7.4% of the total variation in probability of VTE diagnosis occurred between hospitals. **Conclusion**: The results of this study underscore the importance of implementing clinical risk assessment and evidence-based intervention guidelines for preventing VTE and the need to evaluate potential contextual factors that may modify the risk of VTE among hospitalized patients.

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THE CHANGE OF ECONOMIC BURDEN ON ACUTE MYOCARDIAL INFARCTION IN SOUTH KOREA FROM 2008 TO 2011. A Rim Kim, Seok-Jun Yoon, Hye Young Seo, Young Ae Kim, Dong Woo Kim, Young Hun Gong, Eun-Jung Kim*, Ji-Hyun Yoon, Jae_Hun Jeong (Department of Preventive Medicine, College of Medicine, Korea University, South Korea, Korea)

In Korea, with aging population and increasing the prevalence of chronic diseases, the prevalence of cardiovascular diseases including acute myocardial infarction is rising, along with associated health care expenditures. Therefore, we estimated total annual patient costs associated with acute myocardial infarction in Korea from 2008 to 2011 using nationally representative data. We used a prevalence-based approach to estimate the cost of AMI by nationwide claims database of Health Insurance Review & Assessment Service in Korea. From January 2008 to December 2011, patients with acute myocardial infarction (ICD-10 codes I21) were analyzed and the unit of analysis was the claim. Direct medical care costs were estimated using expenses paid by insurers and patients for non-covered care and pharmaceutical costs. Direct nonmedical costs were estimated using data on transportation costs for hospital visits and costs for caregivers. Indirect costs included the costs of productivity loss and premature death in AMI patients by Data from the Korea Health Panel, the Korea National Statistical Office's records of causes of death, and Labor Statistics. Total costs were estimated by adding age and gender specific costs. The economic burden of AMI in 2008 was estimated at $372.64 million US dollars. The indirect costs amounted to 66.83 % (US $249.21 million) of the total AMI costs. While in 2011 was estimated at $351.08 million US dollars and the indirect costs amounted to 59.95 % (US $210.61 million) of the total costs. The result show that the economic burden of AMI decreased by 5.79% and the indirect costs decreased by 15.49% from 2008 to 2011. Therefore, continuous improvement for the overall quality of medical services that may influence mortality and length of stay are needed to reduce the economic burden of AMI in Korea.

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PUBERTAL ONSET AND MATURITY AND ADOLESCENT BLOOD PRESSURE: EVIDENCE FROM HONG KONG'S "CHILDREN OF 1997" BIRTH COHORT. Man Ki Kwok*, Gabriel M Leung, C Mary Schooling (The University of Hong Kong, Hong Kong SAR China)

Introduction: Earlier puberty has been associated with elevated blood pressure (BP). Different biological factors may underlie various pubertal markers. Distinguishing the effects of pubertal onset and progress on BP may unravel the underlying etiology. **Methods**: We examined whether age at pubertal onset (Tanner stage II for breast or genitalia or pubic hair or testicular volume of 4 milliliters), or pubertal maturity (age at menarche or latest testicular volume) were associated with BP z-score at ~13 years relative to sex-, age- and height-specific reference for contemporary US children in a population-representative Chinese birth cohort (n=5,554). Mediation by menarche was examined for the associations of pubertal onset in girls. **Results**: Younger age at pubertal onset or maturity was associated with higher systolic BP z-score in girls (breast stage II -0.08 mmHg, 95% confidence interval (CI): -0.11, -0.05; pubic hair stage II -0.08 mmHg, 95% CI: -0.13, -0.03; menarche -0.14 mmHg, 95% CI: -0.18, -0.10), adjusted for infant characteristics and socioeconomic position. The association for breast development was attenuated (-0.04 mmHg, 95% CI: -0.08, -0.003) by adjusting for age at menarche and that for pubic hair became null. Similarly adjusted, younger age at onset of testicular, but not genitalia or pubic hair, development (-0.06 mmHg, 95% CI: -0.10, -0.02) and greater testicular volume (0.03 mmHg, 95% CI: 0.02, 0.05) was associated with higher systolic BP in boys. Similar associations of smaller magnitude were found for diastolic BP. **Conclusion**: Younger age at pubertal onset in both sexes was associated with higher BP, largely due in girls to younger age at menarche. Age of maturity plays a role on blood pressure, perhaps via up-regulation of the gonadotropic axis. The declining age at puberty, or factors which drive earlier puberty, may have contributed to the increasingly prevalence of cardiovascular diseases in rapidly developed or developing settings.

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SERUM URIC ACID IS ASSOCIATED TO HIGH PULSE WAVE VELOCITY IN WOMEN BUT NOT IN MEN. THE BRAZILIAN LONGITUDINAL STUDY OF ADULT HEALTH (ELSA-BRASIL). Cristina Baena*, Roberto Cunha, Marcia Olandoski, José Faria-Neto, Sandhi Barreto, José Mill, Paulo Lotufo, Isabela Bensenor (Universidade de São Paulo, São Paulo Brazil)

Background: Elevated serum uric acid is associated with incident cardiovascular disease. However, the association between uric acid (UA) and pulse wave velocity is not clearly understood. **Methods**: We analyzed the association of serum uric acid and high carotid-femoral pulse-wave velocity (cf-PWV) (Complior SP; Artech Medicale, France) in the baseline evaluation of the ELSA-Brasil, a cohort of 15,105 participants 35-74 years focused on CVD. In a cross-sectional and sex-specific analysis, we excluded participants taking allopurinol, antihypertensive drugs and those with creatinine > 1.4 mg/dL. Uric acid levels were analyzed in quartiles and high carotid-femoral pulse-wave velocity was considered for values above the 75th percentile. Logistic regression was used considering high cf-PWV as dependent variable and uric acid quartiles as independent variable (lowest quartile as reference) and risk factors as covariates. Statistical significance at 5%. **Results**: We analyzed 5676 women and 4717 men with mean age (SD) of 52 (9.2) and 52 (8.8) respectively. Proportion of high carotid-femoral pulse wave velocity increased significantly across uric acid quartiles for both genders (p trend=0.001). Multivariate analysis (highest versus lowest UA quartile) showed in Odds Ratio and Confidence Interval 95% OR (CI 95%): crude 1.34 (1.11-1.61) and 2.74 (2.31-3.24) for men and women, respectively. Adjustment for age and blood pressure yielded non-significant association 1.11 (0.90-1.39) for men while significance persisted for women 1.40(1.14-1.71). Further adjustments for fasting blood glucose and hormone replacement therapy increased the magnitude to 1.49 (1.12-1.99) in women. **Conclusion**: In a population not using antihypertensives, allopurinol and with normal serum creatinine, there is a positive association between uric acid and high cf-PWV independent of other cardiovascular risk factors in women but not in men.

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THE ASSOCIATION OF EDUCATION AND OBESITY STATUS AS DETERMINANTS OF PULSE PRESSURE IN DIABETIC AND NON-DIABETIC US POPULATIONS- RESULTS FROM 2009-2010 NHANES SURVEY. Harish Aggarwal*, Jian Liu (Brock University, St. Catharines Canada)

Research has pointed to various demographic, physical, and social factors as determinants of blood pressure and cardiovascular health; however literature has not explicitly pointed to the relationship between education levels as a measure pulse pressure (PP) in diabetic populations. This analysis looks to understand the social factor of education, along with obesity status contributing to a high PP in diabetic and non-diabetic groups. High PP was defined as >60mmHg from up to three systolic and diastolic readings. The population sample of US adults aged 25-55 (N=4596) was split into groups by completed level of education: less than grade 9, grade 9-11, high school, some college, and college graduate. They were also split by obesity status as well as diabetes condition as diagnosed by a physician as pre-diabetes, diabetes, or none. Multiple logistic regression models were constructed and age, gender, ethnicity, and history of coronary heart disease were controlled for. The second and third models were made examining this relationship in the same population absent of diabetics (N=3897), and both diabetics and pre-diabetics (N=3796). In the original population, compared to college graduates the odds ratios ([ORs] 95% CI) of having a high pulse pressure was non-significant in less than grade 9 education, 1.85 (1.07, 3.20) with grade 9-11, 2.10 (1.27, 3.46) with high school, and 3.01 (2.10, 4.30) with some college. In this group, obese individuals had no significantly increased odds. In the models excluding diabetic/ pre-diabetic patients, the grade 9-11 education groups no longer had significant odds increase, and obese individuals did have significantly increased odds of a high pulse pressure with 1.84 (1.07, 3.17) and 1.91 (1.09, 3.32), respectively in the restricted populations. Therefore the effect of obesity on pulse pressure may be dependent on an interaction with diabetes status.

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THE EFFECT OF EXTREME HEAT ON MENTAL HEALTH – EVIDENCE FROM AUSTRALIA. Ning Ding*, Léan O'Brien, Helen Berry (National Centre for Epidemiology and Population Health (NCEPH), Australian National University, Canberra Australia)

Introduction: Carbon emissions are warming our planet and harming human health. While assessments of warming effects on physical health are becoming well-established, there are few quantitative analyses of impacts on mental health – a core aspect of human wellbeing and, by 2030, the world's leading cause of burden of disease. Our goals were to accurately quantify the causal effects of extreme heat on individual-level mental health and wellbeing in Australia, which has the world's most variable climate, with a view to providing input data for climate change impact scenario modelling. **Methods**: Matching the data for four domains of mental wellbeing – mental health, vitality, social functioning and role-emotional – from waves 9 and 10 of the Household, Income and Labour Dynamics in Australia (HILDA) Survey, with temperature from Gridded Daily Temperature Data from the Australian Government Bureau of Meteorology forms a two-wave unbalanced panel dataset (12,847 participants aged 15 and over; 22,290 observations). Fixed effects models were employed to model the impacts of heat on mental health correcting for potential bias caused by unobserved individual-level adaptive capacity. We also controlled for a wide range of confounders. **Results**: Same-day extreme heat (defined as over 30ºC) led to a 0.936 (95% CI: -1.536,-0.335, p=0.002) deterioration in mental wellbeing (a norm-based combined score for four domains) equivalent to the negative association between unemployment and mental wellbeing and 4.00% (95% CI: 0.87%,7.13%, p=0.012) increase in the incidence of mental illness. The cumulative effects of heat remained significant up to one year. **Conclusion**s: This study suggests extreme heat can be harmful to multiple aspects of mental health and wellbeing. It is essential to consider mental health when proposing adaptation strategies in response to climate change impacts.

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COLLECTING AND POOLING REPEATED BIOLOGICAL SAMPLES TO LIMIT BIAS AND OPTIMIZE POWER IN BIOMARKER-BASED EPIDEMIOLOGICAL STUDIES - A SIMULATION STUDY APPLIED TO SHORT HALF-LIFE CHEMICALS. Claire Philippat, Flavie Perrier, Lise Giorgis-Allemand, Remy Slama* (Inserm (French Institute of Health and Medical Research), Grenoble France)

Context: Exposure biomarkers are a central tool to provide an exposure proxy for chemical factors with several exposure routes. For short half-lived chemicals, a single biological sample provides a poor estimate of the average exposure throughout long time periods. Collecting repeated urine samples constitutes an option worth considering. Aim: We characterized the impact of exposure misclassification due to the reliance on few biological samples, on the estimated health effect of exposures. We explored the efficiency of increasing the number of urine samples collected and using measurement error models (MEM) to limit bias. **Methods**: In a simulation approach, we assumed that pregnancy average of urinary concentrations of a compound was associated with a continuous outcome and estimated the bias of studies assessing exposure using 1 to 50 urine samples per subject, assuming a classical type error. We considered two chemicals with intra-class correlation coefficients (ICC) of 0.2 and 0.6. Associations were studied using a pooling approach and two MEMs: simulation extrapolation (SIMEX) and regression calibration (RC), which require separate analyses of the biological samples collected in each subject. **Results**: For a compound with an ICC of 0.2, 40, 9 and 2 urine samples were needed with the pooling, SIMEX and RC methods, respectively, to obtain an effect estimate biased by less than 10%. For a compound with an ICC of 0.6, 7 (pooling method) and 2 (SIMEX and RC) samples were needed. Power varied little between the pooling, SIMEX and RC methods. Discussion: Pooling several urine samples can limit the attenuation bias occurring in studies with classical type error where only one biological sample is assessed. For a given number of urine samples collected, SIMEX and RC measurement error models limit bias without increasing power, compared to the pooling approach.

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CHRONIC EXPOSURE TO ORGANOPHOSPHATE PESTICIDES AND ITS EFFECT ON IVORIAN SCHOOLCHILDREN ABILITIES IN REY-OSTERRIETH COMPLEX FIGURE. Pacôme Kouadio N'go*, Fatima-Zahra Azzaoui, Abdelaziz Lacheb, Ahmed Ahami (Equip of Clinical and Cognitive Neuroscience and Nutritional Health, Faculty of Science, Kenitra Morocco)

Introduction: Organophosphate insecticides (OP) are widely applied in agricultural pest control in Soubre cocoa's area (Ivory Coast). Its toxicity constitutes a potential health hazard for people living in this area. Animal studies suggest that even moderate doses are neurodevelopmental toxicants, but studies in humans remain scarce. Objective: to assess cognitive abilities in schoolchildren of the exposed zone to OP (Soubré) and to compare it to the abilities of children living in non-agricultural area (Dimbokro). **Methods**: A cross-sectional study is realized among Ivorian schoolchildren aged 7 to 12 years living in both exposed and no exposed areas. Neuropsychological evaluation is realized by Rey-Osterrieth Complex Figure (ROCF) test which is sensitive in an evaluation of visual-spatial working memory, visual-perception and constructional deficits. At the first step, subjects are given the ROCF stimulus and then asked to copy the same figure. Subsequently, three minutes after copy phase, subjects are instructed to recall what they are remembered. **Results**: The results show that the exposed children have more difficulties to copy the figure with a success rate of 34.72% compared to 54.72% in non-exposed children ($p<0.001$). There is also a significant difference in rates of figure recall; 18.05% in the exposed group against and 40.9% in no-exposed one ($p<0.001$). **Conclusion**: Our findings suggest that memory and the visuo - constructional deficit might be associated with environmental pesticide exposure. Deeper investigations must be realized to generalize these findings.

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EARLY LIFE BISPHENOL A EXPOSURE AND CHILD BODY-MASS INDEX: A PROSPECTIVE COHORT STUDY. Joseph Braun*, Antonia Calafat, Bruce Lanphear, Sirad Deria, Chanelle Howe, Scott Venners (Brown University, Providence, RI United States)

Some studies suggest that biphenyl A (BPA) exposure increases the risk of childhood obesity, but there are few prospective studies with serial BPA measures during pregnancy and early childhood. We investigated whether early life BPA exposure was associated with increased body mass index (BMI) at 2-5 years of age in 297 mother-child pairs from Cincinnati, OH. BPA concentrations were measured in urine samples collected from pregnant women during the 2nd and 3rd trimesters, and their children at 1 and 2 years of age. BMI z-scores were calculated from weight and height measured annually from 2-5 years of age. We used linear mixed models to estimate BMI changes or trajectories with increasing prenatal or early childhood BPA levels. After confounder adjustment, a 10-fold increase in prenatal (β:-0.1, 95% confidence interval [CI]:-0.5, 0.3) or early childhood (β:-0.2, CI:-0.6, 0.1) BPA concentrations was not associated with BMI. Associations between early childhood creatinine-standardized BPA concentrations and BMI were suggestively stronger in girls (β:-0.6; CI:-1.0, -0.1) than boys (β:0.1; CI:-0.4, 0.5) (effect measure modification p-value=0.07). Children in the highest early childhood BPA tercile (β:0.12; CI:0.07, 0.17) had more rapid BMI gain from 2-5 years than children in the lowest tercile (β:0.07; CI:0.01, 0.12). Associations were attenuated without creatinine adjustment. Early life BPA exposure was not associated with increased BMI, but early childhood BPA exposures may be associated with accelerated BMI velocity from 2-5 years. Future studies should consider examining confounding factors related to diet and determine if BPA exposure is associated with BMI after children experience adiposity rebound.

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USING A NOVEL ENVIRONMENTAL QUALITY MEASURE TO UNDERSTAND POPULATION-LEVEL PHYSICAL INACTIVITY. Christine Gray*, Shannon Grabich, Lynne Messer, Kristen Rappazzo, Jyotsna Jagai, Danelle Lobdell (University of North Carolina at Chapel Hill, Chapel Hill, NC United States)

Physical inactivity has been associated with numerous adverse health outcomes including obesity, heart disease, and depression, and is considered a major contributor to all-cause mortality worldwide. Understanding the role of the overall ambient environment in population inactivity levels is essential. A novel county-level environmental quality index (EQI) was developed for all US counties from 2000-2005 representing 5 environmental domains: air, water, land, built, and sociodemographic. We linked the EQI to 2006 Behavioral Risk Factor Surveillance System county-level prevalence of age-adjusted physical inactivity in US counties (N=3,141). We used random intercept multi-level linear regression with clustering by state to estimate fixed effects of quintiles of the EQI on physical inactivity prevalence. Models were stratified by 4 rural-urban continuum codes (RUCC) ranging from metropolitan urbanized (RUCC1) to rural (RUCC4). Results are reported as prevalence difference (PD) (95% confidence interval) comparing highest quintile/worst quality to lowest/best. Using the overall EQI, we observed negative associations across strata (RUCC1: -5.07(-5.65, -4.49); RUCC2: -3.36(-4.70, -2.01), RUCC3: -3.35(-4.00, -2.71), RUCC4: -2.55(-3.18, -1.92). We then examined domain-specific EQI quintiles. Key associations were: in RUCC1, the sociodemographic domain (4.56 (4.04, 5.08)); for RUCC2, the air (1.96 (0.78, 3.13)) and land domains (0.33 (-0.89, 1.55); in RUCC3, the air domain (1.24 (0.64, 1.84); and for RUCC4, the sociodemographic (-3.00(-3.64, -2.37) and air domains (1.86 (0.98, 2.75)). Physical inactivity was influenced by different domains of environmental quality depending on the extent of urbanization. These results provide useful information for targeting environmental research questions and programs aimed at reducing county-level physical inactivity. This abstract does not necessarily reflect EPA policy.

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MATERNAL RESIDENTIAL PROXIMITY TO CHLORINATED SOLVENT EMISSIONS AND BIRTH DEFECTS IN OFFSPRING. Jean Brender*, Mayura Shinde, F. Benjamin Zhan, Xi Gong, Peter Langlois (Texas A&M Health Science Center, College Station United States)

Some studies have noted an association between maternal occupational exposures to chlorinated solvents and birth defects in offspring, but data are lacking on the potential impact of industrial air emissions of these solvents on birth defects. Using data from the Texas Birth Defects Registry for births occurring in 1996-2008, we examined the relation between maternal residential proximity to industrial air releases of chlorinated solvents and birth defects in offspring of 60,613 case-mothers and 244,927 control-mothers. Maternal residential exposures to solvent emissions were estimated with metrics that took into account residential distances to industrial sources and annual amounts of chemicals released. Relative to exposure indices of 0, neural tube defects were associated with maternal residential exposures (exposure indices > 0) to several types of chlorinated solvents, most notably carbon tetrachloride (adjusted odds ratio [aOR] 1.42, 95% confidence interval [CI] 1.09, 1.86); chloroform (aOR 1.40, 95% CI 1.04, 1.87); ethyl chloride (aOR 1.39, 95% CI 1.08, 1.79); 1,1,2-trichloroethane (aOR 1.56, 95% CI 1.11, 2.18); and 1,2,3-trichloropropane (aOR 1.49, 95% CI 1.08, 2.06). Significant associations were also noted between a few chlorinated solvents and oral cleft and heart defects. We observed stronger associations between some emissions and neural tube, oral cleft, and heart defects in offspring of mothers 35 years or older, such as carbon tetrachloride with spina bifida (aOR 2.49, 95% CI 1.09, 5.72). Overall, these findings suggest that maternal residential proximity to industrial emissions of chlorinated solvents might be associated with selected birth defects in offspring, especially among older mothers.

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MATERNAL SERUM CONCENTRATION OF PERSISTENT ORGANOCHLORINE POLLUTANTS (POPS) IN PREGNANCY AND BIOMARKERS OF ALLERGIC AIRWAY DISEASE IN THE OFFSPRING: RESULTS FROM 20 YEARS FOLLOW-UP. Susanne Hansen*, Marin Strøm, Ekaterina Maslova, Sjurdur F. Olsen, Ronald Dahl, Hans Jürgen Hoffmann, Panu Rantakokko, Hannu Kiviranta, Allan Linneberg, Thorhallur I Halldorsson (Centre for Fetal Programming, Department of Epidemiology Research, Statens Serum Institute, Copenhagen Denmark)

Background: We recently found a direct association for prenatal levels of persistent organochlorine pollutants (POPs) with offspring use of asthma medication during 20 years of follow-up. No study has followed up offspring until adulthood using biomarkers to assess allergic airway disease. Objective: To examine the relation between maternal levels of POPs in gestational week 30 and biomarkers of offspring allergic airway disease at age 20. **Methods**: We used data from a birth cohort of 965 Danish pregnant women from 1988-1989. Maternal levels of POPs (6 polychlorinated biphenyls (PCBs), hexachlorobenzene (HCB), dichlorodiphenyldichloroethylene (p,p'-DDE)) were quantified in serum (n=872). Offspring participated in a clinical examination (n=443, 48% of 915 invited). Blood samples were analyzed for levels of eosinophil cationic protein (ECP), total immunoglobulin E (IgE), and specific IgE against 12 allergens (ImmunoCAP). Offspring lung function was measured by spirometry (Vitalograph). We used multivariable log-binomial and linear regression models to examine the association of maternal levels of POPs with the outcomes. **Results**: The median levels (IQR) of PCB-153, HCB, and p,p'-DDE were 1.37(0.77), 0,54(0.28), and 2.47(2.17) ng/ml, respectively. We found no statistically significant associations for maternal levels of POPs with offspring total or specific IgE, ECP, or lung function. For instance, offspring of mothers in the highest tertile (T3) of PCB-118 exposure had an increase in total IgE levels of 1.29 kUA/L (95% CI:0.84-1.99) compared to offspring of mothers in the lowest tertile (T1). Offspring of mothers in T3 of HCB exposure had a relative risk of 0.88 (95% CI: 0.59-1.29) of having >=1 allergen-specific IgE compared to offspring of mothers in T1. **Conclusion**: We found no evidence of a relation between maternal levels of POPs in pregnancy and biomarkers of allergic airway disease in the offspring at 20 years of age.

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THE EFFECTS OF AIR POLLUTION ON ADVERSE BIRTH OUTCOMES. Sandie Ha*, Hui Hu, Xiaohui Xu (University of Florida, Gainesville, FL United States)

Background: Air pollution has been shown to have adverse effects on many health outcomes including cardiorespiratory diseases and cancer. However, evidence on the effects of prenatal exposure is still limited. The purpose of this retrospective cohort study is to evaluate the effects of prenatal exposure to ozone (O_3) and particulate matter with aerodymanic diameter less than 2.5 micrometer ($PM_{2.5}$) on the risk of adverse birth outcomes (ABOs) including term low birth weight (LBW; defined as birthweight less than 2,500 grams), preterm delivery (PTD; defined as gestation age less than 37 weeks) and congenital anomalies (CA). **Methods**: All singleton births from 2004-2005 in Florida were included in the study (N=424,747). Trimester-specific exposures to O_3 and $PM_{2.5}$ at maternal residence were estimated using the National Environmental Public Health Tracking Network data, which were interpolated using Hierarchical Bayesian models. **Results**: After adjustment for potential confounders such as demographics, medical and lifestyle factors, we found that $PM_{2.5}$ exposures in all trimesters were significantly and positively associated with the risk of all ABOs. Second-trimester exposure has the strongest effects. For every 10µg/m/3/ increase of $PM_{2.5}$ in the second trimester, the risk of term LBW, PTD and CA increases by 15% (95% confidence interval (CI): 4-28%)), 60% (52-69%) and 21%(4-40%), respectively. O_3 was also found to be positively associated with PTD and CA with the strongest effects in the second trimester [14%(12-18%) for PTD and 15%(9-22%) for CA for each 10 parts per million increase]. However, O_3 was observed to have protective effects on term LBW. Results were consistent when exposures were categorized into quartiles. **Conclusion**: $PM_{2.5}$ may have adverse effects on ABOs but O_3 may have inconsistent effects. These findings warrant further investigation.

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ENVIRONMENTAL PHENOLS AND REPRODUCTIVE HORMONES IN PREMENOPAUSAL WOMEN. Anna Pollack*, Enrique Schisterman, Neil Perkins, Sunni Mumford, Kurunthachalam Kannan, Pauline Mendola (George Mason University, Fairfax United States)

Exposure to environmental phenols is widespread and limited evidence suggests possible endocrine disruption, but such studies often rely on single exposure measures, which may be inadequate given rapid clearance and hormonal changes across the cycle. We measured bisphenol A (BPA), benzophenone-3 (BP3), triclosan (TCS), 2,4-and 2,5-diclorophenol (2,4-DCP; 2,5-DCP) in stored urine samples (n=509) at key time points of hormonal variation (during menses, mid-cycle/ovulation, mid-luteal phase) across two menstrual cycles in 143 women. Estrogen, follicle stimulating hormone (FSH), luteinizing hormone (LH), and progesterone were measured in blood across both cycles. Linear mixed models with inverse probability of exposure weights were used to evaluate the relationship between log-transformed individual chemicals and hormones. Given the rapid clearance of these chemicals, day specific levels were also examined. Median chemical levels (interquartile range) were: BPA 2.8 (5.5), BP3 3.8 (13.1), TCS 22.2 (66.3), 2,4-DCP 0.9 (1.7), 2,5-DCP 19.1 (25.0) µg/l. TCS, 2,4-DCP, and 2,5-DCP were higher than NHANES levels. When evaluating all exposure measurements and all hormone measurements across both cycles, there was no relationship between environmental phenols and reproductive hormones in this population of healthy, regularly menstruating women. Select acute associations were observed: mid-cycle estrogen and TCS, 0.07 (95% CI 0.002, 0.15), and BPA with FSH at cycle day 2, -0.07 (-0.14, 0.006) and mid-cycle, 0.09 (0.03, 0.15), after adjusting for age. Environmental phenols may have select acute effects but do not seem to significantly alter reproductive hormone levels across the cycle.

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HAIR MERCURY AND CLINICAL OUTCOMES AMONG WOMEN UNDERGOING IN VITRO FERTILIZATION. Myriam Afeiche*, Diane Wright, Kristen Smith, Audrey Gaskins, Shelley Ehrlich, Paige Williams, Tomas Toth, Jorge Chavarro, Russ Hauser (Department of Nutrition, Harvard School of Public Health, Boston United States)

Introduction: Mercury is a neurotoxicant, but little is known about its reproductive effects. We examined whether hair mercury was related to in vitro fertilization (IVF) outcomes among women participating in a cohort study at the Massachusetts General Hospital Fertility Center. **Methods**: Total hair mercury (ppm) was measured among 198 women (n=216 cycles) in the proximal 3 cm of hair using a Direct Mercury Analyzer 80 (Milestone Inc, Monroe, CT). Median (interquartile range (IQR)) time between hair sample and first IVF cycle was 50 days (6, 90 days). Clinical outcomes (implantation, clinical pregnancy, and live birth) were abstracted from medical records. Generalized linear mixed models accounting for multiple IVF cycles were used to evaluate the association of hair mercury with clinical outcomes, adjusting for age, body mass index, race, smoking status, infertility diagnosis, and protocol type. **Results**: Women's median hair mercury was 0.62ppm (IQR =0.34,1.22ppm) and median age was 35.0yr. Hair mercury was not significantly associated with clinical outcomes. The adjusted mean (95%CI) implantation rate among women in the lowest (0.03-0.33ppm) and highest (1.27-5.66ppm) quartiles of hair mercury was 0.51 (0.35,0.66) and 0.66 (0.50,0.79) respectively. The multivariate-adjusted live birth rates (95%CI) for women in increasing quartiles of hair mercury were 0.35 (0.22,0.52), 0.37 (0.24,0.54), 0.44 (0.29,0.60), and 0.43 (0.28,0.59) (p,trend=0.49). Live birth rates did not differ between women exceeding the EPA safety limit of 1ppm and women below this level (0.37 (0.28,0.47) and 0.45 (0.32,0.59), respectively). **Conclusion**: Hair mercury concentrations were unrelated to clinical outcomes among women undergoing IVF.

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PHTHALATE EXPOSURE AND AGE AT MENARCHE IN US GIRLS. Taara Bhat*, Anna Pollack, Cara Frankenfeld, Germaine Buck Louis (George Mason University, Fairfax United States)

Exposure to endocrine-disrupting chemicals, such as phthalates, is widespread and has been associated with younger age of menarche. The earlier onset of menarche may contribute to adverse social and health consequences. Despite varying mechanisms of endocrine action, individual phthalate metabolites have not been evaluated in relation to age at menarche. Our objective was to evaluate phthalate metabolites in relation to age at menarche among National Health and Nutrition Examination Survey (2003-2012) participants aged 10-19 years (n=766). We used Cox proportional hazards regression models and adjusted for creatinine, race/ethnicity, body mass index, mother smoking during pregnancy, mother age at birth, and poverty income ratio. Pre-menarcheal participants were censored (n=56, 12.2 years). Phthalate metabolites were modeled separately. For two metabolites, monocarboxynonyl phthalate and monocarboxyoctyl phthalate, limits of detection restricted n=525. Earlier age at menarche was positively associated with monomethyl phthalate (hazard ratio=1.12; 95% CI 1.05-1.20), monobenzyl phthalate (1.25; 1.14-1.36), mono (3-carboxypropyl) phthalate (1.17; 1.06-1.29), monobutyl phthalate (1.15; 1.03-1.30), mono(2-ethyl-5-hydroxyhexyl) phthalate (1.13; 1.02-1.26), and monocarboxynonyl phthalate (1.20; 1.06-1.35). Monoethyl phthalate was associated with later age at menarche (0.89; 0.83-0.95). Age at menarche was not associated with mono-isobutyl phthalate, monocyclohexyl phthalate, monooctyl phthalate, monoisononyl phthalate, mono(2-ethyl-5-oxohexyl) phthalate, mono(2-ethyl-5-carboxypentyl) phthalate, and monocarboxyoctyl phthalate. Our findings suggest an association between phthalate metabolites and age at menarche in the US population.

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RESIDENTIAL PROXIMITY TO AGRICULTURAL PESTICIDES AND RISK OF CARDIAC BIRTH DEFECTS. Kristen M Rappazzo*, Joshua L Warren, Robert E Meyer, Amy H Herring, Alison P Sanders, Naomi C Brownstein, Thomas J Luben (Oak Ridge Institute for Science and Education / United States Environmental Protection Agency, Research Triangle Park United States)

Pesticide exposure has been linked sporadically to increased risk of birth defects. We conducted a case-control study to estimate the associations between a residence-based metric of agricultural pesticide exposure and cardiac birth defects. We linked live singleton birth records for 2003-2005 from the North Carolina (NC) State Center for Health Statistics to data from the NC Birth Defects Monitoring Program. Included women had a residence at delivery inside NC and infants with gestational ages between 20-44 weeks inclusive (n=304,906). Pesticide exposure was assigned using a previously constructed metric estimating total chemical exposure (pounds of active ingredient) based on crops within 500 meters of residence, specific dates of pregnancy, and chemical application dates based on the planting/harvesting dates of each crop. Logistic regression was used to estimate odds ratios (OR (95% confidence interval)) for three categories of exposure (<50, 50-90, >90 percentiles) compared to unexposed. Models were adjusted for maternal race/ethnicity, age at delivery, education, marital status, and smoking status. We observed positive ORs for the associations between highest pesticide exposure compared to unexposed with atrial septal defects (OR = 1.60 (1.29, 1.99)), hypoplastic left heart syndrome (OR = 1.55 (0.60, 4.04), and patent ductus arteriosis (OR = 1.40 (1.15, 1.71)). Other cardiac defects generally had null ORs. Our results suggest an association between residential exposure to agricultural pesticides and specific cardiac birth defects. The views expressed in this abstract are those of the authors and do not necessarily reflect the views or policies of the U.S. Environmental Protection Agency.

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TRIMESTER SPECIFIC PM2.5 EXPOSURE AND FETAL GROWTH IN OHIO, 2007-2010. Aimin Chen*, Emily DeFranco, Fan Xu, Eric Hall, Erin Haynes, David Jones, Louis Muglia (University of Cincinnati, Cincinnati, OH United States)

Exposure to particulate matter, particularly with aerodynamic diameter of <2.5 μm (PM2.5), may increase inflammation and oxidative stress in pregnant women and affect fetal growth. We aim to examine trimester-specific PM2.5 exposure levels and small for gestational age (SGA, defined as <10th percentile of US 1999-2000 reference sex- and gestational-age-specific birth weight) in statewide birth registry of Ohio from 2007 to 2010. The exposure to PM2.5 in each of the trimesters was determined using data from 57 Environmental Protection Agency network monitoring stations across the state of Ohio. We restricted the data to 224,921 singleton live births, with gestational age 20-42 weeks and no chromosomal birth defects, from home addresses within a 10 km radius of any PM2.5 monitoring stations using the ArcGIS. We estimated the odds ratio of SGA by binary trimester-specific daily average PM2.5 levels (high as ≥15 μg/m3 or low as <15 μg/m3 according to EPA standard) using Generalized Estimating Equations, with consideration of clustering of subjects living close to a monitoring station and adjustment for maternal age, race, education, parity, body mass index, insurance type, tobacco, prenatal care initiation, birth year, season of birth, and sex of the baby. The percentage of daily average PM2.5 ≥15μg/m3 was 22% in the first trimester, 17% in the second trimester, 19% in the third trimester, and 11% in all three trimesters. Covariates adjusted odds ratio and 95% confidence interval for SGA was 0.97 (0.93, 1.00) for the first trimester high exposure, 0.99 (0.95, 1.04) for the second trimester high exposure, 1.05 (1.01, 1.09) for the third trimester high exposure, and 1.03 (0.97, 1.08) for the all-trimester high exposure. In summary, we conclude that exposure to PM2.5 levels at or above 15 μg/m3 during the third trimester of pregnancy was associated with increased risk of SGA in a contemporary US population.

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RISK OF CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD) DUE TO BIOMASS FUELS AMONG WOMEN IN KURRAM AGENCY, FEDERALLY ADMINISTERED TRIBAL AREA (FATA): A CASE- CONTROL STUDY. Mehreen Mujtaba*, Zahid Ahmed Butt (Health Services Academy, Ministry of National Health Services Regulations and Coordinations, Islamabad Pakistan)

Introduction: Around 50% of the world's population almost all in the developing countries, rely on biomass fuels for their domestic energy. The use of biomass fuels is a major source of indoor air pollution in Pakistan and is estimated to be responsible for 4.6% burden of disease, especially among women who are more exposed to the pollutants. **Methods**: A case control study was conducted in Kurram Agency, FATA. Cases were females aged 25 to 60 years with a diagnosis of COPD whereas controls were females with similar symptoms presenting at the district hospital. Logistic regression analysis was conducted and Odds ratios (ORs) and 95% confidence intervals (CIs) were calculated using SPSS software. **Result**: 90.6% of the cases responded to using biomass fuels for their cooking and heating. There was a strong association between years spent cooking (Chi square 0f 56, p-value 0.00) and hours per day (Chi square 97, p-value 0.00) which were spent near the stove and COPD. In this study, cases were more likely to be older than controls (OR: 1.07, 95% C.I: 1.04-1.1). Cases were also more likely to live in joint family housing (OR: 3.18 95% C.I: 1.86-5.4) and have a lower income than controls (Income between 1500 to 5000 Pak Rs. OR: 4.1 (2.12- 8.08) and income between 6000 and 10,000 OR: 5.1 95% C.I: 2.27- 11.58). **Conclusion**: This study provides evidence to the fact that the use of biomass fuels in traditional stoves in rooms with poor ventilation increases the risk of development of COPD among women. Improvements in household energy practices, use of improved stoves or the use of cleaner fuels, can bring about benefits to women's health.

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OLFACTORY PERCEPTION AND FRAGRANCED PRODUCT USE IN A SAMPLE OF TWINS. Matthew O. Gribble*, Daniele R. Reed, Karen Bandeen-Roche, Pamela Dalton, Mary A. Fox (University of Southern California, Los Angeles, CA United States)

We conducted a study of olfactory perception and behavior related to fragrance chemical exposures at the 2012 Twins Days festival in Twinsburg, Ohio, in 17 black and 140 white twin pairs at least 18 years old. There were 44 persons who visited twice at the twin festival, in whom we assessed within-weekend test-retest reliability. Frequency of fragranced product use was assessed by questionnaire, with test-retest weighted kappa ranging from 0.52 to 0.88. To assess "smell-blindness" (specific anosmia) to the fragrance hexahydrohexamethyl cyclopentabenzopyran (HHCB), a 5% v/v HHCB/mineral oil solution was prepared; then 500 μl was added to ~0.2 g of Viscopearls ® (Rengo, Co. LTD., Osaka) in a vial and capped. Subjects were instructed to uncap the vial, smell, and then asked, "Did you smell something?" Test-retest tetrachoric correlation for HHCB anosmia was 0.61 (standard error [SE] 0.25), with kappa 0.34 (SE 0.16) and observed agreement 79.41%. There was a possible black-white difference in the frequency of HHCB anosmia, with 29.4% of black participants and 17.8% of white participants reporting HHCB anosmia; previous studies have indicated a genetic basis for HHCB anosmia. Tetrachoric correlation between white twins for specific anosmia to HHCB was 0.42 (SE 0.15), and kappa was 0.18 (SE 0.06) with 84.5% agreement. The proportionate odds ratio from ordered logistic models for frequency of fragranced laundry detergent use with multiple imputation among white participants with HHCB anosmia was 0.54 (95% confidence interval 0.24, 1.21) net of twin pair and living with twin, and 0.51 (0.24, 1.11) after also adjusting for sex, age, education, and ever being bothered by fragrance. These results provide preliminary suggestive evidence that a genetically-rooted olfactory perception, potentially differential by race, may be related to behaviors that lead to potentially toxic fragranced product chemical exposures.

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OBJECTIVE MEASUREMENT OF ERYTHEMAL ULTRAVIOLET B RADIATION (UVB) FROM 1979-2009 AND IMPLICATIONS FOR EXPOSURE ASSESSMENT. Marvin Langston*, Leslie Dennis, Heidi Brown (University of Arizona-Mel and Enid Zuckerman School of Public Health, Tucson, AZ United States)

Background: Associations between ultraviolet B radiation (UVB) and various health outcomes including skin cancers, multiple sclerosis, and vitamin D insufficiency have been seen in recent epidemiological research. Objectively measuring exposure to UVB has proven difficult, with research relying on study participant recall of sun exposure and other low sensitivity approaches. Data from spectrometers onboard NASA's Earth Probe (1979-1993) and Nimbus-7 (1996-2004) spacecraft along with the Ozone Monitoring Instrument (2004-2009) were used in order to measure monthly averages of daily integrated erythemal UVB (J/m^2) across the continental USA at 1.25 by 1 degree resolution. The study objective was to determine the persistence of these measurements for use in observational studies. **Methods**: An analysis was completed to detect differences in mean erythemal UVB measurements by month using the activity years of each satellite type as composites. Due to temporal autocorrelation from cyclical UVB trends by month as referenced by strong lag 12 correlations, areas of local significance were detected with a general linear mixed model. A field significance test to detect spatial autocorrelation using Monte Carlo approaches was completed. **Results**: Local tests identified gulf coastal regions of Louisiana, Mississippi, and Alabama along with large portions of Colorado and Wyoming with significant mean differences. These areas were not field significant. **Discussion**: Local areas of UVB differences over time must be interpreted with caution when analyzing all of the mapped data. Due to the lack of field significant differences in UVB over the study period 1979-2009, we conclude that UVB did not change appreciably by location for the study area. This analysis provides evidence that 30 year averages of erythemal UVB by location may be used as an estimate of ambient exposure assessment across the continental USA.

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A SYSTEMATIC APPRAISAL OF FIELD SYNOPSES IN GENETIC EPIDEMIOLOGY. Lazaros Belbasis, Orestis Panagiotou*, Vasilios Dosis, Evangelos Evangelou (Department of Hygiene and Epidemiology University of Ioannina School of Medicine, Ioannina Greece)

Evidence from genetic association studies is accumulating rapidly. Field synopses have recently arisen as an unbiased way of systematic evaluation and synthesis of this evidence. We performed a systematic review and appraisal of published field synopses in genetic epidemiology. We describe their main findings and methodological characteristics. We identified 61 synopses on 52 outcomes reporting 734 nominally significant associations. The median odds ratio for these associations was 1.25 (interquartile range, 1.15-1.43). The decision upon conducting a meta-analysis was based on at least one of the following criteria: the number of datasets available per variant (n=30); the number of subjects per polymorphism (n=4); the minor allele frequency in controls (n=1). Three synopses used only fixed-effect models for the synthesis of the available data, 24 used only random-effects models, 33 synopses used both random-effects and fixed-effect models, while 1 synopsis did not report the method. Egger's test was the most common method for the assessment of publication bias followed by Begg's test, Harbord's test, excess of statistical significance test, the fail-safe N method, and trim-and-fill analysis. To explore potential sources of heterogeneity, 34 synopses performed subgroup analyses, 6 performed meta-regression, and 29 performed sensitivity analyses. Only 12 synopses (20%) used the Venice criteria for the evaluation of the epidemiological credibility of their findings (n=449 identified variants in total); of those 449 variants, 115 (26%) had strong epidemiological credibility (Grade A according to the Venice criteria). Other methods included the Bonferroni correction, the false positive report probability and the Bayesian false discovery probability test. Eleven synopses (18%) were accompanied by an online database that has been regularly updated. Compared to synopses without an online database, synopses accompanied by a database received more citations (P=0.01) and needed a larger research team (P=0.02). Overall, field synopses have been proven a valuable tool for the identification of common variants, especially when researchers follow relevant guidelines as those provided by the Human Genome Epidemiology Network.

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CLINICAL AND GENETIC ASSOCIATIONS WITH COGNITIVE IMPAIRMENT ASSESSED USING TICS-M IN MULTIPLE SCLEROSIS. Michaela George*, Emon Elboudwarej, Farren Briggs, Xiaorong Shao, Hong Quach, Ling Shen, Allan Bernstein, Nandini Bakshi, Rachel Whitmer, Catherine Schaefer, Lisa Barcellos (Division of Epidemiology, Genetic Epidemiology and Genomics Laboratory, School of Public Health, University of California, Berkeley, CA United States)

Objective: Cognitive impairment is common in individuals with multiple sclerosis (MS), and can affect social/emotional function, employment status, and quality of life. The application of an easily administered, validated cognitive impairment assessment tool is critical for conducting large studies to help identify clinical and genetic factors associated with cognitive outcomes in MS. **Methods**: MS cases and controls were identified from Kaiser Permanente, Northern California Region. The Modified Telephone Interview for Cognitive Status (TICS-M) was used to evaluate cognitive status. Associations between both clinical and established genetic risk factors and cognitive status in MS cases were also evaluated. **Results**: On average, TICS-M scores were lower among MS cases compared to controls (p=0.003); similar results were observed for orientation and delayed recall sub-scores. Among cases, more severe disease was associated with a lower cognitive score (p=5x10-4). Gender was associated with cognitive impairment; female cases had lower scores compared to males (p=3x10-4). HLA-DRB1*15:01 was not associated with cognitive impairment in cases, however, there was some evidence for association with non-HLA MS risk variants was observed. **Conclusion**s: TICS-M distinguished MS cases from controls and can be applied to large population-based studies due to the ease and speed of administration. This study is the first to investigate the relationship between established clinical and genetic risk factors and cognitive impairment in MS using TICS-M. While cognitive status in cases was associated with physical disability and gender, established genetic risk variants for MS identified to date, do not appear to play a major role in cognitive impairment, as assessed by TICS-M.

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RACE VERSUS ANCESTRY: DOES SOCIALLY OR GENETICALLY DEFINED RACE PREDICT DEMENTIA RISK IN OLDER AMERICANS? Jessica R. Marden*, Stefan Walter, M. Maria Glymour (Harvard University School of Public Health, Boston, MA United States)

Background: Disparities in dementia among elderly Americans of African versus European ancestry are documented. Racial identity connotes both genetic ancestry and a set of correlated social experiences linked to health; both genetic and social explanations for disparities have been posited. We examined whether race and ancestry independently predict dementia. **Methods**: Race was self-reported by 7,827 Health and Retirement Study participants genotyped in 2006 or 2008 on the Illumina HumanOmni2.5 array. We estimated % African ancestry based on 84,520 independent SNPs (LD < 0.2) using admixture V1.23 imposing K=4 ancestral populations. Dementia probability (in 2006, 2008, and 2010) was estimated using direct and proxy assessments. We used generalized linear regressions (adjusted for age, sex, and year) with logit links to predict dementia based on genetic ancestry and race in race-pooled models; we also used ancestry in models restricted to self-identified African-Americans. Supplemental analyses adjusted for education, birth region, and APOE. **Results**: For self-reported African Americans, mean estimated African ancestry was 82.7% (standard deviation=12.8). Without adjustment for genetic ancestry, African Americans had 2.18 times the odds of dementia as whites (95% CI: 1.09-2.60). Conditional on genetic ancestry, self-reported race was not associated with dementia (OR: 0.55; 95% CI: 0.20-1.50). African ancestry was associated with slightly higher odds of dementia (OR=1.02 per % point; 95% CI: 1.01-1.04 in race-pooled models; OR=1.02; 95% CI: 1.01-1.03 in African American only models). **Conclusion**: African ancestry predicted dementia risk in older African Americans. Findings should be interpreted cautiously given research on inequalities in dementia and cross-national prevalence differences. A possible interpretation is that environmental context substantially modifies genetic determinants of dementia.

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USING AN ALZHEIMER'S DISEASE POLYGENIC RISK SCORE TO PREDICT MEMORY DECLINE. Jessica R. Marden*, Stefan Walter, Elizabeth Rose Mayeda, Alexandre Vivot, Eric J. Tchetgen Tchetgen, Ichiro Kawachi, M. Maria Glymour (Harvard University School of Public Health, Boston, MA United States)

Background: Several genetic loci independently predict Alzheimer's disease (AD). When combined into a polygenic risk score, these loci have been shown to predict both memory and prevalent dementia in a large, public use data set. Although the APOE locus is a robust predictor of longitudinal cognitive change, evidence on whether other loci also predict memory change longitudinally has been inconsistent. **Methods**: Health and Retirement Study participants provided genetic data in either 2006 or 2008. Using the top 10 loci associated with AD (from AlzGene, Jan. 2013), we calculated a genetic risk score (GRS) for all non-Hispanic white genetic sample members with a composite memory score in 2006, 2008, or 2010 (n=8942). The GRS estimates a genetic probability of AD based on loci identified in prior GWAS and corresponding weights. We also calculated an alternative GRS excluding APOE (GRS-exAPOE). Memory score was based on immediate and delayed word list memory and the Informant Questionnaire for Cognitive Decline. We used generalized linear models with GRS-by-age interaction terms to predict memory decline, adjusting for repeated measures. **Results**: The GRS ranged from 0.036-0.303 (mean=0.096; SD=0.038). There was a significant interaction between GRS and age (p<0.0001), suggesting that each SD increase in the GRS was associated with approximately 5% faster age-related memory loss. For example, a 10-year increase in age was associated with 0.374 SD lower memory score for participants with mean GRS, and 0.393 SD lower memory for those with a GRS one SD above the mean. However, when APOE was excluded there was no evidence of differences in rate of decline by GRS (p=0.756 for GRS-exAPOE by age interaction). **Conclusion**: A GRS for AD predicts memory loss in a national dataset, but this association was driven by APOE. Recently discovered AD related loci add little to prediction of rate of memory loss in the elderly.

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A TRANS-ETHNIC, GENOME-WIDE ASSOCIATION STUDY OF VENTRICULAR AND SUPRAVENTRICULAR ECTOPY. Melanie D. Napier*, Nora Franceschini, Christy L. Avery, Sylvie Kabisa, Yun Li, Kirk C. Wilhelmsen, Song Yan, Qing Duan, Kari E. North, Alex Reiner, Zhu-Ming Zhang, Lesley Tinker, Duanping Liao, Carmen Cuthbertson, Eric A. Whitsel (University of North Carolina at Chapel Hill Gillings School of Global Public Health, Chapel Hill, NC United States)

Rationale: Although ventricular and supraventricular ectopy (VE; SVE) are common forms of arrhythmia, their infrequent and intermittent manifestation in the general population limits ability to characterize their genetic underpinnings. *Objective*: To identify genetic variants associated with ectopy in the Atherosclerosis Risk in Communities (ARIC) study and Women's Health Initiative (WHI) clinical trials. **Methods**: We conducted cohort-, race/ethnicity-, and sex-stratified longitudinal analyses of electrocardiographically identified SVE and VE across 9 ARIC and WHI subpopulations (n=26,549). In each, we used generalized estimating equations to estimate associations with ~2.5 million genotyped and imputed single nucleotide polymorphisms (SNPs) while adjusting for ancestral admixture and multiple comparisons. We then used inverse variance-weighted, fixed-effects meta-analysis (METAL) and a Bayesian alternative allowing for ancestral heterogeneity (MANTRA) to combine stratum-specific estimates of SNP dosage-ectopy associations. **Results**: For both VE and SVE, we identified 2 novel loci with a $\log_{10}$ Bayes' Factor (BF) ≥ 6 and posterior probability of heterogeneity < 0.5. One SVE locus was replicated in independent samples (rs4885575; $\log_{10}$ BF=6.2; p=2.79 x 10^{-8}; Odds Ratio: 1.14, 95% Confidence Interval: 1.04, 1.26). **Conclusion**s: The results provide evidence of a genetic basis for ectopy in black, white and Hispanic populations while illustrating the value of ancestral diversity, longitudinal data, and alternative meta-analytic methods for discovering trans-ethnically important risk variants in studies of uncommon traits.

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ADMIXTURE MAPPING OF TYPE 2 DIABETES IN AFRICAN AMERICAN WOMEN. Edward A. Ruiz-Narvaez*, Stephen A. Haddad, Lynn Rosenberg, Julie R. Palmer (Slone Epidemiology Center at Boston University, Boston, MA United States)

African American women are disproportionately affected by type 2 diabetes (T2D) relative to white women, even after adjustment for known risk factors such as body mass index (BMI), suggesting that genetic factors may explain part of the difference in risk. More than 100 genetic variants have been associated with risk of T2D, but most studies have been conducted in white populations, and most variants have not been replicated in African Americans. In the sole genome-wide association scan in African Americans only one novel variant associated with T2D was identified (in chromosome 2); however, the risk allele is more frequent in whites. We conducted admixture mapping using 2,642 ancestral informative markers in 1,851 cases of T2D and 1,675 controls nested in the ongoing Black Women's Health Study cohort, with the goal of identifying T2D risk variants with major allele frequency differences between African Americans and European Americans. We also assessed the relation of mean African ancestry to risk of T2D using logistic regression to estimate odds ratios (OR) and 95% confidence intervals (CI). Cases had higher mean African ancestry as compared to controls (79.6% vs. 77.9%, respectively, $p<0.001$). In a model adjusted for age and region of residence each 10% increase of African ancestry was associated with 16% higher risk of T2D (OR = 1.16; 95% CI = 1.09 -1.23). Adjustment for BMI attenuated the association (OR = 1.08; 95% CI = 1.02-1.15). We found a suggestive locus for T2D with higher African ancestry at 12q12-q14 (case-only Z-score = 4.04, p=$5.3x10^{-5}$; case-control Z-score = 3.92, p=$9.0x10^{-5}$). The identified region includes genes associated with both T2D (HMGA2) and BMI (FAIM2). Our results confirm an association of African ancestry with higher risk of T2D but indicate that no single gene explains the increased risk of T2D in African Americans.

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EPIGENOME-WIDE STUDY IDENTIFIES NOVEL METHYLATION LOCI ASSOCIATED WITH PLASMA ADIPONECTIN. Stella Aslibekyan*, Marguerite Irvin, Jin Sha, Degui Zhi, Krista Thibeault, Michael Tsai, Paul Hopkins, Ingrid Borecki, Jose Ordovas, Devin Absher, Donna Arnett (University of Alabama at Birmingham, Birmingham, AL United States)

Adiponectin, an adipose-secreted protein linked to insulin sensitivity, plasma lipids, and inflammatory patterns, is a robust biomarker for metabolic health. Despite clinical relevance and high heritability, the determinants of plasma adiponectin levels remain poorly understood. We hypothesized that epigenetic factors such as DNA methylation patterns contribute to inter-individual variation in plasma adiponectin. Using data from participants of the Genetics of Lipid Lowering Drugs and Diet Network (GOLDN, n= 859 and n=194 for discovery and replication stages respectively), we conducted the first epigenome-wide study on plasma adiponectin. We assayed the methylation status of ~450,000 cytosine-to-guanine (CpG) sites in CD4+ T-cells. We modeled associations between methylation at each CpG site and circulating adiponectin using linear mixed models, adjusted for age, sex, study site, cell purity, and family structure. In the discovery phase, we have identified a statistically significant (P=2.3x10-9) association between plasma adiponectin and methylation of a CpG site in CPT1A, which encodes a key enzyme in fatty acid synthesis. The observed association was successfully replicated (P=0.0008). Further adjustment for body mass index attenuated the observed association (P=7.2x10-7), suggesting involvement of obesity-related biological mechanisms. In conclusion, our study has identified and replicated a biologically plausible association between CPT1A methylation and plasma adiponectin levels in a population-based study. Our findings provide support for the role of epigenetic mechanisms in the etiology of metabolic traits and lay the groundwork to further evaluate CPT1A methylation as a marker of disease risk.

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GENETICALLY PREDICTED 17?-ESTRADIOL AND SYSTEMIC INFLAMMATION IN WOMEN: A SEPARATE-SAMPLE MENDELIAN RANDOMIZATION ANALYSIS IN THE GUANGZHOU BIOBANK COHORT STUDY. Jane Zhao, CQ Jiang, Tai-Hing Lam, Bin Liu, KK Cheng, Sushma Kavikondala, WS Zhang, Gabriel Leung, C Mary Schooling* (The University of Hong Kong, Hong Kong Hong Kong)

Many chronic diseases are characterized by low-grade systemic inflammation. Estrogens may promote immune response; consistent with sex-specific patterns of diseases. In vitro culture and animal experiments suggest estrogens are anti-inflammatory and might thereby protect against low-grade systemic inflammation. Evidence from epidemiological studies is limited. Using a Mendelian randomization analysis with a separate-sample instrumental variable (SSIV) estimator, we examined the association of genetically predicted 17β-estradiol with well-established systemic inflammatory markers (total white blood cell, granulocyte and lymphocyte count). A genetic score predicting 17β-estradiol was developed in 237 young Chinese women (university students) from Hong Kong based on a parsimonious set of genetic polymorphisms (ESR1 (rs2175898) and CYP19A1 (rs1008805)). Multivariable linear regression was used to examine the association of genetically predicted 17β-estradiol with systemic inflammatory markers among 3,096 older (50+ years) Chinese women from the Guangzhou Biobank Cohort Study. Predicted 17β-estradiol was negatively associated with white blood cell count (-6.3 103/mL, 95% confidence interval (CI) -11.4 to -1.3) and granulocyte count (-4.5 103/mL, 95% CI -8.5 to -0.4) but not lymphocyte count (-1.5 103/mL, 95% CI -3.4 to 0.4) adjusted for age only. Results were similar further adjusted for education, smoking, use of alcohol, physical activity, body mass index, waist-hip ratio, age of menarche, age at menopause, use of hormonal contraceptives and hormone replacement therapy. Endogenous genetically predicted 17β-estradiol reduced low-grade systemic inflammatory markers (white blood cell and granulocyte count), consistent with experimental and ecological evidence of 17β-estradiol promoting immune response.

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AN EPIDEMIOLOGIC INSIGHT FROM THE TWIN AND FAMILY STUDIES: HEALTH EFFECTS OF KIMCHI EATING TRIAL AND SALT INTAKE AND HABITS AS AN EXAMPLE. Joohon Sung*, Jung-Eun Lee, Yun-Mi Song (Seoul National University, Seoul Korea)

Twin studies have contributed to science mainly by discriminating the roles of genes versus environments by comparing the resemblances between monozygotic twins (MZ) and dizygotic twins (DZ). Recently, twin or twin-family studies have evolved; a cotwin-control study is a modern design, in which comparisons are made between two cotwins, instead of unrelated cases and controls. Applications of the design include biomarker, epigenetics and microbiome studies. Clinical trial is another application, where two MZ cotwins are allocated to different intervention groups. We conducted 2 week trial of Kimchi-rich Korean diets (=treatment group), where randomly assigned cotwins are provided DASH diet as controls. In this study, 26 healthy MZ pairs with one or two risk factors of metabolic syndrome components were included. We found that general inflammatory markers (hsCRP) and triglyceride levels were significantly lowered among treatment group, compared with their cotwins (DASH diet) or their own baselines. The author also presented an example of salt intake habits. When the shared environmental effects were analyzed using whole families as shared unit, only genetic influences were evident (explaining 0.30-0.42 of total variances). However, when the analyses were repeated using current cohabitation as unit, sharing environments became significant, explaining 0.07~0.042 of total salt intake levels. This tendency was more evident with the sodium density, a measure reflecting salt taste; 0.22 were explained by current cohabitation. And this tendency was stronger between spouses (r2=0.38) than those between siblings and DZ (r2=0.14). We interpreted this findings that 1) the salt intake habits are not fixed but changeable although it is influenced by moderate genetic effects. 2) the changes in salt intake habits will not take very long, probably a few years by sharing same meals. Although some researchers consider adding twins or families will introduce analytical complexities with few fruits, many epidemiologic studies in fact will benefit from adding twins or families.

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BODY SIZE AND OBESITY GENE VARIATION CONTRIBUTE TO MULTIPLE SCLEROSIS SUSCEPTIBILITY. Milena Gianfrancesco*, Farren Briggs, Ling Shen, Hong Quach, Alan Bernstein, Catherine Shaefer, Lisa Barcellos (UC Berkeley School of Public Health, Berkeley, CA United States)

Multiple sclerosis (MS) is a demyelinating autoimmune disease and one of the most common neurological diseases in young adults. Studies confirm a strong genetic component for MS; however, evidence for environmental risk factors, such as childhood and adolescent obesity, has also been reported. We investigated the relationship between MS and 40 established obesity genes while controlling for effects of several established genetic and environmental risk factors. A gene-environment investigation assessed whether variation within significant obesity genes modifies MS risk conferred by body size and body mass index (BMI) during various age periods. White, non-Hispanic members of Kaiser Permanente Medical Care Plan, Northern California (KPNC) aged 18-69 (1,099 cases, 640 controls); and participants from the Kaiser Permanente Research Program on Genes, Environment, and Health (RPGEH) (11,572 controls). Association analysis between obesity SNPs and MS was conducted using KPNC and RPGEH datasets, adjusted for ancestry, gender and HLA-DRB1*15:01, the strongest genetic risk factor for MS (1,099 cases, 12,212 controls). Within KPNC only, logistic regression models estimated odds ratios (ORs) of having MS with 95% confidence intervals (95% CI) adjusted for year of birth, as well as established genetic and environmental risk factors associated with MS (1,099 cases, 640 controls). Across the 40 obesity genes, five SNPs were associated with MS status in KPNC and RPGEH datasets after correcting for multiple testing. When mean body size in 20's was also considered in the model for the KPNC dataset alone, rs822391 and rs5594391 were independently associated with MS risk (p=0.03 and p=0.05, respectively), after adjusting for established genetic and environmental risk factors. This study is the first to examine the relationship between genetic factors related to obesity and MS susceptibility. Combined, the two SNPs are associated with 1.26 increased odds of MS after controlling for environmental and genetic factors related to the disease. Future studies should examine whether MS risk as related to obesity genes is mediated through increased body mass or other biological pathway.

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MODIFICATION OF GENETIC SUSCEPTIBILITY TO INCREASED BODY MASS BY MEASURES OF ACCULTURATION AMONG UNITED STATES HISPANIC/LATINOS: THE POPULATION ARCHITECTURE USING GENOMICS AND EPIDEMIOLOGY CONSORTIUM. Lindsay Fernández-Rhodes*, on behalf of the PAGE Obesity Working Group (University of North Carolina at Chapel Hill, Chapel Hill, NC United States)

There are marked obesity disparities in United States (US) Hispanic/Latinos. Although the genetic determinants of obesity have been studied in this diverse ethnic group, little is known about how they may be modified by sociocultural factors like acculturation, of which language use is a common proxy. The aim of this study was to examine if acculturation of Hispanic/Latinos to a US lifestyle, as assessed by self-reported exclusive English language use at home, exacerbates the association of previously established risk variants on adult body mass index (BMI). The community-based Hispanic Community Health Study/Study of Latinos includes 11,609 Hispanic/Latino adults (age: 20-74; BMI: 18.5-70.0 kg/m^2) with genetic data from the Metabochip (Illumina, Inc). We used generalized estimating equations to model lnBMI while adjusting for relatedness, sampling design, age, sex, center and global ancestry. We tested for interactions between 1) 13 loci (minor allele>5%) previously associated with BMI in European decent populations and 2) self-reported language use at home. Seven loci displayed evidence of association with BMI (*SEC16B, TMEM18, GNPDA2, STK33, MTCH2, FTO, MC4R,* p<0.05) and the interaction was significant for one locus (*TMEM18,* p=0.02). A joint test of the main genetic and interaction effects identified an additional locus (*BDNF,* p=0.01). As consistent with our hypothesis, at *BDNF* we observed a 1% higher BMI for one versus no risk alleles among those reporting exclusive Spanish use at home, and a 8% higher BMI for one versus no risk alleles among those reporting exclusive English use at home. Future research will replicate these effects in 11,000 Hispanic/Latino participants in the Population Architecture using Genomics and Epidemiology Consortium. Our preliminary findings highlight the importance of capturing both genetic and sociocultural determinants when studying obesity disparities.

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OBESITY-RELATED GENETIC VARIANTS ARE ASSOCIATED WITH AGE AT MENARCHE IN THE MULTIETHNIC NATIONAL LONGITUDINAL STUDY OF ADOLESCENT HEALTH. Angela Liu*, Misa Graff, Ethan Lange, Kristin Young, Kathleen Harris, Karen Mohlke, Kari North, Penny Gordon-Larsen (University of North Carolina at Chapel Hill, Chapel Hill, NC United States)

There is a known inverse relationship between age at first menstruation (menarche) and obesity. Genetic loci previously associated with obesity have been associated with age at menarche in subjects of European descent, but the contribution of these variants across multiethnic samples is largely unknown. Using females enrolled in Waves II and III of the National Longitudinal Study of Adolescent Health (Add Health, n=5608; age 11-27 years), a multiethnic nationally representative cohort, we assessed the association of 40 established obesity-related single nucleotide polymorphisms (SNPs) with age at menarche (Mean=12.17 years, Standard Deviation=1.43) in 3463 European American (EA), 1254 African American (AA), and 891 Hispanic American (HA) females. Mixed linear, additive genetic models that accounted for sampling design, family relatedness, and geographic region were stratified by race/ethnicity, and then combined for meta-analysis. Five SNPs in EA, 3 in HA and 1 in AA showed a nominally significant relationship (P<0.05) with age at menarche. In EA, rs9939609 within the FTO gene achieved Bonferroni-corrected significance (P<0.0013) with a 1.4-month (Standard Error (SE)=0.033) decrease in age at menarche per obesity increasing allele. The nominally significant SNPs in AA and HA did not achieve Bonferroni-corrected significance. The pooled meta-analysis across race/ethnicity revealed 2 Bonferroni-corrected significant SNPs near FTO and TFPA2B (p<0.002) and 1 nominally significant SNP in POMC negatively associated with age at menarche (1.0-month (SE=0.027), 1.3-months (SE=0.035) and 1.0-month (SE=0.028) decrease per allele, respectively). We have previously shown the variants near FTO and TFAP2B, but not POMC, to be positively associated with BMI during adolescence across race/ethnicity in Add Health. These findings suggest a complex relationship between obesity-related variants and pubertal development.

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GENOME WIDE ASSOCIATION STUDY OF URGENCY URINARY INCONTINENCE. Nedra Whitehead*, Holly E. Richter, Kristina Allen -Brady, Lily Arya, Vivian Sung, Peggy Norton, Beri Ridgeway, Yuko Komesu, Jonathan Shepherd, Grier Page, Matthew Fraser, Jasmine Tan-Kim, Joshua Levy, Susie Meikle (RTI International, Atlanta, GA United States)

Urgency urinary incontinence (UUI) is a prevalent condition of unclear etiology that significantly impacts women's quality of life. Twin studies suggest that some women may be genetically predisposed to develop UUI. We conducted a genome-wide association study (GWAS) in post-reproductive women to identify genetic variants associated with UUI. The study was a secondary data analysis of the Women's Health Initiative (WHI) GARNET cohort, which included 4,894 women genotyped using the Illumina Omni Quad 1.0M chip. Genome-wide imputation was performed with IMPUTE2 using the 1000 Genomes ALL Phase I integrated variant set as a reference, providing about 9,000,000 variants with a minor allele frequency > 0.01 for analysis. We defined cases as women who reported UUI at least monthly with sufficient volume to wet or soak their underpants or clothes. Controls were women who had never experienced UI at enrollment and did not develop UUI during the study. We randomly divided the participants into discovery (1,513 women) and replication (1,504 women) samples. Cases were more likely than controls to be obese (48% vs 30%, $p<0.001$). We used logistic regression to examine the association between genetic variants and UUI while controlling for age, obesity, diabetes and depression. At $\alpha=5x10^{-8}$, UUI was not significantly associated with any single genetic variant in a meta-analysis of the discovery and replication subsets. However, four genomic regions on chromosomes 5, 11, 12, and 18 were associated with UUI at the magnitude of 10^{-7}, including eight SNPs in one intron of the zinc finger protein 521 (ZFP521) gene on chromosome 18. The multiple hits within a single intron of ZFP521 suggest that further exploration of this gene is important. ZFP521 is associated with stem cells and has been implicated in the control of blood, bone and neural progenitor cells. These results support the concept that both genetic and environmental factors may contribute to the development of UUI. The pathway analysis in process may shed further light on the development of UUI.

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IMPACT OF PROSECUTION FOR NON-DISCLOSURE OF HIV STATUS ON ATTITUDES AND BEHAVIOUR AMONG HIV-POSITIVE MEN WHO HAVE SEX WITH MEN (MSM) IN TORONTO, CANADA. Maya A Kesler*, Rupert Kaul, Juan Liu, Mona Loutfy, Jason Brunetta, Anu Rebbapragada, Roberta Halpenny, Jennifer Robinette, Molly Gamble, Wangari Tharao, Robert S Remis (University of Toronto, Toronto Canada)

Background: In Canada, HIV-positive persons have been criminally prosecuted for not disclosing their HIV status prior to sex. The impact of prosecutions on disclosure and condom use among HIV-positive MSM is unknown. **Methods**: Sexually active HIV-positive MSM were recruited at a Toronto medical clinic in 2010-12. Participants completed a questionnaire using ACASI. HIV-positive men were asked if they were more likely to disclose or use a condom due to fear of prosecution. **Results**: We recruited 292 HIV-positive MSM (median age 45 [IQR 38-50]). 42.9% were more likely to disclose their HIV status and 43.4% were more likely to use a condom due to fear of prosecution. In a multivariable model, HIV-positive MSM who were younger (Odds Ratio: OR 2.1), Canadian-born (OR 2.2), never used drugs other than marijuana (OR 2.0), and had no unprotected anal intercourse (UAI) with an HIV-positive partner (OR 2.2) were significantly more likely to use a condom due to fear of prosecution. Older MSM born outside of Canada were significantly less likely to use condoms ($p=0.025$). Younger MSM who had UAI with an HIV-positive partner in the previous 6 months were significantly less likely to use condoms ($p=0.022$). In a multivariable model, Canadian-born MSM were significantly more likely to disclose (OR 2.1) due to fear of prosecution. Older MSM with less income were significantly less likely to disclose ($p=0.039$). Younger MSM with 10 or more casual partners in the previous 6 months were significantly less likely to disclose ($p=0.025$). Men born outside of Canada with greater education were significantly less likely to disclose ($p=0.014$).**Conclusion**s: Almost half of HIV-positive MSM reported being more likely to disclose or use condoms due to concerns about possible prosecution. Our analysis reveals subgroups of HIV-positive men who were less likely to disclose or use condoms over concerns about prosecution, and who might be the focus of future interventions.

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THE CONSEQUENCES OF METHODOLOGY CHANGES TO NATIONAL SURVEYS ON MONITORING HIV TESTING TRENDS IN THE UNITED STATES. Michelle Van Handel*, Bernard Branson (Centers for Disease Control and Prevention, Atlanta, GA United States)

Objective: In 2011, the National Health Interview Survey (NHIS), an in-person household survey, revised the HIV section of the survey and the Behavioral Risk Factor Surveillance System (BRFSS), a telephone-based survey, added cellphone numbers to its sampling frame. We sought to determine how these changes might affect assessment of HIV testing trends. **Methods**: We analyzed NHIS data to assess the percentage of persons aged 18-64 years who lived in cellphone-only households and compare the percentage of persons who reported HIV testing in landline versus cellphone-only households from 2003 to 2011. We analyzed NHIS and BRFSS data to compare the percentage of persons who reported HIV testing before and during 2011. Pairwise contrasts for these time points were calculated using linear regression models; all reported results had $p<0.0001$. **Results**: The percentage of persons in cellphone-only households increased from 3.3% in 2003 to 36.4% in 2011. The annual percentage ever tested for HIV was statistically 6%–10% higher among persons in cellphone-only than landline households. In NHIS, the percentage ever tested increased significantly from 40.2% in 2003 to 45.0% in 2010, but decreased significantly in 2011 to 40.6%. In BRFSS, the percentage ever tested fluctuated, but decreased significantly from 45.9% in 2003 to 40.2% in 2010, then increased significantly in 2011 to 42.9%. **Conclusion**s: HIV testing estimates in 2011 decreased after NHIS questionnaire changes but increased after BRFSS added cellphones, trends in opposite directions from each other and opposite from trends within each survey in recent years. NHIS HIV testing estimates were likely more representative than BRFSS estimates before BRFSS added cellphone numbers in 2011 because of the expanding cellphone-only population and their higher testing rates. However, NHIS showed an implausible decrease in one year and might now underestimate HIV testing.

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USE OF P-TECHNIQUE TO EXAMINE THE DYNAMIC RELATIONSHIP AMONG STD-ASSOCIATED FEELINGS AND PERCEPTIONS IN A COHORT OF ADOLESCENT FEMALES. Pamela Matson*, Waylon Howard, Shang-en Chung, Jonathan Ellen (Johns Hopkins School of Medicine, Baltimore, MD United States)

Recent work found that feelings of intimacy confound the association between risk perception, a prime sexually transmitted disease (STD) prevention target, and condom use. As most relationship data was collected at a single point in time, day-to-day variations and the dynamic nature of the association between STD-associated factors is unknown. Using a Smartphone, daily data was collected from adolescent females to examine systematic patterns of daily intimacy fluctuation and predictors of this change over 18 months. This study examined the equivalence of the measurement properties of the intimacy latent construct across participants and used P-technique structural equation model (SEM) to evaluate the dynamic day-to-day effects of intimacy and perceived risk of acquiring an STD (PRSTD). Two lags were incorporated into the data structure to examine any carryover effects across the next two days. Nineteen participants from the cohort were selected based on similar patterns of intraindividual variability. Results showed reliable dimensions of interindividual change. Today's intimacy levels predicted tomorrow's intimacy with a standardized regression weight of .380, which predicted intimacy levels on the third day. Intimacy levels today directly predicted intimacy levels two days into the future with a standardized regression weight of .131. Similar results were found for PRSTD with standardized regression weights of .314 for day 1 to day 2; and .226 for day1 to day 3. Within a given day intimacy levels were negatively associated with PRSTD levels ($r = -.242$). Today's PRSTD predicted intimacy levels for the following two days with standardized regression weights of -.083 (day 1) and -.080 (day2). Similarly, today's intimacy levels were shown to predict tomorrow's PRSTD (-.129) but not the subsequent day. Dynamic changes within a relationship in feelings of intimacy were associated with changes in PRSTD.

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SURVIVAL BY RACE/ETHNICITY AND SEX AMONG TREATED, HIV-INFECTED ADULTS. Catherine Lesko*, Stephen Cole, Michael Mugavero (Department of Epidemiology, University of North Carolina, Chapel Hill, NC United States)

Whether racial, ethnic, or sex disparities in survival persist following antiretroviral therapy (ART) initiation is unknown. We describe differences in 10-year all-cause mortality by race/ethnicity and sex among HIV-infected patients who initiated ART between 1/1/1998 and 12/30/2011 at one of eight sites in the Centers for AIDS Research Network of Integrated Clinical Systems. Of 10,017 ART initiators, 39% were African American, 14% were Hispanic, and 19% were female. Patients were followed until death from any cause, or administrative censoring at either 10 years after ART initiation or the end of follow-up on 12/31/2011. Survival curves were constructed to estimate 10-year all-cause mortality, stratified by the cross-classification of race/ethnicity and sex, and standardized (using inverse probability weights) to the study cohort at ART initiation. During 51,121 person-years of follow up, 1,224 patients died. The overall 10-year mortality risk was 20.2% (95% CI = 19.2%, 21.3%). African American men and women experienced standardized 10-year all-cause mortality risks that were 7.2% (95% CI: 4.3%, 10.1%) and 7.9% (95% CI: 3.9%, 12.0%) higher than non-Hispanic white men. White women, Hispanic men, and Hispanic women all had apparently lower mortality than did white men (10-year risk differences of -4.0, 95% CI: -8.5, 0.4; -3.2, 95% CI: -7.1, 0.8; and -7.1, 95% CI: -16.1, 1.9, respectively). This study had no loss to follow-up and negligible measurement error of both the exposure and outcome. Disparities in health outcomes among HIV-infected African Americans appear to persist beyond therapy initiation.

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THE EFFECT OF PROVIDING COMBINATION ANTIRETROVIRAL THERAPY TO HIV-INFECTED MOTHERS ON LOSS TO FOLLOW-UP AMONG THEIR HIV-EXPOSED INFANTS IN KINSHASA, DEMOCRATIC REPUBLIC OF CONGO. Lydia Feinstein*, Andrew Edmonds, Vitus Okito, Stephen R. Cole, Annelies Van Rie, Benjamin H. Chi, Pappy Ndjibu, Jean Lusiama, Jean Lambert Chalachala, Frieda Behets (University of North Carolina at Chapel Hill, Chapel Hill, NC United States)

Despite overwhelming loss to follow-up (LTFU) of HIV-exposed infants in most prevention of mother-to-child HIV transmission (PMTCT) programs, few modifiable risk factors for infant LTFU have been identified. Accounting for competing risks (e.g. death), we assessed if providing combination antiretroviral therapy (cART) to HIV-infected mothers reduced LTFU among their exposed infants. Data came from 1318 mother-infant pairs who received PMTCT services at 2 sites in Kinshasa, Democratic Republic of Congo between 2007 and 2013. Infants were considered LTFU following 3 unsuccessful tracking attempts after a missed visit or if they were last seen >6 months before the database was closed. Multiple imputation was used to account for missing covariate data. Infants were enrolled at a median age of 2.6 weeks (interquartile range [IQR]: 2.1-6.9 weeks) and followed up to age 18 months. At infant enrollment, mothers had been enrolled in HIV care for a median of 72 days (IQR: 0-126 days) and 24% were receiving cART for their own health. In cumulative incidence analyses, 5% of infants never returned after enrollment and 16% were LTFU by 18 months. The 18-month cumulative incidence of LTFU was 8% among infants whose mothers had initiated cART by infant enrollment and 18% among infants whose mothers had not yet initiated cART (Gray's p-value <0.001). Adjusted for baseline factors, infants whose mothers were not on cART were more than twice as likely to be LTFU, with a subdistribution hazard ratio of 2.4 (95% CI: 1.6, 3.8). Increasing access to cART for pregnant women could reduce LTFU of HIV-exposed infants, thereby increasing the impact of PMTCT programs, opportunities to provide early infant HIV diagnosis, and access to early cART initiation for HIV-infected infants. These are important collateral benefits to consider as countries decide whether to provide cART for all pregnant and breastfeeding women (Options B/B+).

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THE INTERPLAY OF OWN AND PARTNER'S EDUCATION ON HIV RISK IN SUB-SAHARAN AFRICA. Guy Harling* (Harvard School of Public Health, Boston, MA United States)

Background: HIV infection risk in Africa is associated with one's educational attainment. This effect has been hypothesized to relate to own risk behaviors, however HIV risk is determined primarily by behaviors of one's partners. We therefore test the hypothesis that partner's education effect-modifies the impact of own education on HIV infection. **Methods**: We conducted survey-adjusted and weighted regression for prevalent HIV infection using data on women aged 15-34 from 14 Demographic and Health Surveys in seven countries with generalized epidemics (Cameroon, Ethiopia, Kenya, Lesotho, Malawi, Rwanda, Zimbabwe). Analyses were stratified into 14 groups by country and urbanicity. We began with a bivariate relationship between HIV and own education ('none', 'primary' or 'secondary or above'), then added partner education and finally an interaction term. **Results**: Both rural (n=56,152) and urban (n=19,221) women partnered assortatively by education level (Newman coefficients of r=0.39 and r=0.42). In regression analysis, five patterns of association were seen using joint Wald tests at 95% significance: no association (n=5); only own education (n=2); only partner's education (n=1); both own and partner's education (n=2); and effect-modification of own by partner's education (n=4, in three cases after no association for own education alone). Notably, in rural Malawi, Rwanda and Zimbabwe the effect-modification showed more HIV infection amongst less-educated women with highly educated partners. Discussion: Partner socioeconomic status may be as important for determining HIV risk as own status in many African settings. In this study, focusing only on own education would have led to missed effects half of the time. Prevention and outreach efforts considering both own and partner characteristics may thus find otherwise-hidden risk groups, and avoid spending resources on low-priority populations.

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IMPACT OF A ROUTINE, OPT-OUT HIV TESTING PROGRAM ON RISK OF PROGRESSION TO AIDS AMONG NEW HIV DIAGNOSES IN NORTH CAROLINA SEXUALLY TRANSMITTED DISEASE CLINICS. Pamela Klein*, Lynne Messer, Evan Myers, David Weber, Peter Leone, William Miller (Medical College of Wisconsin Center for AIDS Intervention Research, Milwaukee, WI United States)

Although routine HIV testing programs aim to identify persons earlier in the course of their HIV infection, the results of HIV testing programs are inconclusive. The objective of this study was to estimate the impact of a routine, opt-out HIV testing program in North Carolina sexually transmitted disease (STD) clinics on the risk of progression to AIDS after HIV diagnosis. North Carolina residents aged 18-64 identified as new HIV-infected cases in North Carolina STD clinics from July 1, 2005 through June 30, 2011 were included. Exposure status was dichotomized on the date of intervention implementation on November 1, 2007. Risk of progression to AIDS within 12 months of initial HIV diagnosis was analyzed using county-specific random-intercept multilevel binomial regression models to calculate risk ratios (RRs) and 95% confidence intervals (95% CIs). Of the 1203 persons newly diagnosed with HIV infection, 12% and 13% were diagnosed with AIDS within 12 months of their initial HIV diagnosis in the pre- and post-intervention periods, respectively. Overall, we did not observe an association between the introduction of the expanded HIV testing program and the risk of progression to AIDS (RR=1.04, 95% CI: 0.77-1.43). The intervention was associated with an increased risk of progression to AIDS among women (RR=2.32, 95% CI: 1.06-4.83) and persons who had previously been tested for HIV (RR=1.42, 95% CI: 0.92-2.19). Overall, the routine, opt-out HIV testing program was not associated with a decreased risk of progression to AIDS. Among some subpopulations, the increased risk of progression to AIDS post-intervention was likely due to identification of persons who had been infected for many years but were not previously targeted for risk-based testing. If undiagnosed HIV-infected persons do not seek interactions with the healthcare system, they cannot benefit from routine HIV testing programs in clinical settings.

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RISK COMPENSATION FOLLOWING SEXUALLY TRANSMITTED INFECTIONS PREVENTION INTERVENTIONS: A SYSTEMATIC REVIEW. Dudith Pierre-Victor*, Soumyadeep Mukherjee, Raed Bahelah, Purnima Madhivanan (Florida International University, Miami, FL United States)

Background: Risk compensation surrounds many sexually transmitted infections (STIs) prevention and treatment technologies. This review will examine the evidence of an interventional effect of risk compensation after participating in STIs prevention and control interventions among adolescents and adults. Risk compensation was defined as any behavior that increases the risk of acquiring STIs. **Methods**: We formulated a comprehensive and exhaustive search strategy in an attempt to identify all relevant studies in English. In September 2013, we searched MEDLINE, Scopus, Cochrane Library, Web of Science, and CINAHL for all relevant published studies from 2004 to 2013. We contacted researchers and relevant organizations and checked reference lists of all included studies. Two review authors independently assessed study eligibility, extracted data, and graded methodological quality. Data extraction and methodological quality were checked by a third author who resolved differences when these arose. **Results**: The searches resulted in 50 studies, and 19 studies were eligible for inclusion in the review. The 19 study involved 14,492 participants, and 15 were epidemiologic studies and 4 were qualitative. Of the 15 epidemiologic studies, 14 did not find evidence of risk compensation among intervention participants, and one reported risk compensation among women but not in men. For the qualitative studies, participants did not express reduction in protective behaviors. **Conclusion**: Overall, STIs prevention and control interventions do not lead to risk compensation among participants. Key words: STIs, STIs prevention and control, Interventions, Risk Compensation

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SEXUAL PARTNERSHIP DURATION, GAPS, AND OVERLAPS AMONG YOUNG SOUTH AFRICAN WOMEN: KEY MEASUREMENT CHALLENGES. Nadia Nguyen*, Kimberly Powers, Kathleen Kahn, F. Xavier Gomez-Olive, Estelle Piwowar-Manning, Oliver Laeyendecker, James Hughes, Audrey Pettifor (University of North Carolina, Chapel Hill, NC United States)

Accurately estimating sexual partnership duration, gaps between partnerships, and overlaps across partnerships is critical for developing preventive interventions for HIV and other sexually transmitted infections. We estimated median partnership duration, gap length, and overlap length for 654 young women in rural South Africa, using cross-sectional data on dates of first and most recent sex, and partnership status (ongoing or not) at the time of interview, for their three most recent sexual partners. We considered four approaches – "standard", "new", and two hybrids – to explore how assumptions about partnership end impact estimates. The standard approach assumes that all partnerships have ended at the time of interview and is known to bias estimates because it right-censors ongoing partnerships. A new approach corrects for censoring with a Kaplan-Meier model, but bases the censoring determination on reported partnership ongoing status, which may be unreliable. We propose two hybrid approaches that correct for censoring with Kaplan-Meier and administratively end partnerships after 3 and 6 months of sexual inactivity (measured from date of most recent sex to date of interview), respectively. We modeled estimates from each approach using Kaplan-Meier with a robust variance estimator. Partnership duration and overlap length were highly sensitive to approach and were much longer in the new approach than the hybrid or standard approaches, but gap length was stable across approaches. Median partnership duration of 367 days in the standard approach increased by 5% in the 3 month hybrid (386 days), 62% in the 6 month hybrid (595 days), and 179% in the new approach (1024 days). Measuring partnership patterns is challenging and current methods may yield biased estimates. Studies that track partnerships over time are needed to determine the extent of this bias.

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DEPRESSIVE SYMPTOMS, HIV MEDICATION ADHERENCE, AND HIV CLINICAL OUTCOMES IN TANZANIA. Nadya M. Belenky*, Stephen R. Cole, Brian W. Pence, Dafrosa Itemba, Venance Maro, Kathryn Whetten (University of North Carolina at Chapel Hill, Chapel Hill, NC United States)

Depressive symptoms have been shown to independently affect both antiretroviral therapy (ART) adherence and HIV clinical outcomes in high-income countries. We examined the prospective relationship between depressive symptoms and adherence, virologic failure, and suppressed immune function in people living with HIV/AIDS in Tanzania. Data from 403 study participants who were on stable ART and engaged in HIV clinical care were analyzed. We assessed crude and adjusted associations of depressive symptoms and ART adherence, both at baseline and at 12 months, using logistic regression. We used logistic generalized estimating equations to assess the association and 95% confidence intervals (CI) between depressive symptoms and both virologic failure and suppressed immune function. Ten percent of participants reported moderate or severe depressive symptoms at baseline and 31% of participants experienced virologic failure (>150 copies/ml) over two years. Depressive symptoms were associated with greater odds of reported medication nonadherence at both baseline [Odds Ratio (OR) per 1-unit increase = 1.18, 95% CI (1.12, 1.24)] and 12 months [OR = 1.08, 95% CI (1.03, 1.14)]. By contrast, increases in depressive symptom score were inversely related to both virologic failure [OR = 0.93, 95% CI (0.87, 1.00)] and immune system suppression [OR = 0.88, 95% CI (0.79, 0.99)], though the association between depressive symptoms and clinical outcomes was less precise than for the association with nonadherence. Findings indicate a positive association between depressive symptoms and nonadherence, and also an inverse relationship between depressive symptoms and clinical outcomes, possibly due to informative loss to follow-up.

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WHEN TO SWITCH ANTIRETROVIRAL THERAPY FOLLOWING VIROLOGIC FAILURE ON A FIRST-LINE REGIMEN. Lauren Cain*, on behalf of the ART-CC, CNICS, and the HIV-CAUSAL Collaboration (Harvard School of Public Health, Boston, MA United States)

The optimal time to switch to a new antiretroviral regimen following virologic failure is unknown. Using data from the Antiretroviral Therapy Cohort Collaboration (ART-CC), the HIV-CAUSAL Collaboration, and the CFAR Network of Integrated Clinical Systems (CNICS), we compared strategies of the form "switch within 90 days of HIV-RNA crossing above x copies/mL" where x took the values 1,000 (loose control) and 400 (tight control). Our analysis was restricted to HIV-infected persons who became virologically suppressed following initiation and experienced confirmed virologic failure. At confirmed virologic failure, we made two copies of every eligible individual (one per strategy) and censored them if and when their data were no longer consistent with following that strategy. We use inverse probability weighting to adjust for potential time-varying selection bias introduced by the censoring and fit weighted pooled logistic regression models to estimate the hazard ratio of death and AIDS-defining illness or death. We identified 32,893 individuals who initiated antiretroviral therapy of which 1,450 met the baseline inclusion criteria. Among the 2,900 copies, there were 14 and 19 deaths and 28 and 39 AIDS-defining illnesses in the loose and tight control groups, respectively. Compared with tight control, the baseline and time-varying-adjusted hazard ratios [95% confidence interval] for loose control were 1.16 (0.71, 1.90) for death and 1.10 (0.91, 1.32) for AIDS or death. We did not find sufficient evidence of differences between strategies within the short follow-up of this study. Despite pooling of many large cohorts, the number of eligible individuals was low and confidence intervals were wide. We will also highlight the challenges of this type of analysis including defining the arms of the hypothetical trial, preparing the data, determining eligibility, defining switching, and conducting the analysis.

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LOW RATES OF HIV TESTING AMONG A MEDICAID POPULATION: DATA FROM A MEDICAID CLAIMS DATABASE – 2010. Patricia Dietz*, Michelle Van Handel, Huisheng Wang, Philip Peters, Jun Zhang, Abigail Viall, Pascale Wortley (Centers for Disease Control and Prevention, Atlanta United States)

Objective: To assess what proportion of Medicaid enrollees were tested for HIV and factors associated with testing during outpatient visits. **Methods**: We analyzed 2010 data from the Truven Health MarketScan Multi-state Database, a nonprobability sample from 12 geographically diverse states that includes Medicaid claims data for all outpatient medical visits. We excluded those who were <13 years or >64 years, pregnant, enrolled <9 months, previously HIV diagnosed or had no outpatient visit during 2010. We identified HIV tests through CPT codes in outpatient visits. HIV-infection was defined by presence of HIV ICD-9 codes after but not before the HIV test. HIV testing rates were assessed by patient demographics and other screenings or diagnoses occurring during the same visit. Statistical significance ($p<.05$) was assessed with Chi square tests. **Results**: During 2010, 1,618,265 enrollees in the state Medicaid programs met the inclusion criteria, of these 4.0% (n=65,410) had at least one HIV test and 0.9% (n=616) of those tested were diagnosed with HIV. The percent of enrollees who received at least one HIV test was highest among enrollees aged 20-29 years (8.2%) ($p<.001$). Testing was higher among blacks (5.6%) than whites (2.6%) and Hispanics (2.7%); and higher among females (5.2%) than males (2.4%) ($p<.001$). Of visits where enrollees received an HIV test, 79.2% included screening for or diagnosis of a sexually transmitted infection (STI); in addition, 6.9% included Hepatitis B or C virus screening. **Conclusion**s: HIV testing was infrequent among Medicaid enrollees and the great majority of testing occurred concurrently with screening or diagnoses for STIs or Hepatitis B or C. Given the observed HIV positivity rate (0.9%) in this Medicaid population, expanding to routine HIV testing consistent with the CDC's recommendations would likely result in additional HIV diagnoses and improved patient care.

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ADOLESCENT AND YOUNG ADULT MARIJUANA USE AND SEXUALLY TRANSMITTED INFECTIONS: PEER DRUG AND ALCOHOL NORMS MEDIATE THE ASSOCIATION BETWEEN NEIGHBORHOOD DRUG NORMS AND MARIJUANA USE. Kathryn Leifheit*, Jenita Parekh, Pamela Matson, Lawrence Moulton, Jonathan Ellen, Jacky Jennings (Johns Hopkins University School of Medicine Center for Child & Community Health Research, Baltimore, MD United States)

Purpose: Marijuana use is associated with bacterial sexually transmitted infections (STIs) among urban youth. Evidence suggests that peer drug and alcohol norms (PDAN) and neighborhood drug prevalence (NDP) influence marijuana use. We aim to confirm the association between marijuana use and STI outcomes and determine whether PDAN mediates the relationship between NDP and marijuana use. **Methods**: Cross-sectional data from a 2004-2007 household survey of 563 sexually active youth aged 15-24 in Baltimore, Maryland were analyzed via gender-stratified, weighted multilevel logistic regression models. **Results**: Marijuana use was significantly associated with increased odds of risky sexual behaviors (age-adjusted OR (AOR)=6.04, 95%CI=2.32, 15.7), selection of a risky sex partner (AOR=3.39, 95%CI=1.29, 8.95) and current STI (AOR=14.2, 95%CI=2.77, 72.6) among males. Associations among females were of similar direction but not statistically significant. Permissive PDAN increased the odds of marijuana use significantly among males (AOR=2.56, 95%CI=1.67, 3.92) and females (AOR=1.70, 95%CI=1.31, 2.20). High NDP was associated with increased odds of marijuana use, significantly among females (AOR=1.76, 95%CI=1.26, 2.47) and non-significantly among males (AOR=1.26, 95%CI=0.85, 1.87). The relationship between NDP and marijuana use was mediated by PDAN for males and females. **Conclusion**s: Marijuana use was associated with increased odds of STI-related outcomes. The association between NDP and marijuana use was mediated by PDAN. Our findings suggest that youth are far more likely to contract an STI associated with marijuana use if they live in a high drug prevalence neighborhood and particularly if their peers condone drug and alcohol use. These results suggest that interventions aimed at STI prevention should target peer - and neighborhood-level drug norms rather than individual-level substance use.

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FACTORS ASSOCIATED WITH HIGH HOSPITAL RESOURCE UTILIZATION IN A POPULATION-BASED STUDY OF CHILDREN WITH OROFACIAL CLEFTS. Dawson April, Scott Grosse, Hilda Razzaghi*, Russell Kirby, Richard Olney, Correia Jane, Cynthia Cassell (Centers for Disease Control and Prevention, Atlanta, GA United States)

We aimed to identify selected maternal/household and child characteristics associated with high hospital resource utilization for children with orofacial clefts (OFC), one of the most common categories of birth defects in the United States. This was a statewide, population-based, retrospective, observational study of children with OFC born 1998-2007 identified by the Florida Birth Defects Registry and linked with hospital discharge records. We stratified results by infant's age, cleft type [cleft lip with cleft palate (CLP), cleft palate only (CPO), and cleft lip only (CLO)], and by isolated vs. multiple (presence of other coded major birth defects) OFC. We used Poisson regression to analyze associations between selected characteristics and high hospital resource utilization (defined as 90th percentile of estimated hospitalized days and inpatient costs) for birth and post-birth hospitalizations and all hospitalizations initiated before age two years. Our analysis included 2,585 children with OFC. Infants with low or very low birth weight (<2500 and <1500 grams, respectively) were significantly more likely to have high birth hospitalization costs for CLP [adjusted prevalence ratio (aPR): 2.01 (95% confidence interval (CI): 1.43-2.82)], CPO [aPR: 1.58 (95% CI: 1.16-2.14)], and CLO [aPR: 4.80 (95% CI: 2.19-10.53)]. Presence of multiple birth defects was associated with a 2-8 fold adjusted prevalence of high birth hospitalization costs and days and a modest but statistically greater prevalence of high hospitalization costs and days post-birth and overall for children with CLP, CPO, and CLO. Multiple birth defects and low birth weight contribute to high hospitalization costs and days for children with OFC.

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RURAL RESIDENCE, DUAL SYSTEM USE, AND CHRONIC WOUND OUTCOMES. Erin Bouldin*, Alyson Littman, Kenneth Rice, Gayle Reiber (VA Puget Sound Health Care System, Seattle, WA United States)

Wounds become chronic when they fail to progress through the expected phases of healing, potentially resulting in disability, decreased quality of life, and amputation. The VA health care system serves a large population of adults among whom the risk for lower limb (LL) wounds is high. 41% of Veterans live in a rural area and 50% use both VA and Medicare systems (dual use) for outpatient care, resulting in fragmented and potentially poorly coordinated care. The purpose of this study was to assess whether rural residence and dual system use are associated with wound outcomes. This retrospective cohort study was conducted in the VA's Northwest Health Network and included 320 Veterans (160 rural and 160 urban) who had incident chronic LL wounds between October 1, 2006 and September 30, 2007. All wounds were identified through the VA medical record and followed up to one year. Medicare files were searched to identify dual wound care during follow-up. We used Cox proportional hazards models to calculate hazard rates for wound healing, treating amputation and death as competing risks, and adjusted for confounding factors, including demographics and health status. 21% of rural and 19% of urban Veterans used dual wound care. Chronic wound healing did not differ by rural residence, and in fact, there was a suggestion of better wound healing among rural compared to urban patients (age- and chronic condition-adjusted HR=1.26, 95%CI: 0.98-1.63). Dual use compared to exclusive VA wound care was associated with a lower hazard of healing in the multivariate model (HR=0.51, 95%CI: 0.35-0.74). Results were similar after adjusting for VA care quality. In summary, dual system wound care, but not rural residence, was associated with poorer chronic wound outcomes. This association was not explained by variation in the quality of VA wound care; Medicare quality should be investigated, along with other features of dual use.

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EXPLAINING HIGH MASTECTOMY RATES IN ALBERTA BY SURGEONS' PATIENT VOLUMES AND RESIDUAL SURGEON-SPECIFIC VARIATIONS: A POPULATION-BASED HEALTH SERVICES RESEARCH USING EMPIRICAL BAYES ESTIMATION. Stacey Fisher*, Yutaka Yasui, Marcy Winget (School of Public Health, University of Alberta, Edmonton Canada)

Alberta has high rates of mastectomy compared to other Canadian provinces. We sought to investigate the relationship between surgery type received, surgeon volume and survival in breast cancer patients. All women diagnosed with stage I, II and III breast cancer in Alberta from 2002 to 2010 were identified from the Alberta Cancer Registry. Type of surgery (mastectomy or breast conserving surgery (BCS)), surgeon (anonymized), and hospital were obtained from provincial physician claims data. Odds ratios of mastectomy were calculated using logistic regression, adjusting for patient characteristics and with surgeons and hospitals as random effects. Surgeon-specific odds ratios were calculated by empirical Bayes estimation. Cox proportional hazards models were fitted to compare breast cancer-specific mortality by treatment received. Mastectomy was received by 51% of the 13 588 patients included in the study and was found to be inversely related to surgeon volume among stage I and II patients. Surgeons who performed 5 to 12 surgeries in their highest volume year were more likely to perform mastectomies on patients with stage I (OR= 2.32; 95% CI: 1.36, 3.95), stage II node negative (OR= 2.20; 95% CI: 1.27, 3.82) and stage II node positive (OR= 1.84, 95% CI: 1.06, 3.19) disease than surgeons who performed 60+ surgeries. Adjusted odds ratios of mastectomy varied widely by individual surgeon (IQR: 0.71, 1.39). Breast cancer-specific mortality among stage II (HR= 1.51; 95% CI: 1.19, 1.91) and III (HR= 1.94; 95% CI: 1.33, 2.81) patients who received mastectomy was significantly higher than those who received BCS with radiotherapy. Receipt of mastectomy is associated with low surgeon volume and decreased breast cancer-specific survival. Residual variation in care provided by individual surgeons beyond that attributable to surgeon volume may be explained, in part, by other aspects which contribute to surgeon experience.

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VALIDATION OF ADMINISTRATIVE CODING FOR NEUTROPENIA IN THE FIRST CYCLE OF CHEMOTHERAPY: ELECTRONIC LABORATORY DATA INDICATED HIGHER INCIDENCE IN VETERANS WITH LUNG CANCER. Sarah Knerr*, Elaine Hu, Steven Zeliadt (University of Washington, Seattle, WA United States)

Objective: The frequency of neutropenia associated with lung cancer chemotherapy outside of randomized trials is largely unknown because administrative coding underestimates its prevalence. Better understanding of the risk of neutropenic complications is needed to guide colony-stimulating factor prophylaxis during cancer chemotherapy. Study Design and Setting: The incidence of neutropenia during the first cycle of chemotherapy was assessed using electronic laboratory results and ICD-9 codes among a cohort of 718 Veterans with non-small cell lung cancer. **Results**: A total of 118 of 718 patients (16.4%) were identified with an absolute neutrophil count less than 1,000 cells/mm3, while only 49 of 718 patients (6.8%) had ICD-9 codes for neutropenia. Combined, 136 of 718 patients (18.9%) experienced a neutropenic event. When events were identified using laboratory results the incidence of neutropenia varied by age and receipt of surgery or radiation. Incidence did not vary by either patient characteristic or treatment variables when neutropenia was identified by ICD-9 codes. **Conclusion**s: Relying on ICD-9 codes to identify neutropenia in administrative data results in underreporting. The emerging availability of electronic laboratory results provides an opportunity to more accurately quantify patterns of neutropenia, identify individual risk factors, and assess clinical management practices in large community cohorts.

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ACCESS TO ONCOLOGY SPECIALIST CONSULTATION IN PATIENTS WHO DIED FROM CANCER IN NORTHEASTERN ONTARIO, CANADA. Michael Conlon*, Mark Hartman, Barbara Ballantyne, Margaret Meigs, Natalie Aubin, Andrew Knight (Health Sciences North, Northeast Cancer Centre, Sudbury Canada)

Background: An oncologist consultation is an important component of cancer care, and in the Sudbury-Manitoulin district of Northeastern Ontario serves as an access to both treatment and palliative services. All residents of Ontario have universal public health insurance, the Ontario Health Insurance Plan (OHIP), which is the single payer for all medically necessary services. **Methods**: Using linked administrative data provided through the Ontario Cancer Data Linkage Project (`cd-link'), the primary purpose of this population-based retrospective study was to estimate the percentage of patients who died from cancer without having had a prior documented medical or radiation oncology consultation, during the interval of 2004-2008. A secondary purpose was to determine factors associated with never having received this specialized medical consult. **Results**: A total of 6,683 individuals with a valid primary cancer diagnosis record died from any cancer cause within the 5 year period from 2004-2008. About 18.4% never consulted a medical or radiation oncologist through their disease trajectory. Multivariable logistic regression identified older age and rural residence as being associated with increased risk of "never consultation", with adjusted Odds Ratios (OR) of 7.13 (95% Confidence Interval (CI) 3.68-13.81) and 1.77 (95% CI 1.51-2.06) for residents 80 years and older, or living in a rural residence, respectively. A longer duration of disease was associated with a decreased risk, with an OR of 0.99 (95% CI 0.99-0.99). **Conclusion**: While there are limitations to interpreting administrative data, we estimate over 18% of decendents never benefitted from an oncologist consultation. Specific strategies directed towards older and rural patients may help to address this identified cancer care issue.

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ADOLESCENT PERTUSSIS VACCINATION COVERAGE: AGE AND PERIOD EFFECTS, 2008-2011. Britt Livak*, Diane S. Lauderdale (University of Chicago, Chicago, IL United States)

Background: Pertussis is the only vaccine preventable disease in the U.S. on the rise, due largely to waning immunity among adolescents and adults. In 2006, the Advisory Committee on Immunization Practices recommended a new acellular pertussis vaccine (Tdap) for adolescents aged 11-18 years to try to address this problem. The Healthy People 2010 goal for adolescent immunizations was 90%. We used the U.S. National Immunization Survey (NIS) Teen, which began in 2008, to examine year and age effects on vaccination status from 2008 through 2011. **Methods**: The NIS-Teen is a national probability sample of adolescents age 13–17 years and their vaccination providers. The dependent variable was whether the teen was up-to-date (UTD) with their Tdap vaccination, defined as having =>1 Tdap-only shots since age 10. Multivariable logistic regression was used to model the odds of being UTD on Tdap. These independent variables were assessed: age, year (2008, 2009, 2010, 2011), poverty, census region, race/ethnicity, education level of the mother, and health insurance. **Results**: Tdap coverage of 13-17 year olds increased each year, from 40.7% in 2008 to 78.7% in 2011. In 2011, there was an age effect with rates increasing with age from age 13 (72.1%) to age 15 (81.6%) and then decreasing for ages 16 and 17 (77.5% & 72.1%). Results from the multivariable model using data from all years show that being UTD is associated with increased mother's education, living in the Northeastern U.S., and younger age. The association with age was modified by year and attenuated in more recent years. **Conclusion**s: Pertussis vaccination rates have increased among adolescents since the 2005 recommendation, but have fallen short of the goal of 90%. Older teens in particular need "catch up" vaccination to prevent their being a reservoir in coming years for vulnerable populations such as infants.

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TREND OF QUADRIVALENT HUMAN PAPILLOMAVIRUS VACCINE (HPV4) INITIATION AND COMPLETION IN ADOLESCENT MALES IN A MANAGED CARE ORGANIZATION. Rulin Hechter*, Chun Chao, Margo Sidell, Lina Sy, Bradley Ackerson, Jeff Slezak, Nilesh Patel, HungFu Tseng, Steven Jacobsen (Kaiser Permanente Southern California, Pasadena, CA United States)

Objectives The recommendation for quadrivalent HPV vaccine (HPV4) for males has undergone progressive changes from "permissive use" to expanded indication for anal cancer and to routine recommendation in October 2011. We sought to examine the HPV4 uptake in boys over the time periods in a pre-paid health plan. **Methods** We examined HPV4 initiation and correlates in 3 open cohorts of boys aged 9-17 years in Kaiser Permanente Southern California during each recommendation period: permissive use (10/21/2009-12/21/2010), anal cancer indication (12/22/2010-10/24/2011), and routine use (10/25/2011-06/30/2013). We abstracted demographic and vaccination information from electronic health records. Mixed regression models were used to adjust for random cluster effects of medical centers in multivariate analysis. **Results** We identified 297 703, 357 384, and 345 348 eligible boys in the 3 cohorts, respectively. The overall initiation rate increased over time (1.6%, 3.4%, and 18.5%, respectively); with the greatest increase observed in boys aged 11-12 years, from 1.7% to 26.2%. Boys were more likely to initiate HPV4 at age 13-17 than at 11-12 in Cohort 1 and 2 (odds ratio [OR] [95% confidence interval] = 1.4 [1.3-1.6] and 1.3 [1.2-1.3], respectively), but less likely in Cohort 3 (OR=0.7 [0.6-0.7]). HPV4 initiation was associated with enrollment in the Medicaid program and receipt of flu vaccination in the previous year in all cohorts (OR= 1.2 [1.1-1.2]) and 1.8 [1.7-1.8], respectively, in Cohort 3). Boys of other racial/ethnical groups were more likely to initiate HPV4 than Whites (P<.001). Boys who did not have an assigned pediatrician were less likely to initiate the HPV4 (OR=0.6 [0.6-0.7]). **Conclusion** The data suggest that the stronger recommendation has led to increased uptake of HPV4 in boys. However, the uptake rate remained low even in a pre-paid health plan with relatively equal access to vaccination.

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CAN ADMINISTRATIVE DATA ACCURATELY IDENTIFY COMORBIDITIES IN NON-ELDERLY POPULATIONS? Katelin B Nickel*, David K Warren, Anna E Wallace, Daniel Mines, Victoria J Fraser, Margaret A Olsen (Washington University School of Medicine, St.Louis, MO United States)

Background: Measures to identify comorbidities in administrative data were developed using elderly or hospitalized patients. We compared the prevalence of five medical comorbidities using different definitions in women undergoing mastectomy compared to national estimates. **Methods**: Using a cohort of 7,612 privately insured women aged 18–64 years coded for mastectomy from 1/04–12/08, we identified smoking, obesity, diabetes, hypertension, and iron deficiency anemia using inpatient and outpatient claims for the year prior to surgery. Our revised comorbidity algorithm included outpatient medications for diabetes and hypertension, expanded the timeframe to include the mastectomy admission, and adjusted the interval and number (≥ 1 claims for smoking and obesity) of required outpatient claims. A $\chi 2$ test of proportions compared prevalence rates in the cohort to 18–64 year old women in the 2007 Behavioral Risk Factor Surveillance System and the 2000 National Health and Nutrition Examination Survey. **Results**: Compared to the standard claims algorithm, the prevalence increased from 0.6% to 6.6% for smoking, 0.6% to 3.6% for obesity, 3.4% to 6.1% for diabetes, 10.7% to 21.4% for hypertension, and 2.9% to 5.0% for iron deficiency anemia. The revised prevalence estimates were more similar to national estimates, however, with the exception of diabetes, were not statistically equivalent (17.1% smoking, 24.7% obesity, 5.9% diabetes, 19.7% hypertension, and 3.0% iron deficiency anemia). **Conclusion**s: Our revised comorbidity algorithm resulted in prevalence estimates that were closer to expected rates for non-elderly women than the standard medical claims algorithm. The prevalence of chronic medical conditions (i.e., hypertension, diabetes, iron deficiency anemia) was more similar to national estimates as compared with obesity and smoking, possibly since chronic conditions are more likely to impact reimbursement.

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DISCHARGE AGAINST MEDICAL ADVICE IN THE UNITED STATES 2003-2010: SPATIAL AND TEMPORAL DESCRIPTIVES. Jashvant Poeran*, Madhu Mazumdar, Stavros Memtsoudis (Weill Cornell Medical College, New York, NY United States)

Background: Discharge against medical advice (DAMA), in which an in-patient chooses to leave the hospital before recommended discharge, may have negative health care, economic and legal effects. To characterize this public health issue on a national and statewide scale we aimed to study rates of DAMA, in particular by discharge year, disease category, and state. **Methods**: We analyzed data from the Nationwide Inpatient Sample (NIS, 2003-2010, n=313,135,142 discharges). DAMA (per 1,000 discharges) was characterized (crude) by demographic, healthcare related, temporal, and disease category variables. Next, we calculated directly standardized (for insurance type, race, gender: 30 patient subgroups) rates per state with the full NIS database as the standard population. **Results**: The rate of DAMA gradually increased from 8.4 in 2006 to 9.9 per 1,000 in 2010. Higher rates were observed for patients aged 21-60 years (16.0-17.8), males (13.6), African Americans (16.7), and self-payers (34.0). Mental health and skin diseases were the disease categories with the highest rates of DAMA: 38.6 and 18.3 per 1,000. The highest standardized rates of DAMA were observed for New York (19.4) and Nevada (18.5) while Colorado and Indiana showed the lowest rates (both 4.6). Standardized rates showed narrow 95% confidence intervals. **Conclusion**: In this first national study describing disease specific, temporal and spatial DAMA rates we show that while still low, the rate gradually increased over the years. Moreover, large differences exist between states with a >4-fold difference between states with the lowest and highest rates. These data may be helpful in prioritizing policy, e.g., patient education, to address this public health issue.

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THE SIZE OF UNNECESSARY HOSPITAL UTILIZATION OF PATIENTS WITH SINGLE CHRONIC DISEASE WTHOUT COMPLICATIONS IN KOREA: FOCUSING ON HYPERTENSION, DIABETES, AND HYPERLIPIDEMIA. Sang Jun Eun, Min-Woo Jo, Weon-Seob Yoo, Hyun Joo Kim, Jung-Eun Kim, Jin Yong Lee*, Minsu Ock (Seoul National University Boramae Medical Center)

Objectives: This study aims to investigate the volume of unnecessarily utilizing outpatient services in hospitals among patients with single chronic disease without complication and to estimate the amount of inefficient healthcare expenditure due to inappropriate utilization. **Methods**: We used the database of 2009 National Inpatient Sample (NIS) published by the Health Insurance Review and Assessment Service (HIRA) in Korea. It contains totally sampled 27,320,505 claims for utilizing outpatient services; one claim or one patient is designed to be representative of 100 claims or 100 patients. We operationally defined single chronic diseases without complication using International Classification of Diseases-10th Revision (ICD-10): Hypertension (HTN) without complications (only I10); diabetes mellitus (DM) without complications (E10, E10.9, E11, E11.9, E13, E13.9, E14, or E14.9); and hyperlipidemia (HL) without complication (E78, E78.0, E78.1, E78.2, E78.3, E78.4, or E78.5). In order to define unnecessary utilization of patient who has single chronic disease without complication, authors employed Charlson Comorbidity Index (CCI), containing 17 conditions or diseases. If a patient is estimated to have 0 score of CCI (no comorbid with above 17 conditions) and concurrently utilized hospital outpatient clinics to treat his/her single chronic disease such as HTN, DM, and HL, it is considered as 'unnecessary hospital utilization". **Results**: In case of HTN, approximately 90% of hospital outpatient clinic utilization was evaluated as unnecessary, which contains 3,261 (thousands) claims (tertiary hospital: 766, general hospital: 1,427, hospital: 1,068, respectively). Diabetic patient also showed similar pattern of HTN and 438(thousands) claims (tertiary hospital: 104, general hospital: 158, hospital: 176, respectively) were unnecessary hospital utilization. In case of HL, over 90% of hospital utilization was unnecessary and total volumes of claims were 1,310(thousands) (tertiary hospital: 506, general hospital: 532, hospital: 272, respectively). Also, the amount of inefficient healthcare expenditures due to unnecessary hospital utilization was estimated to $104,225,848 (USD) (HTN: $59,659,081, DM: $11,834,264, and HL: $32,732,503, respectively). **Conclusion**s: Our results showed that at least 90% of hospital utilization was unnecessary and inefficient healthcare costs were significant. Therefore, Korean government should make an effort to reverse the flow of the patients with simple or minor diseases from hospitals to primary care. Keywords: chronic disease, hospital outpatient clinics, primary care, health care costs, healthcare delivery

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CERVICAL CANCER SCREENING PATTERNS IN THE JOHNS HOPKINS HOSPITAL SYSTEM. Michelle Silver*, Darcy Phelan-Emrick, Patti Gravitt (Johns Hopkins School of Public Health, Baltimore, MD United States)

Background: Recently cervical cancer screening guidelines have undergone several revisions, encouraging a change from screening once per year to once every 3 years following a negative, or normal screening test. We estimated the proportion and characteristics of women returning for annual screening from 2001-2011 to evaluate use of extended screening intervals in clinical practice over time. **Methods**: We obtained de-identified records of Pap smears and HPV DNA tests performed in Johns Hopkins Hospital from 2001-2011. Data included almost 200,000 records from 60,000 unique women attending 44 different clinics. We used Poisson regression with robust error variance to estimate prevalence ratios (PR) and 95% confidence intervals (CI). **Results**: Women with dual negative Pap/HPV co-tests were 24% less likely to return within a year than women who were Pap negative without HPV testing [PR (95%CI): 0.76 (0.72-0.80)], indicating a trend to appropriate extension of screening intervals over time in screen-negative women. Non-whites were about 25% less likely to return for annual screening than white women [black: 0.72 (0.70-0.74); other race: 0.77 (0.74-0.81)], and women with Medicaid [0.64 (0.61-0.67)], Medicare [0.93 (0.88-0.97], Medical Service Capitation [0.84 (0.80-0.89)], and self-payers [0.54 (0.31-0.92)] were significantly less likely than those in private health plans to return within a year for follow-up after adjusting for age and screening test results. **Conclusion**: We observed a decline in annual screening among women in Baltimore, MD. It is unclear whether lower rates of annual screening in non-whites and Medicaid/Medicare recipients reflect better adoption of screening guidelines or problems in follow-up. Further studies are needed to clarify this difference to avoid increasing disparities in cervical cancer incidence among non-white, economically disadvantaged women.

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PRESCRIPTION MEDICATION USE IN A NATIONALLY REPRESENTATIVE SAMPLE OF YOUNG U.S. ADULTS. Quynh C. Nguyen*, Eric A. Whitsel, Hsien-Wen Meng, Carolyn T. Halpern, Ley A. Killeya-Jones, Jon M. Hussey, Joyce W. Tabor, Kathleen Mullan Harris (University of Utah, Salt Lake City, UT United States)

Motivation: Few recent studies examine national patterns in prescription medication use, especially among U.S young adults often assumed healthy. We examined them in the National Longitudinal Study of Adolescent Health (Add Health), Wave IV (2008). **Methods**: Use of prescription medications over four weeks was inventoried and therapeutically categorized using Multum LexiconTM. The relative risk (RR) of use and number of medications used were estimated as functions of participant characteristics using negative binomial and log Poisson regression. **Results**: Of 15701 participants (aged 24-32 years), 5820 (37%) were using 10,711 medications (1.8/user). Excluding contraceptives, medication use was higher among females, non-Hispanic whites, and those reporting low income, low education (among men), unmet medical needs, health insurance, and a routine place of care. For both sexes, central nervous system (CNS) and psychotherapeutic agents were among the top medications. The percentages using antidepressants, analgesics,anxiolytics/sedatives/hypnotics, and anticonvulsants were 9.2%, 8.4%, 4.2%, and 3.5% among women and 4.1%, 6.8%, 2.6%, and 2.2% among men. One-third with a history of depression, PTSD, or anxiety/panic disorder were being treated with CNS or psychotherapeutic agents. Half of those with a history of seizure disorder were taking CNS agents. Use of CNS agents was about 27% for those with a history of migraines. Predictors of CNS and psychotherapeutic medication use included low income (RR: 1.5), history of prescription misuse (RR: 1.5), insurance (RR: 1.7) and neurological or psychiatric disease (RR: 3.5). **Conclusion**: Prescription medication use is common among U.S. young adults with variations by sociodemographics and behavior, although it is difficult to disentangle differentials due to medical need from those due to health care access and utilization.

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ANTERIOR CRUCIATE LIGAMENT INJURIES AND GROUND REACTION FORCES. Rebecca Yau*, Stephen Marshall (University of North Carolina Injury Prevention Research Center, Chapel Hill, NC United States)

BACKGROUND: Anterior cruciate ligament (ACL) injuries result in high level of short-term disability and accelerate progression to post-traumatic osteo-arthritis. ACL injuries typically occur in physically active populations. Motion analysis can be used to identify those at risk of ACL injury. This study aims to determine if ground reaction forces (GRFs) are associated with incident ACL injuries. **METHODS**: We utilized data from a prospective cohort study of military cadets who were enrolled in the Joint Undertaking to Monitor and Prevent ACL study between 2005 and 2008 and prospectively followed for incident ACL injury data. GRF data were collected from a nonconductive force plate continuously during a jump-landing test at enrollment so that there were 100 time points of GRF data per cadet. ANALYSIS: Multilevel modeling using whole polynomials of time comparing cadets who sustained ACL injury to those who did not. **RESULTS**: Among 5467 cadets tested, 114 (2%) had incident ACL injuries during their 4-year academy career. Males and females had a similar risk in this population. Cadets who sustained ACL injuries exhibited higher vertical [random intercept model-predicted values of 123.5% and 120.7 % of body weight at maximum knee flexion (p=0.09); observed values of 121.8% and 118.5% for injured and non-injured cadets, respectively] and medial/lateral [random intercept model-predicted values of 12.1% and 11.2% of body weight at maximum knee flexion (p=0.10) for injured and non-injured cadets, respectively; observed values were the same] forces during the stabilization and propulsion phase of the jump-landing task. **CONCLUSIONS**: Obtaining GRF data may help determine whether that person is at increased risk of ACL injury. These individuals could then be screened into neuromuscular training programs that decrease the incidence of ACL injury.

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DIABETES AND RISK OF HOSPITALIZED FALL INJURY AMONG OLDER ADULTS. Rebecca Yau*, Elsa Strotmeyer, Helaine Resnick, Deborah Sellmeyer, Kenneth Feingold, Jane Cauley, Eric Vittinghoff, Nathalie De Rekeneire, Tamara Harris, Michael Nevitt, Steven Cummings, Ronald Shorr, Ann Schwartz (University of North Carolina at Chapel Hill, Injury Prevention Research Center, Chapel Hill, NC United States)

BACKGROUND-To determine whether older adults with diabetes are at increased risk of an injurious fall requiring hospitalization. **METHODS**-The longitudinal Health, Aging, and Body Composition Study included 3,075 adults aged 70-79 at baseline. Hospitalizations that included ICD-9-CM codes for a fall and an injury were identified. The effect of diabetes with and without insulin use on the rate of first fall-related injury hospitalization was assessed using Cox proportional hazards models. Within the subpopulation of people with diabetes, backwards selection was used to remove variables from an initial model until only variables that were significant at $p<0.05$ remained in the model. All results were statistically significant at $p<0.05$. **RESULTS**-At baseline, 719 participants had diabetes, and 117 were using insulin. Of the 293 participants who were hospitalized for a fall-related injury, 71 had diabetes, and 16 were using insulin. Diabetes was associated with a higher rate of injurious fall hospitalization [hazard ratio 1.48 (95% CI 1.12, 1.95)] in models adjusted for age, race, gender, BMI, and education. In those using insulin, compared to participants without diabetes, the HR was 3.00 (1.78, 5.07). Additional adjustment for potential intermediaries, fainting in the past year, standing balance score, cystatin C, and number of prescription medications, accounted for some of the increased risk associated with diabetes [1.41 (1.05, 1.88)] and insulin-treated diabetes [2.24 (1.24, 4.03)]. Among participants with diabetes, history of falling, poor standing balance score, and A1C>8% were risk factors for an injurious fall hospitalization. **CONCLUSIONS**-Older adults with diabetes, particularly those using insulin, are at greater risk of an injurious fall requiring hospitalization than those without diabetes. Among those with diabetes, poor glycemic control is associated with an increased risk of injurious fall.

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CHILDREN HOSPITALIZED FOR TRAUMATIC BRAIN INJURIES: DOES MECHANISM OF INJURY MATTER? Rennie Ferguson* (Safe Kids Worldwide, Washington, DC United States)

Awareness of traumatic brain injury (TBI) has risen, particularly in the field of sports. However, it is unknown if certain activities lead to greater odds of serious traumatic brain injury in children requiring hospitalization. We sought to determine if any activities are associated with increased odds of hospitalization for children diagnosed with TBIs in emergency departments. Cases of children ages 19 and under where the patient was diagnosed with concussion or internal organ injury involving the head were included from the National Electronic Injury Surveillance System. Over the study period there were 2,083,613 emergency department (ED) visits for product-related TBIs in children ages 19 and under among an at-risk population of 249,138,898 person-years, a rate of 8.36 per 1000 person-years. From 2010 to 2012, the number of TBI diagnoses increased from 665,565 (95% CI: 637,823, 693,935) to 740,104 (95% CI: 703,490, 777,550). Almost a third (29.9%) of ED injuries resulted from sports, recreation, or playground activities. 88,654 of all visits resulted in hospitalization, an incidence rate of 0.36 per 1000 person-years. The difference in the proportion of cases hospitalized by age group was statistically significant (p=0.0429). The rate for hospitalizations was highest for children under five (0.57 per 1000 person-years), followed by teens ages 15 to 19 (0.34 per 1000 person years). Controlling for age and gender in a logistic regression model, we found that TBIs involving sports, recreation and playground categories resulted in a lower odds of hospitalization (OR 0.714, p=0.003). TBIs involving cribs, baby seats, and other infant products resulted in higher odds of hospitalization, but was not statistically significant (OR 1.124, p=0.485). Healthcare professionals should consider enquiring about mechanism of injury when evaluating TBIs in children.

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RISK OF INJURY ACCORDING TO HAVING ATTENTION DEFICIT HYPERACTIVITY DISORDER AND COMORBID MENTAL ILLNESS. Chella Palmer*, Ray Merrill (Brigham Young University, Provo, UT United States)

Background: Attention Deficit Hyperactivity Disorder (ADHD) increases the risk of injury. ADHD patients also have an increased risk of comorbid mental illness. Comorbid mental health problems and use of psychotropics, which may interact with ADHD medication, can further increase risk for injury. **Objective**: Identify the risk of injury among ADHD patients according to medication use and comorbid mental health illness. **Design and setting**: A retrospective cohort study design was conducted using medical claims data from the Deseret Mutual Benefit Administrators (DMBA), a large health insurance company. ADHD diagnosis, injury, medication, and demographic data were extracted from claims files during 2001-2012. **Results**: The incidence rate of ADHD significantly increased for males and females (more so for females) over the study period, as well as the percentage of patients prescribed Adderall. The significantly increasing trend in Adderall is reflected in the age range 18 years and older for both sexes. Among ADHD patients, 22.6% had a medical claim for psychoses, 26.4% had a medical claim for depression, and 0.4% had a medical claim for schizophrenia. The rate of injury was significantly greater for those with ADHD (Rate Ratio = 1.38, 95% CI= 1.35-1.42), psychoses (1.65 [1.62-1.69]) depression (1.51 [1.49-1.53]), and schizophrenia (1.49 [1.33-1.68]), after adjusting for year, age and sex. The greatest risk of injury for ADHD patients was in those with other comorbid mental health problems. **Conclusion**s: ADHD patients have an increased risk of injury, significantly more so for ADHD patients with comorbid mental health disorders. Drug interactions may contribute to this finding.

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AGE, PERIOD AND COHORT EFFECTS ON SUICIDE RATES AMONG ELDERS IN SOUTH KOREA. Dohee Lim*, Sun jung Baik, Hye Ah Lee, Kyoung-Ae Kong, Hyesook Park, Kyunghee Jung-Choi (Department of Preventive Medicine, Ewha Womans University School of Medicine, Seoul Korea)

Background: Suicide rates have recently been decreasing on average among OECD countries, but increasing trends have been detected in South Korea. South Korea's suicide rate is the highest among OECD countries, and the rate of suicide elders is four times higher than OECD average. Korean elders had experienced the Korean War, rapid economic development, and three major financial crises. Because of these life-course experiences may influence on their high suicide rates. Objective: We aim to examine the age-period-cohort (APC) effects among elders with 65 years old or more in South Korea. **Methods**: The Age-Period-Cohort Intrinsic Estimator model was conducted using both death certificate data and census from Statistics Korea. The analysed data covered the period 1983–2011, and aggregated by 5-year age-intervals and 5-year period-intervals. **Results**: The period effect exhibited a sudden rise in 2004 and 2009. This effect was more larger in elderly than middle-aged and more noticeable in women than in men. The suicide rate of older cohort appeared to be higher than the younger one. The age-specific effect was presented an overall increase with age in both genders. **Conclusion**: Strong age-effect was detected, and elderly suicide was more vulnerable to economic problems than middle-aged. Gender difference in these vulnerability also was found. It is crucial that social safety net should be strengthen for elders with vulnerablity.

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CHILDREN AND YOUTH WITH TRAUMATIC BRAIN INJURY: A COMPARISON OF CASE DEFINITIONS. Vincy Chan*, Angela Colantonio (Toronto Rehabilitation Institute, University Health Network, Toronto Canada)

Although healthcare administrative data are commonly used for traumatic brain injury (TBI) research, there is currently no consensus or consistency on the case definition used to define TBI among pediatrics internationally. This study compared the profiles of children and youth aged 19 years and under by case definitions using healthcare administrative data in Ontario, Canada. The overall rate of TBI episodes of care differed between a case definition aimed for specificity (250.0 per 100,000) versus sensitivity (2,667.3 per 100,000). Further, a more sensitive case definition showed that the highest rate was among infants however, a more specific case definition showed that the highest rate was among older adolescents. Chi-squared tests revealed that compared to a more sensitive case definition, the more specific case definition identified a significantly higher proportion of females ($p<.05$), patients with delayed discharges from acute care ($p<.05$) and special care days ($p<.001$), and patients discharged to inpatient rehabilitation ($p<.001$), transferred to another inpatient setting ($p<.01$), and died in acute care ($p<.001$). However, the more sensitive case definition identified a significantly higher proportion of patients discharged home ($p<.001$). T-tests showed that the average length of stay (LOS) in acute care as identified by a more specific case definition was significantly longer (6.7 days, SD=14.7) than the LOS identified using a more sensitive case definition (5.5 days, SD=12.5; $p<.001$). The intention of injury did not differ significantly by case definitions, however, the proportion injured via motor vehicle collision ($p<.01$) and struck by/against an object ($p<.001$) differed significantly. Profiles of children and youth with TBI differed by case definitions. Findings suggest that a range of definitions should be considered for prevention and the planning of post-injury care for TBI.

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MANAGEMENT AND OUTCOMES OF PEDIATRIC MOTOR VEHICLE COLLISION INJURIES TREATED AT LEVEL I TRAUMA CENTERS: ANALYSIS OF THE NATIONAL TRAUMA DATA BANK. Jill Dreyfus*, Andrew Flood, Gretchen Cutler, Anupam Kharbanda (Children's Hospitals and Clinics of Minnesota, Minneapolis, MN United States)

Background: Motor vehicle collisions (MVC) are the primary cause of death among children aged 5-17 years. There is limited information describing and comparing the quality of care and outcomes of pediatric MVC injuries treated at pediatric specialty vs general trauma centers. We aimed to describe characteristics of pediatric patients treated for MVC-related injuries at a sample of level I trauma centers in the United States, and to compare mortality and number of procedures by trauma center type. We hypothesized that the odds of mortality and number of procedures would be higher at general trauma centers. **Methods**: Analyses included children (≤18 years of age, not transferred from another facility) treated at level I trauma centers contributing to the 2010 National Trauma Data Bank (NTDB). MVC-related injuries were defined as e-codes 810-819. We accounted for correlation by facility using GEE models to estimate the OR for death after admission (excluding DOA or death after resuscitation attempt), and mixed linear regression to estimate the number of procedures performed per encounter, for pediatric vs general trauma centers. **Results**: There were a total of 65 MVC-related deaths (pediatric center n=2; general center n=63). Patients at level I pediatric specialty centers (n=1,140) were younger (9.5 vs. 13.2 yrs, p<.001), had less severe injuries (ISS>=15: 16.9% vs. 23.2%, p<.001), and were more likely to have public insurance (44.6% vs. 29.1%, p<.001) compared with pediatric patients at general level I trauma centers (n=7,498). Adjusting for age, sex, anatomic severity, physiologic severity, mechanism, and payment type, the OR for death=5.4 at general vs. pediatric centers (95% CI 0.91, 32.1). The adjusted number of procedures was 0.29 higher (p=0.03) at general centers. **Conclusion**: Pediatric specialty centers performed fewer procedures without an apparent increase in mortality for MVC-related injuries.

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LONGER-TERM EFFECTS OF NEW JERSEY'S GRADUATED DRIVER LICENSING DECAL PROVISION ON YOUNG LEARNER AND INTERMEDIATE DRIVERS' CRASH RATES. Allison E. Curry*, Michael R. Elliott, Melissa R. Pfeiffer, Konny H. Kim, Dennis R. Durbin (The Children's Hospital of Philadelphia, Philadelphia, PA United States)

In May 2010, New Jersey (NJ) implemented the first-in-the-US Graduated Driver Licensing (GDL) decal provision, requiring all drivers under age 21 with a learner's permit or intermediate license to display decals on their vehicles. The provision is hypothesized to facilitate police enforcement of GDL restrictions and increase the likelihood that novice drivers avoid higher-risk driving behaviors, thereby reducing their crash risk. We evaluated the two-year effect of NJ's decal provision on overall and age-specific crash rates of young drivers with learner's permits and intermediate licenses. Monthly per-driver crash rates were estimated from January 2006 – June 2012. Secondary outcomes included injury, nighttime, single-vehicle, multiple-vehicle, and peer passenger crashes. We conducted negative binomial modeling that compared pre- vs. post-decal rates, adjusting for age, gender, calendar month, gas price, and 21- to 24-year-old licensed driver crash rates; further, piecewise negative binomial regression models accounted for pre-decal crash trends among learner/intermediate drivers themselves. The adjusted crash rate for intermediate drivers was 9% lower in the two-year post-decal period than the four-year pre-decal period (95% Confidence Interval: 0.88, 0.93). Crash rates decreased an average of 1.8% per year before the provision and 7.9% per year in the post-decal period (adjusted rate ratio, post- vs pre-decal slope: 0.94 [0.92, 0.96]). For several outcomes, including single-vehicle crashes, effects were particularly strong for 18- and 19-year-olds. No significant effect was found among learner drivers. An estimated 3,197 intermediate drivers had crashes prevented by the provision. NJ's decal provision was associated with a sustained decline in intermediate driver crashes. Decal provisions provide an opportunity to enhance GDL effectiveness and should be strongly considered by other US states.

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STATE-SPECIFIC AND RACIAL/ETHNIC HETEROGENEITY IN TRENDS OF FIREARM FATALITY RATES IN THE UNITED STATES. Bindu Kalesan*, Matt Mobily, Sowmya Vasan, Dennis Fowler, Roger Vaughan, Jeffrey Fagan, Sandro Galea (Columbia University, New York, NY United States)

National firearm-related fatality (FRF) rates in the US have been at endemic levels since 2000. The heterogeneity between states and racial/ethnic groups in overall and intent-specific FRF has not been documented despite dramatically different state-specific regulations that might suggest such heterogeneity. Using data from the Web-based Injury Statistics Query and Reporting System from 2000 to 2010 we documented spatio-temporal patterns and annual rate of change (ARC) by racial/ethnic and intent groups for FRF rates per 100,000 persons. National FRF rate for the period was 10.21, with a low of 3.02 in Hawaii to a high of 18.62 in Louisiana; 60% of states had higher than national rates; 41 (25 higher and 16 lower than national rates) states had no change across time. FRF rates during the period among blacks and whites were 18.51 and 9.05 and among Hispanics and non-Hispanics were 7.13 and 10.13; Hispanics had a decreasing ARC of -0.18, p-trend<0.0001. In states with increasing trend in FRF (FL, MA) over the past decade, whites and non-Hispanics drove the rise, while in states with decreasing trends (CA, NC, AZ, NV, NY, IL), Hispanics and blacks drove the fall. FRF nationally were mainly due to suicides and homicides; FRF rates by intent were 5.8 and 4.1 respectively. There was no significant change in the relative FRF due to homicides and suicides nationally during the period, but there was wide variation between states. Endemic national FRF rates mask a wide variation in rates and time trends between states. FRF rates nationally were twice as high in blacks than whites. State specific efforts to curb firearms may contribute to changing patterns over this period, with particular efforts potentially having a greater impact on homicide or suicide across states. Efforts to identify state-specific best practices can contribute to changes in national FRF rates that remain, overall, stubbornly constant.

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THE ASSOCIATION BETWEEN HORMONAL CONTRACEPTIVE USE AND ANTERIOR CRUCIATE LIGAMENT INJURY AMONG ACTIVE DUTY ARMY SERVICEWOMEN. Melanie Hosker*, Brian W. Whitcomb, Craig McKinnon, Owen T. Hill, Lisa Chasan-Taber, Raji Balasubramanian, Maria T. Bulzacchelli (USARIEM and University of Massachusetts Amherst, Amherst, MA United States)

PURPOSE. To evaluate the association between hormonal contraceptive (HC) use and risk of Anterior Cruciate Ligament (ACL) injury among active duty U.S. Army servicewomen. HC use may influence risk for ACL injury directly through estrogen receptors on the ACL or indirectly by altering properties of the knee including strength, stability and neuromuscular reaction time. Few studies to date have examined this relationship, and the majority have been limited by small sample size. **METHODS**. The Total Army Injury and Health Outcome Database (TAIHOD) captures demographic and clinical data on active duty service members. Among servicewomen aged 17 to 40 who served on active duty between 2002 and 2011 (n=201,107), over 50% filled at least one contraception prescription for pills, patch, ring or injection. In this population, 2,120 incident ACL cases (ICD9 884.2) were frequency matched 1:10 to controls by age and year of entry to active duty. Odds ratios (OR) from conditional logistic regression were adjusted for education, grade and prior service to assess risk of ACL injury by HC use (ever versus never picked up a prescription after 2002) and use at the time of injury (current user versus nonuser). **RESULTS**. Compared to nonusers, current users had 47% increased odds of ACL injury (OR 1.47, 95% CI 1.31-1.64). Compared to never users, ever users had 23% increased odds of ACL injury (OR 1.23, 95% CI 1.15-1.38). **DISCUSSION**. The TAIHOD is a unique asset to assess the relationship between hormonal contraceptive and injury risk in a large population of highly active, healthy reproductive age women. These results suggest that current use of HC could increase the odds of ACL injury up to 50%. Given the widespread use of contraception in this population further evaluation is warranted to characterize contraceptive users and better understand the injury mechanisms in order to develop strategies designed to mitigate risk.

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ISSUES WITH ANDROGEN MEASUREMENT USING NHANES III. C Mary Schooling, Lin Xu* (The University of Hong Kong, Hong Kong Hong Kong)

Professional guidelines recommend testosterone replacement for men with symptomatic testosterone deficiency, which is partly assessed from serum testosterone. However, successful use of anti-androgens at castrate levels of serum testosterone has raised questions as to what serum testosterone represents, and hence its role in diagnosis and etiology. This question is particularly pertinent now that evidence is emerging from meta-analysis of randomized controlled trials and pharmacoepidemiology suggesting that testosterone replacement causes cardiovascular disease, despite its popularity. Serum testosterone is a measure largely of circulating gonadal production, which may be affected by age and ill-health, when androgens may also be produced in the adrenals or produced and used locally. Androstanediol glucuronide (3α-diol-G) is a correlate of the final breakdown production of all androgens. Here we assessed whether the association of serum testosterone with 3α-diol-G varied with age or ill-health in a nationally representative study of 1460 US men from NHANES III phase 1 (1988-1991) age 18+ years. Using linear regression we found little evidence that the association of serum testosterone with 3α-diol-G varied with age or markers of ill-health. Instead it would appear that serum testosterone and 3α-diol-G are measuring different things. Given that 3α-diol-G observationally has associations with cardiovascular disease and its risk factors more similar to those seen in RCTs than for serum testosterone, it would be useful to further assess the association of 3α-diol-G and consider its role in the diagnosis and treatment of testosterone deficiency.

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ANDROGEN ACTIVITY AND CARDIAC FUNCTION AMONG MEN IN NHANES III. Levi Waldron*, C Mary Schooling, Lin Xu (CUNY School of Public Health at Hunter College, New York, NY)

Despite observations suggesting endogenous serum testosterone might protect against cardiovascular disease and widespread promotion of testosterone replacement evidence from meta-analysis of randomized controlled trials (RCTs) indicates exogenous testosterone increases cardiovascular-related events. To clarify how such a discrepancy occurred, potentially putting men at risk, the associations of two different androgen biomarkers (serum testosterone a measure of circulating gonadal production, and androstanediol glucuronide (3α-diol-G) a correlate of the final breakdown production of all androgens) with markers of cardiac function obtained from an ECG recording were examined in a nationally representative study of US men from NHANES III phase 1 (1988-1991). Linear regression in 766 men aged 40+ years was used to assess the adjusted association of serum testosterone and 3α-diol-G tertiles, with Bazett corrected QT interval and left ventricular mass (LVM). Serum testosterone and 3α-diol-G were poorly correlated. Higher serum testosterone was associated with shorter QT-interval (-8.7 milliseconds (ms), 95% confidence interval (CI) -13.3 to -4.12) and lower LVM (-23.5, 95% CI -31.0 to -16.0) for highest compared to lowest testosterone tertile, adjusted for age, education, race/ethnicity, alcohol use and smoking, but higher 3α-diol-G, similarly adjusted, had different associations with QT interval (0.88 ms, 95% CI -4.01 to 5.78) and LVM (4.5, 95% CI -1.02 to 10.1) for highest compared to lowest 3α -diol-G tertile. 3α-diol-G had associations with markers of cardiac function more consistent with meta-analysis of RCTs, where testosterone appears damaging to the cardiovascular system, suggesting first that endogenous serum testosterone may be a poor guide to the cardiovascular effects of testosterone, with corresponding implications for etiology and practice, and second effects of androgens on left ventricular mass might be worth investigating.

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SOCIAL NETWORK INFLUENCES ON DISCLOSURE OF SUICIDE IDEATION IN ADOLESCENTS WITH SELF-HARM ACTS: A TAIWANESE SELF-REPORT HIGH SCHOOL SURVEY. Chia-Yi Wu*, Hui-Ching Liu, Yu-Shin Huang, Shen-Ing Liu (Department of Nursing, National Taiwan University, Taipei Taiwan)

Youth suicide is the third leading cause of death in the 15-24 year-olds globally. Previous suicide attempt or self-harm is a key risk factor of suicide death. Although greater suicide ideation was related to lower help-seeking intentions, suicide attempt history would increase the likelihood of receiving help. Given that only one in four adolescents received formal health services after self-harm, seeking informal help from friends or family was far more prevalent. However, it is unknown whether social networks within four main informal support sources of friends, teachers, parents or other family would exert influences on initial help-seeking behavior of disclosing suicide ideation. Thus, in this computer-assisted survey across 16 high schools in northern Taiwan, we analyzed the pupils' social networks and their relationship with disclosure of suicide ideation by matching subjects of disclosure with informal support sources. Among the 5879 participants, 25% experienced previous self-harm and 43.2% existed lifetime suicide ideation. In the 13.6% who had suicide idea within a month, about half disclosed to others (n=154) including friends (93.5%), siblings (27.3%), parents (24.7%), or online peers (18.2%). The percentage of seeking formal help at schools, community or hospitals appeared to be relatively low (between 0.3-2.6%) among those with previous self-harm acts. The results also revealed a distinct correlation of disclosing suicide ideation to friends and limited levels of parental listening or openness to talk about mental distress with the adolescents ($p<0.001$). Moreover, lower levels of being listened by friends or teachers were associated with disclosing to parents. The findings indicated the need for enhancing adolescent social networks by encouraging genuine listening and offering self by close others at school or home to high-risk youths to facilitate early help-seeking.

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ASSOCIATIONS BETWEEN TESTOSTERONE, FOLLICLE STIMULATING HORMONE AND SPERM QUALITY PARAMETERS IN MEN FROM CHILD HEALTH AND DEVELOPMENT STUDIES. Beverly Insel*, Piera Cirillo, Barbara Cohn, Pam Factor-Litvak (Mailman School of Public Health Columbia University, New York United States)

Introduction: The current body of literature on male reproductive health primarily focuses on sperm quality parameters to the exclusion of reproductive hormones. However, testosterone, an androgenic steroid hormone and Follicle Stimulating Hormone (FSH), a gonadotrophic hormone, are essential for quantitatively normal spermatogenesis. **Method**: The participants comprise 183 men aged 38-49 from the Study of the Environment and Reproduction, a follow-up of the Child Health and Development Studies, conducted from 2005-2008 in California. Samples were analyzed for total testosterone, FSH, sperm concentration, motility and morphology. Sperm concentration was square-root-transformed to approximate normal distribution. Linear regression was used to estimate the effects of testosterone and FSH on the sperm parameters, adjusting for the relevant lifestyle and anthropometric factors. **Results**: Mean total testosterone was 390.9 ± 184.0 ng/dl. Mean FSH was 5.6 ± 3.7 mIU/mL. We found an inverse association between FSH and sperm concentration (β = -0.35, 95% Confidence Interval (CI) =-0.48,-0.21), motility (β =-0.98, 95%CI =-1.62,-0.34), and morphology (β =-0.21, 95% CI = -0.40, -0.03), adjusting for age, race, smoking, alcohol consumption, and time since last ejaculation. Testosterone was significantly associated only with morphology (β =-0.004, 95% CI = -0.008,-0.0001). **Conclusion**: Our analysis suggests that FSH may be a better indicator of semen quality and reproductive aging than testosterone.

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THE RELATIONSHIP BETWEEN ALLOSTATIC LOAD AND SEMEN QUALITY IN A FOLLOW-UP OF 181 MALE PARTICIPANTS FROM THE CHILD HEALTH AND DEVELOPMENT STUDIES. Linda Kahn*, Teresa Janevic, Piera Cirillo, Barbara Cohn, Pam Factor-Litvak (Mailman School of Public Health Columbia University, New York, NY United States)

Introduction: Previous studies have suggested an inverse relationship between recent stress and semen quality based on data from occupational and psychosocial questionnaire data. However, the relationship between biological indicators of chronic stress and sperm concentration, motility, and morphology remains unexplored. **Methods**: Using data from 181 men who participated in the 2005-8 Study of the Environment and Reproduction, a follow-up to the Child Health and Development Studies, we examined associations between a biologically-based measure of allostatic load and three semen parameters: sperm concentration, percent motile sperm, and percent sperm with normal morphology. Our allostatic load scale incorporated four items: body mass index (BMI) and self-report of high blood sugar, high blood cholesterol, and hypertension. We performed linear regression and report estimated beta coefficients (ß) adjusted for age, income, current smoking, and time since last ejaculation. **Results**: Our results suggest a negative association between allostatic load and sperm concentration (ß = -0.33, 95% CI [-0.83, 0.18]) and percent motility (ß = -1.95, 95% CI [-4.42, 0.53]). There was a positive association between allostatic load and percent morphologically normal sperm (ß = 0.19, 95% CI [-0.51. 0.90]). Our allostatic load scale was highly correlated with the validated Perceived Stress Scale (Spearman correlation coefficient = 0.80). **Conclusion**: Based on self-reported markers of chronic stress, our measure of allostatic load suggests a negative association of embodied stress with both sperm concentration and motility, but a positive association with morphology This paradox may have biological significance as an adaptive response to stress.

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GENDER AND POSITION OF AUTHORITY AND THE RISK OF DEPRESSION AND POST-TRAUMATIC STRESS DISORDER AMONG A REPRESENTATIVE SAMPLE OF U.S. RESERVE COMPONENT PERSONNEL. Gregory Cohen*, Laura Sampson, David Fink, Jing Wang, Dale Russell, Robert Gifford, Robert Ursano, Sandro Galea (Columbia University , New York, NY United States)

Recent United States military operations in Iraq and Afghanistan have seen dramatic increases, relative to prior conflicts, in the proportion of women serving, and the breadth of their occupational roles, including combat. General population studies broadly suggest that women are more likely than men to report psychological consequences of trauma exposure. Further, these studies suggest that persons with lower, as compared to higher, social position may be at greater risk of psychopathology. However, these relations remain unclear in military populations. Accordingly, we aimed to estimate the effects of (1) gender (2) military authority and (3) the interaction of gender and military authority upon: (a) risk of most-recent-deployment-related post-traumatic stress disorder (PTSD), and (b) risk of past-year depression; all estimates were adjusted for demographics, combat exposure, deployment characteristics, and predeployment psychopathology. We used data from a nationally representative sample of 953 previously deployed reserve component personnel, surveyed by telephone in 2010. Weighted multivariable logistic regression models demonstrated no associations between gender and either PTSD or depression, while those with less authority were more likely to report depression, AOR 1.87(95% CI: 1.08-3.23), but not PTSD. Interaction models demonstrated multiplicative statistical interaction between gender and authority for PTSD (beta=-2.02; p=0.01), and depression (beta=-1.54; p=0.02). Predicted probabilities of PTSD and depression, respectively, were lowest in male officers (0.06, 0.1), followed by enlisted males (0.1, 0.2), enlisted females (0.12,0.21), and female officers (0.31, 0.29). These results suggest that female officers may be at greatest risk for PTSD and depression relative to their male and enlisted counterparts, and that this relation is not explained by combat exposure.

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IS INSOMNIA ASSOCIATED WITH DEFICITS IN NEUROPSYCHOLOGICAL FUNCTIONING? EVIDENCE FROM A POPULATION-BASED STUDY. Sidra Goldman-Mellor*, Alice Gregory, Avshalom Caspi, Terrie Moffitt (University of North Carolina at Chapel Hill, Chapel, NC Hill United States)

Objective: People suffering from insomnia complain about experiencing cognitive deficits in their daily lives. Empirical studies examining the association between insomnia and neuropsychological impairment, however, have generally relied on small clinical samples of treatment-seeking insomnia patients. **Results** from these studies have been mixed. Data from large, representative samples are needed to rigorously test the relationship between insomnia and cognitive function, as treatment-seeking clinical samples may show greater impairment than population-based samples. **Methods**: We used data from the Dunedin Study, a population-representative birth cohort study of 1,037 individuals from New Zealand, to examine whether insomnia in early midlife was associated with neuropsychological cognitive test performance. We further tested whether treatment-seeking insomniac individuals experienced greater cognitive impairment compared to other insomniac individuals. Insomnia was diagnosed at age 38 according to DSM-IV criteria. Neuropsychological assessments, including the Wechsler Memory Scale-III, were conducted at age 38. **Results**: Although study members with insomnia reported greater subjective cognitive impairment compared to their peers at age 38, they did not exhibit greater objective neuropsychological impairment. Individuals who reported seeking treatment for their insomnia, however, did exhibit significant deficits in their objective cognitive functioning, even after control for confounding variables. Reports from people who knew the study members well corroborated these group differences. **Conclusion**s: The link between insomnia and cognitive impairment may be limited to individuals whose insomnia is severe enough to result in clinical treatment-seeking. These findings suggest that clinicians should be regularly assessing cognitive functioning among their insomniac patients.

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MODELING THE TRAJECTORIES OF PSYCHOPATHOLOGY OVER TIME AMONG MILITARY POPULATIONS: THE POTENTIAL IMPACT OF ALCOHOL MISUSE. Laura Sampson*, Gregory Cohen, Joseph Calabrese, David Fink, Marijo Tamburrino, Israel Liberzon, Sandro Galea (Columbia Mailman School of Public Health, New York United States)

The burden of psychopathology in military populations is well documented; PTSD and depression are more prevalent in military, compared to civilian samples, and are frequently comorbid, particularly with alcohol misuse. However, few studies have documented longitudinal trajectories of these disorders among soldiers, and none have considered how comorbid alcohol misuse may modify these trajectories. The aim of this study is to identify trajectories of depression and posttraumatic stress disorder (PTSD) symptoms after deployment, utilizing a cohort of soldiers drawn from the Ohio Army National Guard (sampled & interviewed beginning in 2008). Additionally, the effect of alcohol misuse, a time-varying covariate, on observed trajectories was investigated. PTSD symptoms were modeled using the PTSD Check List (PCL) symptom scale in 469 soldiers who completed two or more study waves and had a potentially traumatic event during a deployment within two years of baseline assessment. Depression symptoms were modeled using the Patient Health Questionnaire (PHQ-9) in 727 soldiers who completed two or more study waves and were deployed within two years of the baseline assessment. About 50% of soldiers were resistant to depression and PTSD symptoms across all four years, while about 36% and 17% of soldiers showed resilience to PTSD and depression symptoms, respectively. Mild and chronic dysfunction constituted the smallest trajectory groups across disorders. Alcohol misuse appreciably affected trajectory shapes for both types of symptoms. Critically, alcohol misuse at every time-point resulted in the following symptomatology increases in chronic dysfunction groups: 15% for PTSD, and 13% for depression. These results suggest that a life-course perspective is critical when investigating psychopathology in service-members and that alcohol may contribute substantially to the burden of psychopathology in this population.

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POSTPARTUM DEPRESSION IN WOMEN WITH NO PRIOR PSYCHIATRIC HISTORY: RISK, DURATION OF TREATMENT, AND RECURRENCE RISK. Jan Wohlfahrt*, Marie-Louise Rasmussen, Marin Strøm, Poul Videbech, Mads Melbye (Statens Serum Institut, Copenhagen Denmark)

Background: Depending on the inclusion criteria 5-15% of all women experience postpartum depression (PPD). For many of these women a PPD is their first psychiatric disorder. The trajectory is likely very different compared to women with previous psychiatric disorders. Yet, incidence, prognosis, and recurrence risk in this group have not been studied. Objective: To estimate the PPD incidence, duration of treatment, and the rate of subsequent PPD and other depressive episodes in a nation-wide cohort of women with no prior psychiatric hospitalisations and/or use of antidepressants. Material and **Methods**: Linking Danish national registers we constructed a cohort of 327,461 primiparous singleton mothers with a first birth in the period 1996-2008 (565,668 births) and no prior recorded psychiatric history. Women were followed 1996 to 2009. PPD was defined as a hospital contact for a depressive episode and/or dispersion of antidepressants within one year after a child-birth. Information on PPD and depression was retrieved from the Danish Psychiatric Central Registry, the Danish Register for Medicinal Product Statistics, and the National Patient Registry. **Results**: In these women with no prior recorded psychiatric history, we observed 6,888 (1•2%) episodes of PPD. One year after the first PPD episode 28.5 percent were still in treatment; after four years 5.6 percent. Primiparous women with a PPD episode had an 18 times higher recurrence rate (95% CI=15•4-20•3) of PPD in a second birth and a 6.8 times higher rate (95% CI=6•7-7•8) of a subsequent depressive episode other than PPD compared to women with no PPD episode after their first birth. **Conclusion**: Overall, 1.2 percent of women with no prior psychiatric history developed PPD that required treatment. These women are characterized by a relatively short treatment regime, but a markedly higher rate of later depression and recurrent PPD episodes.

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POSTTRAUMATIC STRESS DISORDER, DEPRESSION, AND INTENTIONAL SELF-HARM IN MASSACHUSETTS VETERANS. Jaimie Gradus*, Sarah Leatherman, Sanjay Raju, Ryan Ferguson, Matthew Miller (VA Boston Healthcare System and Boston University, Boston, MA United States)

The literature on the association between Posttraumatic Stress Disorder (PTSD) and fatal and non-fatal intentional self-harm (ISH) among Veterans who receive care within the Veterans Health Administration (VHA) is limited in scope and contradictory. Some studies have found an association between PTSD and ISH or death from suicide among VHA patients, while others have shown that a PTSD diagnosis is protective against death from suicide in a sample of VHA patients with depression diagnoses. The goals of the current study are to assess (1) the gender-stratified incidence rate ratio for the association between PTSD and subsequent ISH among a large, longitudinal sample of Massachusetts VHA patients and (2) the interaction between PTSD and depression in predicting the ISH in a gender-stratified sample. VHA electronic medical record data were obtained for patients who received a PTSD diagnosis at a Massachusetts treatment facility (n = 16,004) and a gender/age matched comparison group (n = 52,506). Results revealed an adjusted incidence rate ratio (aIRR) among men for the association between PTSD and ISH of 3.2 (95% CI: 2.3, 4.4). Among women, the aIRR was 20 (95% CI: 6.8, 59.4). Evidence of an interaction between PTSD and depression diagnoses in predicting ISH for both genders, as indicated by a positive adjusted interaction contrast, was also found but was more marked among women. Our results suggest that suicide prevention approaches in the VHA should integrate treatment for PTSD and depression.

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SOCIAL DETERMINANTS OF EMOTIONAL WELL-BEING IN NEW REFUGEES IN THE UK. Mark Pearce*, Mark Campbell, Kay Mann (Newcastle University, Newcastle upon Tyne United Kingdom)

Good mental health and well-being is extremely important for the physical, social and emotional welfare of new refugees. However, refugees are the most vulnerable to mental health problems of all migrant groups. Epidemiological studies measuring the prevalence of mental health disorders in resettled refugee populations have found high rates of psychiatric disorders including post-traumatic stress disorder (PTSD), depression and anxiety. It is important to understand the reasons why. This study was an analysis of an existing dataset from the Longitudinal Survey of New Refugees (n=5678), in which all new UK refugees (2005-2007) were sent a postal questionnaire at four time points across two years which included emotional well-being and changes in emotional well-being using a question from the Short-Form-36 (SF-36) Health Survey Questionnaire. Refugees who were unemployed in the UK, could not speak English well or were unsatisfied with their accommodation had significantly higher odds of poorer emotional well-being in the cross-sectional analysis ($p<0.05$ at all time points measured). Changes in employment status and satisfaction with accommodation were significantly associated with improving or worsening emotional well-being in the longitudinal analysis ($p<0.05$). Post-displacement social factors, including language ability, employment status and accommodation satisfaction, were important determinants of refugee emotional well-being. Changes in these social determinants have the potential to improve refugee mental health, making them legitimate, modifiable targets for important public health interventions.

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IN-HOSPITAL USE OF ANTIDEPRESSANT MEDICATIONS IN CRITICALLY ILL TRAUMA PATIENTS. Hayden Smith*, Peter Tonui, Sarah Spilman, Lori Schirmer (UnityPoint Health, Des Moines, IA)

Introduction: Traumatic injury can be life-altering. As such, pre-existing depression can be exacerbated and newly revealed depressive symptoms may emerge. Few studies have examined in-hospital prevalence and treatment of depression in critically ill trauma patients, specifically examining pharmacological treatment during the hospital stay. **Methods**: A retrospective cohort study was performed to examine patterns of in-hospital antidepressant medication (ADM) use among adult trauma patients with an Intensive Care Unit (ICU) stay of five or more days. Data were ascertained for a five year period from a level I trauma registry with patient medical and pharmacy data deterministically linked. **Results**: Study sample consisted of 319 trauma patients, with 26% receiving an ADM during their hospital stay. Patients receiving or not receiving an ADM were comparable in injury cause, injury score, and survival score (p-values<0.05). Of patients receiving an ADM, 11% were prescribed by a psychiatrist and 89% prescribed by a critical care or non-psychiatric physician. One third of these medications were new prescriptions. Patients who received an ADM were significantly more likely to have a documented history of depression upon admission to the hospital (p-value<0.001) and more likely to receive a psychiatric consultation during hospital stay (p-value=0.004). These patients also were more often discharged with a plan for psychiatric follow-up (p-value=0.009). Patient adjusted odds of being prescribed an ADM increased 7% (95% CI 3%, 12%) each day they were in the ICU. Patients without a documented history of depression who received a psychiatric consult had increased odds (AOR 6.3; 95% CI 2.3, 17.4) of receiving an ADM than patients without a psychiatric consult. **Conclusion**s: Critically ill trauma patients may receive an ADM prescription for existing depression or newly revealed depressive symptoms. It is important for trauma and psychiatric physicians to partner together to manage the care of these patients and ensure proper follow-up treatment plans.

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SHORT INTER-PREGNANCY INTERVALS AND RISK OF AUTISM SPECTRUM DISORDERS. Ousseny Zerbo*, Cathleen Yoshida, Lisa Croen (Kaiser Permanente Northern California, Division of Research, Oakland, CA United States)

Background: Short inter-pregnancy intervals have been associated with increased risk of adverse birth outcomes and later development. Method: We assessed the association between inter-pregnancy interval and risk of autism spectrum disorder (ASD) in a birth cohort of children born at Kaiser Permanente Northern California (KPNC) between 2000 and 2009 and their siblings born between 1990 and 2009. The birth cohort was matched to the California birth files and the department of developmental services (DDS) to respectively identify siblings and additional ASD cases who were born at KPNC but left before the end of the study period of 2012. Inter-pregnancy interval was defined as the time from the birth of one child to the conception of the next in a sibship minus the gestational age of the latter. The outcome of interest was ASD in the subsequent child in the sibship, defined according to International Classification of Diseases, Ninth Revision codes 299.0 and 299.8 recorded in KPNC and DDS databases. Logistic regression models were used to evaluate the association between inter-pregnancy intervals and ASD while controlling for covariates. **Results**: The study sample included 65102 singleton sibling pairs. Second-born children born after inter-pregnancy intervals of < 6 months, 6 – 8 months, and 9 – 11 months were at increased risk of ASD compared to those born after an inter-pregnancy interval of =36 months. Respective adjusted odds ratios with 95% confidence intervals are: 2.02 (1.41 - 2.89), 1.81 (1.32 - 2.50), and 1.43 (1.07 - 1.92. **Conclusion**: Consistent with two previous studies, inter-pregnancy intervals shorter than 1 year were associated with increased risk of ASD in second-born children. Research is needed to determine the biological mechanism of the association.

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SMOKING AND PERCEIVED STRESS IN RELATION TO SHORT SALIVARY TELOMERE LENGTH AMONG CAREGIVERS OF CHILDREN WITH DISABILITIES. Xiaoli Chen*, Juan Carlos Velez, Clarita Barbosa, Micah Pepper, Asterio Andrade, Lee Stoner, Immaculata De Vivo, Bizu Gelaye, Michelle A. Williams (Harvard School of Public Health, Boston, MA United States)

BACKGROUND: Telomere length (TL) has emerged as a novel biomarker of cell aging and chronic stress. There is increasing but limited research exploring the associations of smoking and perceived stress with TL, and the results are inconsistent. This study aimed to examine whether smoking and perceived stress were associated with shortened salivary TL among primary caregivers of children with disabilities such as autism and Down syndrome. **METHODS**: Using a quantitative polymerase chain reaction method, salivary TL was assessed cross-sectionally among 89 caregivers aged 19-69 years (86.5% were women) between April and July 2013 in the Patagonia Region, Chile. Saliva samples were collected from caregivers using Oragene® Salivary kits. Interviewer-administered questionnaires were used to collect information on caregivers' sociodemographic and lifestyle factors. The 14-item Perceived Stress Scale (PSS-14) was used to assess perceived stress. Multivariable linear and logistic regression analyses were performed with adjustment for covariates. **RESULTS**: The mean of relative salivary TL was 0.92 (standard error=0.03). Smokers had adjusted mean TL that was 0.07 units lower (beta=-0.07, standard error=0.03; p=0.012) than non-smokers after controlling for age. Smokers were 2.17-times more likely to have shorter TL (<0.73, the lowest quartile of TL) than non-smokers (odds ratio: 3.17; 95% confidence interval: 1.05-9.52) with adjustment for age and perceived stress. Caregivers with higher perceived stress (upper quartile of the PSS-14 score=27) were 2.13-times more likely to have shorter TL (odds ratio: 3.13; 95% confidence interval: 1.03-9.55) than caregivers with lower perceived stress after adjustment for age and current smoking. **CONCLUSIONS**: This study provides the first evidence of strong associations between smoking, perceived stress and shortened salivary TL among caregivers of children with disabilities.

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EXPERIENCE OF THE DEEPWATER HORIZON OIL SPILL AND MENTAL HEALTH IN PREGNANT AND REPRODUCTIVE-AGED WOMEN. Emily W Harville*, Arti Shankar, Marni Jacobs (Tulane University, New Orleans, LA United States)

Experiencing natural or technological disasters can be associated with worsened mental health. 614 pregnant and reproductive-aged women were recruited from southern Louisiana areas affected by the Deepwater Horizon oil spill. Women were interviewed about their exposure to oil and personal effects of the oil spill, and completed the Edinburgh Depression Scale. Log-linear models were used to assess the relative risk of worse mental health associated with oil spill experiences, with adjustment for age, BMI, education, race, and marital status. Most strongly associated with mental health were spending time in an area where oil, oily materials, or chemicals were being used (adjusted relative risk [aRR], 2.30, 95% CI 1.42-3.70); having someone close to you injured or killed in the explosion (aRR 4.13, 2.28-7.49); having property lost or damaged (aRR 2.37, 95% CI 1.17-4.81) and coming into contact with oil during activities such as fishing (aRR 1.93, 1.26-2.96). There were no associations with being involved in cleanup work, damage to areas where they fished commercially, or a household member having contact with oil. Involvement in legal proceedings was, if anything, protective against mental health problems (aRR for "believe legal representation is needed", 0.84, 0.72-0.97; "there have been a lot of demands made by litigation" 0.81, 0.70-0.94). Direct and severe experience of the oil spill was associated with depression, but other indicators of oil spill exposure were not. Unlike some previous studies, involvement in legal proceedings did not worsen mental health.

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EATING ATTITUDES AND BEHAVIORS AND CARDIOMETABOLIC RISK PROFILE IN PRE-ADOLESCENCE. Seungmi Yang*, Michael Kramer, Emily Oken, Rita Patel, Oleg Skugarevsky, Mourad Dahhou, Richard Martin (McGill University Health Centre, Montreal Canada)

Eating habits are established early in life, likely to track, and associated with adverse cardiometabolic risk factors in adulthood. Unhealthy eating attitudes and behaviors in childhood may be an early marker of the increased risk of chronic diseases in later life. We examined whether eating attitudes and dieting behaviors—food preoccupation, bulimia, and concerns about body weight—are associated with blood pressure, body fat composition, and fasting insulin, glucose, adiponectin, and apolipoprotein A1 in pre-adolescence. In a sample of 13,584 healthy children who participated in the 11.5-year-follow-up of the Promotion of Breastfeeding Intervention Trial, we estimated mean differences in risk factors between children with problematic eating attitudes, defined as having a total score of 22.5 (85th percentile) or greater on the Children's Eating Attitudes Test, and those without problematic eating attitudes, after controlling for a wide range of child and family characteristics. Children with problematic eating attitudes showed slightly higher levels of blood pressure [0.8 (95% CI: 0.04, 1.1) mm Hg for DBP; 0.7 (-0.2, 0.7) mmHg for SBP], % body fat [2.6 (2.3, 3.0) %), and fasting insulin [0.5 (0.3, 0.8) mU/L), but lower levels of glucose [-0.5 (-0.9, -0.01) mmol/L) and adiponectin [-0.5 (-0.9, -0.1) μg/mL]. No difference was observed by eating attitudes for apolipoprotein A1. Although the clinical significance remains unclear given the modest effect sizes, our study suggests that unhealthy eating attitudes and dieting behaviors are associated with increased cardiometabolic risk factors as early as 11 years of age.

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EVALUATING UNIVERSAL EDUCATION AND SCREENING FOR POSTPARTUM DEPRESSION USING POPULATION-BASED DATA, NEW JERSEY, 2009-2010. Sherry Farr*, Charles Denk, Elizabeth Dahms, Patricia Dietz (Centers for Disease Control and Prevention, Atlanta, GA United States)

In 2006, New Jersey was the first state to mandate prenatal education and screening at hospital delivery for postpartum depression. We sought to evaluate provision of prenatal education and screening at delivery and identify venues where additional screening and education could occur. For women who delivered live infants during 2009 and 2010 in New Jersey, data on Edinburgh Postnatal Depression Scale scores assessed at hospital delivery and recorded on birth records were linked to survey data from the Pregnancy Risk Assessment Monitoring System (PRAMS), a population-based survey of mothers completed 2-8 months postpartum. The PRAMS survey assesses postpartum depressive symptoms and whether the woman's prenatal care provider discussed postpartum depression with her. All analyses were conducted in SUDAAN using appropriate weights to generate population-based estimates. Data from both sources were available for 2,012 women (84.1% of PRAMS participants delivering in hospitals reporting depression screening results to the NJ Department of Health). Of women, 67.2% (95% confidence interval (CI): 64.9-69.5) reported that a prenatal care provider discussed depression with them and 88.6% (95% CI: 87.3-89.8) were screened for depression at hospital delivery. Among women with depressive symptoms at delivery and/or during the postpartum period, 19.1% (95% CI: 14.5-24.7) had an infant in the neonatal intensive care unit (NICU); 98.5% (95% CI: 95.9-99.5) of their infants attended ≥1 well baby visits; and 43.3% (95% CI: 37.2-49.9) were WIC participants. Prenatal education and screening for depression at hospital delivery is feasible and results in the majority of women being educated and screened. However, more information is needed on how to utilize NICU, well baby and WIC encounters to ensure effective education, accurate diagnosis and treatment for depressed women.

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APPLICATION OF THE WORLD HEALTH ORGANIZATION (WHO) INTERNATIONAL CLASSIFICATION OF FUNCTIONING, DISABILITY AND HEALTH (ICF) TO INDIVIDUALS WITH DUCHENNE/BECKER MUSCULAR DYSTROPHIES: THE MUSCULAR DYSTROPHY SURVEILLANCE, TRACKING, AND RESEARCH NETWORK (MD STARNET). Kristin Caspers Conway*, Christina Westfield, Emma Ciafaloni, Michele Yang, Dennis Matthews, Kathy James, Pangaja Paramsothy, Paul Romitti (The University of Iowa, Iowa City, IA United States)

Aim: To identify domains and categories from the WHO ICF body function component clinically relevant to Duchenne/Becker muscular dystrophies among a population-based sample of males identified by the MD STARnet. **Methods**: The hierarchical coding structure of the ICF consists of 8 first-level body function domains for which additional categories of greater granularity are provided (Levels 2-4). Two MD STARnet neuromuscular clinicians reviewed all ICF body function component domains and categories to identify those affected by Duchenne/Becker muscular dystrophies; discrepancies within categories were resolved by consensus. The domains and highest category level (Level 2) selected and agreed upon by the clinicians were compiled. **Results**: Six of 8 domains with 24 of 79 Level 2 categories were selected as clinically relevant to Duchenne/Becker muscular dystrophies. The function domains with corresponding number of Level 2 categories were: 'Mental Functions' (5 of 20); 'Sensory Functions and Pain' (1 of 12); 'Voice and Speech Functions' (0 of 4); 'Functions of the Cardiovascular, Hematological, Immunological and Respiratory Systems' (6 of 10); 'Functions of the Digestive, Metabolic, and Endocrine Systems' (7 of 10); 'Genitourinary and Reproductive Functions' (0 of 7); 'Neuromusculoskeletal and Movement-Related Functions' (4 of 10), and 'Functions of the Skin and Related Structures' (1 of 6). **Conclusion**s: This first phase of reviewing clinically relevant ICF body functions identified a comprehensive set of domains and categories that represent compromised functions among those affected by Duchenne/Becker muscular dystrophies. Subsequent phases will link MD STARnet surveillance data with selected ICF function categories to develop patient profiles, determine severity of disability and evaluate the impact of disability on ICF Activity Limitations and Participation components.

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WHEN DOES ADJUSTMENT FOR PREDICTORS OF EXPOSURE MISCLASSIFICATION INCREASE BIAS? A SIMULATION STUDY. Samantha E Parker*, Mahsa M Yazdy, Matthew P Fox, Daniel R Brooks (Boston University School of Public Health, Boston, MA United States)

Accurate measurement of variables utilized in epidemiologic research is necessary for minimizing the impact of information bias. One method commonly used in an attempt to decrease bias when exposure information is suspected to be of different quality is to statistically adjust for or match on predictors of misclassification, such as whether data was obtained directly from subjects or from next-of-kin. Although it has been shown this approach can in fact increase bias, the conditions under which adjustment for predictors of misclassification might increase, decrease, or have no impact on bias have not been systematically assessed across a range of scenarios. We used 7,290 datasets of N=10,000 to simulate 3 case-control studies where the true odds ratio (OR) was 0.5, 1.0, or 2.0. Parameters that were manipulated were the prevalences of exposure (0.01 – 0.99) and the predictor among cases (0.25-0.75) and controls (0.25-0.75), and sensitivity (0.70-0.90) and specificity (0.70-0.90) of the exposure classification with and without the predictor. We classified adjustment as harmful (adjusted OR>10% further from the true value compared to the misclassified unadjusted), beneficial (adjusted OR>10% closer to the true value compared to the misclassified unadjusted), or having no impact (within 10% of the unadjusted value). In many plausible scenarios, adjustment either increased or did not reduce bias. For example, with exposure prevalence of 0.20 and a true OR of 2.0, adjustment decreased bias in only 17% of the simulated scenarios, the majority of which had at least one parameter of sensitivity or specificity at 0.70. Given the frequency with which adjustment did not reduce or actually increased bias and the fact that information regarding sensitivity and specificity of predictors of exposure classification are rarely known, adjustment for predictors of exposure misclassification is not recommended.

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INDUCTION AND IMPACT OF NON-DIFFERENTIAL MEASUREMENT ERROR THROUGH USE OF REGRESSION CALIBRATION: ILLUSTRATION IN A REAL-DATA EXAMPLE OF RISK FACTORS FOR WHITE MATTER HYPERINTENSITY PROGRESSION. Melinda C. Power*, Thomas Mosley, Dean Shibata, Rebecca F. Gottesman (Johns Hopkins Bloomberg School of Public Health, Baltimore, MD United States)

Regression calibration is a common approach for equating non-equivalent data and is usually used in the context of changes in measurement approach or technology. After correction, the remaining measurement error is assumed to be non-differential. However, this assumption may not always hold. We provide a real-data example, a study of risk factors for cerebral white matter hyperintensity (WMH) progression, where use of regression calibration appears to induce non-differential bias and illustrate the approach we took to identify this problem. A subset of participants in the Atherosclerosis Risk in Communities Study (ARIC) underwent brain magnetic resonance imaging (MRI) in 1993-1995 and in 2004-2006; 976 subjects participated at both time points. Given changes in MRI technology, WMH severity was characterized using a 9-point scale in 1993-1995, but was characterized using both the scale and measured volume in 2004-2006. We developed a regression calibration approach to estimate WMH volume based on the scale in order to take advantage of the available volume data using paired scale-volume data from 2004-2006; analyses suggested a quadratic relationship between scale score and volume (R2=0.80). However, residual diagnostics on the regression calibration model demonstrated large errors relative to the mean and standard deviation of observed volumes for a substantial number of participants. Further analyses demonstrated that several potential risk factors significantly predicted these errors in both univariate and multivariate models, such that if the regression calibration algorithm was applied to 1993-1995 MRI scale scores, the resulting bias would inflate or induce adverse associations for models of risk factors for WMH volume change (actual 2004-2006 volumes minus derived 1993-1995 volumes). Similar bias is expected if WMH progression been an exposure, rather than outcome variable.

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IDENTIFYING CONDITIONS ASSOCIATED WITH BEING HIGHLY IMAGED FROM COMPUTED TOMOGRAPHY (CT). Leslie D. McIntosh*, Thomas C. Bailey, Richard T. Griffey (Washington University School of Medicine, St. Louis, MO United States)

OBJECTIVES: The use of computed tomography (CT) has steadily increased over the past ten years, and previous studies have shown that repeated imaging could increase cancer risk. The ability to identify particular medical conditions leading to multiple or repeat CT imaging over a patient's lifetime would be useful in directing strategies to avoid or limit ionizing radiation among higher risk groups. **METHODS**: We conducted a retrospective, exploratory, observational study at an urban hospital using a centralized data repository of electronic medical records. The primary outcome measure was identification of chronic conditions associated with being in the top 10% of CT imaging frequency from 1 million unique patients seen during 2003-2012. Due to the large number of initial conditions returned, we only reviewed diagnoses prevalent in at least 100 patients then we used a modification of the term frequency-inverse document frequency (tf-idf) algorithm to produce a statistical score based on each diagnosis to account for its prevalence. This score increased based on the number of times a diagnosis appears per patient, weighted for the frequency of the diagnosis across all patients, allowing for less prevalent diagnoses to be identified by assigning them higher weights. Two authors independently reviewed diagnoses, scores, and CCS groups to arrive at a list of candidate conditions for testing. **RESULTS**: Among 6,331 unique diagnoses, 532 were reviewed, and 168 identified as potential unique diagnoses. 93 diagnoses grouped into 27 conditions remained after comparing the top and bottom 10% of the cohort. Seventeen conditions were associated with being in the top 10% of CT imaging. **CONCLUSIONS**: The identified chronic conditions that place patients at risk for being highly imaged may be useful in considering patient risk profiles in directing efforts in imaging quality improvement.

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WHOSE BURDEN? SYNTHESIZING EVIDENCE FROM DIVERSE PERSPECTIVES FOR A COMPREHENSIVE DESCRIPTION OF DISEASE BURDEN. Amy Colquhoun, Arianna Waye*, Karen J. Goodman (University of Alberta, Edmonton Canada)

To address public concerns about a specific health threat and develop effective public health strategies aimed at reducing related health risks, it is necessary to describe the extent of the health threat in the target population. This typically involves assessing the impact of the health threat using quantitative measurement of pertinent epidemiologic and economic indicators. To ensure that public health strategies developed through the investigative process are relevant to the target population, however, valuable insights can be gained by ascertaining how affected community members and their health care providers view related risks. In fact, information regarding public perspective and quantitative assessments of health indicators are both essential so that resulting solutions are culturally-sensitive and cost-effective for the target population. While existing literature espouses the benefits of building collective knowledge to capture the depth and complexity of health and disease, there is limited information about the most effective ways to synthesize different forms of evidence to construct a comprehensive assessment of the burden of disease. Research is currently underway in northern Canadian Aboriginal communities concerned over their high prevalence of *Helicobacter pylori* infection and the associated risk of stomach cancer. This community-driven research program will be used to illustrate the value of incorporating multiple perspectives in characterizations of disease burden when attempting to address public health concerns, with emphasis on the application of methods for synthesizing diverse types of evidence on disease burden.

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ASSESSING POSITIVITY IN ENVIRONMENTAL EPIDEMIOLOGY: APPLICATIONS TO MULTI-POLLUTANT MODELING. Jonathan M Snowden*, Colleen E Reid, Kathleen Mortimer, Ira Tager (Oregon Health and Science University, Portland, OR United States)

Air pollution epidemiology is increasingly moving toward analysis of mixtures and multi-pollutant modeling. Although the statistical challenges associated with highly correlated exposure variables are well-known in air pollution epidemiology, there has been less attention paid to the issue of the causal interpretation these effects. To illustrate the concerns related to lack of data support/positivity in air pollution epidemiology, we analyzed how daily concentration changes in two air pollutants (NO2 and PM2.5) related to one another across seasons (summer and winter), and cities with distinct air pollution profiles (Burbank, California; Houston, Texas; Pittsburgh, Pennsylvania). In each city and both seasons, we examined the empirical data support underlying the IQR approach to multipollutant effect estimation in time-series studies with lag 1 (i.e., multiplying one regression coefficient by an IQR). We operationalized assumptions behind the IQR approach by defining two conditions regarding daily variability in the pollutants. Condition 1 specified that the index pollutant had to experience a daily concentration change of greater than one IQR, reflecting the assumption that the daily concentration can change by an IQR interval. Condition 2 specified that the co-pollutant had to remain relatively constant (as is implicitly assumed by its inclusion in the multivariable model with no scaling of the regression coefficient). We found that data support varied by city and season, and in some instances was inadequate (e.g., only 1 day meeting the assumptions of the IQR approach). We discuss the practical implications of non-positivity and encourage other environmental investigators to explicitly address positivity in their research.

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PRINCIPLE COMPONENT ANALYSIS WITH INCOMPLETE DATA: A SIMULATION OF R PCAMETHODS PACKAGE IN CONSTRUCTING AN ENVIRONMENTAL QUALITY INDEX WITH MISSING DATA. Shannon Grabich*, Christine Gray, Kristen Rappazzo, Lynne Messer, Jyotsna Jagai, Danelle Lobdell, Danelle Lobdell (University of North Carolina at Chapel Hill, Environmental Protection Agency, Chapel Hill, NC United States)

Missing data is a common problem in the application of statistical techniques. In principal component analysis (PCA), a technique for dimensionality reduction, incomplete data points are either discarded or imputed using interpolation methods. Such approaches are less valid when a significant portion of the data is unknown. We simulated alternative methods for handling incomplete data with PCA using the Environmental Quality Index (EQI) developed by the Environmental Protection Agency. The EQI was developed for all U.S. counties (n=3,141) and includes 5 domains: air, water, land, sociodemographic, and built environment. We simulated varying levels of missing data (5%, 10%, 20%, 30%) in the data matrix and implemented four algorithms in R pcaMethods package for handling the missing cases: Probabilistic PCA (PPCA), Bayesian PCA (BPCA), Inverse non-linear PCA(IPCA), and Non-linear estimation by iterative partial least squares (Nipals) PCA. In simulations with 30% missing three of four algorithms gave similar resulting eigenvalues and variable weights as the full data. For example, weights for 1,1,2,2-Tetrachloroethane (air domain) for the first component ranged from 0.10-0.18 with the complete data yielding a weight of 0.12. Overall BPCA and Nipals were computationally the least efficient. BPCA and IPCA consistently had the lowest, possibly more biased, standard deviations (e.g. PCA of air domain standard deviations were: 0.1 for BPCA and IPCA, 5.0 for PPCA, and 8.0 for Nipals). Nipals significantly diverged from the complete dataset as the complete data became more sparse. PPCA was the most efficient, and unbiased for large datasets even at 30%. These simulations introduce an efficient way to address incomplete data when using PCA to construct indices such as the EQI. This abstract does not necessarily reflect EPA policy.

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USING ROUTINE HEALTH INFORMATION SYSTEMS FOR WELL-DESIGNED HEALTH EVALUATIONS IN LOW-AND MIDDLE-INCOME COUNTRIES. Bradley Wagenaar*, Kenneth Sherr, Quinhas Fernandes, Alexander Wagenaar (University of Washington, Seattle, WA United States)

Health information systems (HIS) are in place in nearly every country and provide routinely collected full-coverage records on all levels of health system service delivery. However, these rich sources of data are regularly overlooked for evaluating population-level effects of health programs due to concerns regarding completeness, timeliness, representativeness, and accuracy. Using example data from Mozambique's national HIS (Módulo Básico), we urge renewed attention to the use of HIS data for health evaluations. Interventions to improve data quality exist and have been tested in low-and middle-income countries (LMICs). Intrinsic features of HIS data (numerous repeated observations over extended periods of time, full coverage of health facilities, and numerous real-time indicators of service coverage and utilization) provide for very robust quasi experimental designs, such as controlled interrupted time series (cITS), which are not possible with intermittent community sample surveys. In addition, cITS analyses are well suited for continuously evolving development contexts in LMICs by: (1) allowing for measurement and controlling for trends and other patterns before, during, and after intervention implementation, and (2) facilitating the use of numerous simultaneous control groups and nonequivalent dependent variables at multiple nested levels to increase validity and strength of causal inference. With expanded use of HIS data for the evaluation of health programs, investments in data systems, health worker interest in and utilization of HIS data, as well as concomitant data quality will further increase over time. Since HIS data is ministry-owned and operated, relying upon these data will contribute to sustainable national capacity over time.

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ACCOUNTING FOR MEASUREMENT ERROR IN MARGINAL STRUCTURAL MODELS: JOINT EFFECTS OF SMOKING AND ANTIRETROVIRAL THERAPY. Jessie K. Edwards*, Stephen R. Cole (University of North Carolina at Chapel Hill, Chapel Hill, NC United States)

Marginal structural models have become central to the analysis of observational studies of HIV, but applications of these models typically assume that variables are measured without error. We describe a method to account for non/differential measurement error in a marginal structural model. We illustrate the proposed method estimating the joint effects of antiretroviral therapy (ART) initiation and smoking on all-cause mortality in a cohort of patients with HIV. We followed 12,290 patients enrolled in care at one of 8 clinical sites in the CFAR network of integrated clinical systems for mortality for 3 years. ART was defined as initiation of 3 or more antiretroviral drugs, and smoking status was obtained from physician notes on patient intake forms. Physician-reported smoking status was likely measured with error. A subset of 3686 patients who also reported current smoking status on separate questionnaires composed an internal validation subgroup. In this group, the sensitivity of physician-reported smoking was 74% (95% CI: 72%, 76%) and the specificity was 83% (95% CI: 81%, 85%). We compared a standard joint marginal structural model fit using inverse probability weights with a model extended using multiple imputation to account for misclassification of smoking status; both approaches accounted for measured fixed and time-varying covariates. In the standard analysis, the hazard ratio (HR) for the effect of smoking was 0.96 (95% CI: 0.74, 1.25) under ART initiation. After accounting for misclassification of smoking status, the HR was 1.53 (95% CI: 0.79, 2.95). Multiple imputation to account for measurement error can be used in concert with methods for causal inference to strengthen observational studies.

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MONTE CARLO SENSITIVITY ANALYSIS TO CORRECT FOR EXPOSURE MISCLASSIFICATION: THE EXAMPLE OF HAZARDOUS DRINKING AND PROGRESSION TO LIVER FIBROSIS IN THE CANADIAN CO-INFECTION COHORT STUDY. Laurence Brunet*, Erica Moodie, Curtis Cooper, Sharon Walmsley, Valérie Martel-Laferrière, Kathleen Rollet, Marina Klein (McGill University, Montreal Canada)

Alcohol is a well-known risk factor for liver fibrosis. Hazardous drinking can be identified with a validated 3-item questionnaire (AUDIT-C). One question (How often do you have a drink containing alcohol?) was omitted in the follow-up questionnaires of the Canadian Co-infection Cohort Study so the validated measure for hazardous drinking can only be calculated at baseline. We aimed to estimate the magnitude of bias introduced by imperfect measures of hazardous drinking in relationship with progression to liver fibrosis, while adjusting for confounding. We analyzed data for 925 persons infected with HIV and hepatitis C (HCV) without fibrosis at baseline and censored at initiation of HCV treatment. The validity of 3 imperfect measures of hazardous drinking was assessed at baseline against the AUDIT -C measure and used to inform a trapezoidal distribution of sensitivity and specificity for the Monte Carlo sensitivity analysis. A value was randomly drawn from these distributions to perform a record-level correction of the exposure. The association between fibrosis and the corrected measure of hazardous drinking was assessed with pooled logistic regression, adjusting for potential confounders. This process was repeated 20,000 times to obtain a distribution of measurement error-corrected OR. The measurement error corrected ORs (95% CI) for the 3 imperfect measures ranged between 2.14 (1.44, 3.59) and 2.79 (1.62, 5.43) while the uncorrected ORs ranged between 1.71 (1.24, 2.36) and 1.93 (1.32, 2.81). Results of the conventional analysis were 19-37% closer to the null, compared to the results obtained after correcting for measurement error, depending on the imperfect measure used. These results show the impact exposure misclassification can have on epidemiologic findings. MCSA reflects the uncertainty regarding the true sensitivity and specificity of a measure, as opposed to deterministic sensitivity analyses.

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A REGRESSION-BASED APPROACH FOR ADJUSTING FOR COMORBID CONDITIONS IN THE ESTIMATION OF UNITED STATES DISEASE EXPENDITURE, 1996-2010. Rose Gabert, Anthony Bui, Ranju Baral, Anne Bulchis, Brendan DeCenso, Daniel Dicker, Michael Hanlon, Jonathan Joseph*, Rouselle Lavado, Christopher Murray, Noelle Nightingale, Martin Tobias (Institute for Health Metrics and Evaluation, Seattle, WA United States)

United States health care is characterized by large volumes of patient encounters complicated by comorbid conditions. Studies quantifying national health expenditures tend to ignore the issue of multiple diagnoses for a given encounter. Most approaches in the United States have bypassed the issue by aggregating expenditure at the age-sex level. Some international work has further disaggregated expenditure into disease categories, assigning expenditure for a given encounter to primary diagnosis only or splitting it evenly across all causes listed. This paper takes our original work of estimating US disease expenditure by primary diagnoses and employs a regression-based strategy to distribute expenditure across multiple diagnoses. We use two types of data – (1) volume data, which provides encounters (e.g. number of outpatient visits), and (2) price data, which provides price per encounter (e.g., charges per visit). In the volume data we observe a sample of individuals and a distribution of single and multiple diagnoses. Where we observe comorbidities, we distinguish between primary and secondary diagnoses. In the price data we observe the average expenditure for each encounter. For comorbid encounters, we run a log-linear regression in which the outcome variable is an encounter charge with a random effect on the primary diagnosis and fixed effects on all secondary diagnoses, assuming the effect of the secondary diagnosis on the encounter charge is independent of the primary diagnosis. Coefficients from the primary and the secondary diagnoses provide us with a distribution of the expenditures for the set of diseases in a comorbid encounter. We parse out comorbid expenditure with this distribution and reallocate expenditure to each individual disease or condition. Ultimately we produce comorbidity-adjusted US health expenditure by disease, age, and sex, for three five-year periods, 1996 to 2010.

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ASSESSING HEALTH SYSTEM PRODUCTIVITY BY DISEASE AND INJURY, AGE, AND SEX FOR THE UNITED STATES, 1996-2010. Ranju Baral*, Anthony Bui, Anne Bulchis, Brendan DeCenso, Daniel Dicker, Rose Gabert, Michael Hanlon, Jonathan Joseph, Rouselle Lavado, Christopher Murray, Noelle Nightingale, Martin Tobias (Institute for Health Metrics and Evaluation, Seattle, WA United States)

In 2010, the United States spent 2.6 trillion dollars on health care, about 18 percent of GDP. Not much is known about the total expenditure by diseases and injuries, nor is the relationship between health expenditure and its impact on changes in health outcomes at the diseases and injuries level. This paper describes the trends in US national health expenditures and corresponding health outcomes (measured in disability-adjusted life-years [DALYs]) for the past 15 years (1996-2010). Both expenditures and health outcomes are classified according to the diseases and injuries defined in the Global Burden of Disease 2010. To get the total expenditure data, we utilize disease volume and unit price of service consumed for various health functions from different data sources (such as National Hospital Discharge Survey, Medical Expenditure Panel Survey, National Inpatient Survey, National Hospital Ambulatory Medical Care Survey, National Ambulatory Care Survey). We also estimate US health system productivity growth at the national level by analyzing the relationships between the trends in disease expenditures and the corresponding trends in health outcomes, using econometric methods to adjust for time-varying confounders. Understanding health expenditure and trends in health expenditure at disease level is important as health outcomes are naturally measured at disease level. Information on expenditure and outcomes by disease or injury would facilitate evidence-based health policy formulation through more sharply focused policy design; enhance health system stewardship through sounder planning and budgeting; and improve health system performance management through greater transparency and accountability. In addition, by relating trends in disease expenditures to corresponding trends in health outcomes, health system productivity growth could be monitored and drivers of productivity improvement quantified.

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CONSIDERATIONS FOR ESTIMATING DISEASE PREVALENCE WITH ADMINISTRATIVE CLAIMS DATA. Elizabeth T Jensen*, Suzanne F Cook, Jeffery K Allen, Alan M Brookhart, Michael D Kappelman, Evan S Dellon (University of North Carolina at Chapel Hill, Chapel Hill, NC United States)

Administrative claims data offer the opportunity to study, at the population level, disease comorbidities, healthcare utilization patterns, and treatment-related outcomes. These data have been increasingly used in studies of disease incidence and prevalence. While it is conceptually simple to estimate prevalence, there is surprisingly little guidance in the literature about the limitations or considerations for using these data for the purposes of estimating disease prevalence. We conducted a cross-sectional study estimating the prevalence of five gastrointestinal conditions, including Barrett's Esophagus, Celiac Disease, Crohn's Disease, Ulcerative Colitis, and Eosinophilic Esophagitis. We used Truven Health Analytics Marketscan Commercial enrollment and claims data obtained from 2009-2012 with 86.4 million commercially insured enrollees aged 0-64. First, we identified the source population meeting various health plan enrollment, prescription drug benefit, or healthcare utilization characteristics. Next, we identified patients meeting the empirically-defined case definition for each of the diseases of interest. We compared the estimates obtained to evaluate the influence of enrollment period, drug benefit, and insurance usage. Between 2009-2012, the mean length of enrollment for patients meeting case definitions for the selected diseases was longer than the mean enrollment for the source population (e.g. mean enrollment of 854 for UC as compared to 595 days for the source population). As the criteria for inclusion in the source population became increasingly stringent (requiring longer periods of continuous enrollment or evidence of having used the benefit plan at least once) the estimated prevalence increased, between 56% and 69%, depending on the disease. Disease prevalence estimation in administrative claims data is sensitive to variations in the selection of the at-risk population.

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CUSUM AND FUNNEL PLOT FOR THE EVALUATION OF CLINICAL PERFORMANCE IN HEART TRANSPLANT IN FRANCE. Nasser HAWAJRI*, JACQUELINET Christian, Richard DORENT (Agence de la Biomédecine, SAINT DENIS LA PLAINE France)

Introduction: To improve healthcare outcomes, a number of government agencies have developed different graphical methods of rating health care providers on patient risk-adjusted outcomes. To provide accurate information about our heart transplantation centers in France, we compared 2 methods for post-transplantation mortality evaluation. **Methods**: We analyzed the data of the national heart transplantation registry for the period 2000 to 2011 (3500 patients from 26 transplantation centers). The studied outcome was post-transplantation one-year mortality rate in adult patients. --A Funnel plot is a plot of an outcome summary statistic from each transplantation centers against a specified target (national mortality rate) together with upper and lower control limits. The funnel plot was used to analyze distinct five year period cohorts. --The Cumulative Sum (CUSUM) is a plot over time, comparing the observed with expected outcomes based on either the national or a center-specific model of mortality. The CUSUM was used to analyze the cohort over the whole period. Both plots can be risk-adjusted for important donor and recipient characteristics. **Results**: The national post-transplantation one-year mortality rate over the studied period is 25.8% (24.4-27.3). Our results showed that CUSUM plots are more sensitive than funnel plots and also intuitively reveal trends in mortality excess over time. Some transplantation Centers which exceeded more than 50% of the national mortality rate over time where not detected by funnel plots, while CUSUM was able to detect such excess in mortality. **Conclusion**: Relying on funnel plots to detect low performance in transplantation centers may lead to under-estimation of an increase in mortality. CUSUM is adapted to continuous performance monitoring where funnel plot can be useful in overall performance reporting. The results of CUSUM are very important for clinicians, and policy makers, whereas the results of funnel plots could be provided to the general public also.

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ESTIMATING HEALTH EXPENDITURE BY DISEASE AND INJURY, AGE, AND SEX, FOR THE UNITED STATES, 1996-2010. Anthony Bui*, Ranju Baral, Anne Bulchis, Brendan DeCenso, Daniel Dicker, Rose Gabert, Michael Hanlon, Jonathan Joseph, Rouselle Lavado, Christopher Murray, Noelle Nightingale, Martin Tobias (Institute for Health Metrics and Evaluation, Seattle, WA United States)

In 2010, the United States spent 2.6 trillion dollars on health care, comprising almost 18 percent of GDP. While we know from the US National Health Expenditure Accounts (NHEA) what goods and services were purchased, we know little about what diseases and injuries are responsible for the largest share of expenditure. In our paper, we estimate expenditure disaggregated by disease or injury as classified by the Global Burden of Disease 2010 as well as by age and sex from 1996 to 2010. Our analytical strategy is composed of two components. First, we attain total US health expenditure by health function from the NHEA and adjust the expenditure categories with encounter-based micro-data to parse out expenditure by service provision type. Second, we attain a distribution of expenditure by condition, age, and sex within each service provision category. We use category-specific encounter-based micro data to estimate volume of encounters and unit prices of services consumed. For example, to attain the distribution of expenditure in US inpatient services, we obtain volume of bed-days from the National Hospital Discharge Survey (NHDS) and average price per bed-day from the National Inpatient Survey (NIS). We use a regression-based approach to smooth prices and volumes when appropriate. We apply these expenditure fraction disease distributions to our expenditure envelope estimates. Ultimately we produce expenditure estimates, overall and by function, by GBD condition, five-year age groups, and sex, for three five-year time periods between 1996 and 2010. We use a bootstrapping method to produce uncertainty intervals around all estimates. Having estimates of expenditure by disease and injury will help inform cost-effectiveness analysis of services and so contribute to better policies relating to resource allocation in the health sector.

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USING QUALITATIVE METHODS TO INFORM CONFOUNDING: AN EXAMPLE IN BREAST IMAGING. Karen Wernli* (Group Health Research Institute, Seattle, WA United States)

Confounding and bias need to be addressed in the design and analysis of epidemiologic studies. However, at times, concepts like physician referral bias are not well-defined or measured within quantitative data. Epidemiologic studies could benefit from qualitative methodology to more fully- understand potentially biases. We present an example to understand physician referral bias in a study of breast imaging in breast cancer survivors. National guidelines recommend women receive annual mammography after treatment for their first breast cancer in the absence of signs or symptoms of a new cancer. Over the past decade, women are also receiving breast MRI to detect second breast cancer events without clinical evidence to support this practice. We conducted key informant interviews with 4 physicians of different specialties to evaluate elements of physician referral patterns as pilot data. Physicians were asked about their general practice and rationale for referring women for different types of breast imaging after treatment for breast cancer. By conducting interviews with physicians, we were able to identify five key reasons that physicians refer women for breast MRI: 1) breast cancers not detected on a screening exam; 2) patient diagnosed with lobular carcinoma, a rare breast cancer; 3) breast MRI was done to diagnose the first breast cancer; 4) patient had > 20% lifetime risk of breast based on her characteristics prior to her first breast cancer; and 5) patient had dense breasts. These factors are available as quantitative measures in the data, and we can incorporate those measures confounders in our analytic plan. Further ongoing work will expand the number of key informant interviews with providers in different regions of the country. Mixed methods is one approach to more fully understand confounding and potential biases in quantitative data and epidemiologic studies could benefit from mixed methods approach, in particular for patient-centered care.

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USE OF CERVICAL PESSARIES TO PREVENT PRETERM DELIVERY AMONG TWIN GESTATIONS: PRELIMINARY STUDIES FOR A PRIORI SUB-GROUP ANALYSIS TARGETING PRECOCIOUS CERVICAL RIPENING IN A PROSPECTIVE META-ANALYSIS. Qing Li*, Zhiying You, Louis Keith (Department of Epidemiology & Biostatistics, Michigan State University, East Lansing, MI United States)

To evaluate whether use of cervical pessaries is more effective compared to targeting short cervices alone in preventing spontaneous preterm delivery (SPD, before 34 weeks) in subgroups of patients with PreCocious Cervical Ripening (PCCR) in order to plan a prospective meta-analysis (PMA). We conducted retrospective subgroup analyses and sample sizes estimation of a partially published nonrandomized concurrent control study of twin gestations (Arabin et al., 2003). Transvaginal ultrasonography (TVU) longitudinally assessed cervical length (CL) and funneling (CF) in 315 twin gestations at a Dutch center (1994-2001). Forty mothers with cervical pessaries were matched with 40 mothers without pessaries through existing pairs and nearest neighbor matching by CL within 2 mm. A short cervix was defined as CL<38 mm. Paired t-Test, McNemar's Test and conditional logistic regression were conducted. CF occurred in 38% and 15% of pessary and control groups, respectively. PTD was 77% less frequent in the pessary group (OR=0.23, 95% CI 0.07-0.81) and 83% less in a subgroup of 34 pairs with short cervices (OR=0.17, 95% CI 0.04 -0.75). Among 34 women with pessary treatment and short cervices, those with CF had 3% less SPD compared to those without CF (1/14 [7.1%] vs 2/20 [10.0%], OR=0.97, 95% CI 0.79-1.19). We specified the design parameters based on the Dutch data, and estimated the required sample sizes using an approach proposed by Demidenko (2008). A total of 1,628 mothers with twin gestations (i.e. 814 per group) will provide 80% power with a one-sided type I error of 0.05 to detect an interaction effect at the OR of 0.5. Mothers of twins with cervical pessaries had less SPD. Subgroups with short CL appear amenable to pessaries. These preliminary studies can help a priori biologic justification for subgroup analyses considering PCCR in the PMA of new pessary trials.

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MEDIATION MISGIVINGS: AMBIGUOUS CLINICAL AND PUBLIC HEALTH INTERPRETATIONS OF NATURAL DIRECT AND INDIRECT EFFECTS. Ashley Naimi*, Jay Kaufman, Richard MacLehose (McGill University, Montreal Canada)

Recent methodological innovation is giving rise to an increasing number of applied papers in medical and epidemiologic journals in which causal mediation analysis is used to estimate natural direct and indirect effects. In light of the repeated calls for a consequential epidemiology geared towards influencing population health, we question the utility and relevance of natural direct and indirect effects. We review three related issues: (1) the use of composite cross-world counterfactuals and the need for cross-world independence assumptions; (2) interventional versus non-interventional identifiability; and (3) the non-falsifiability and interpretational ambiguity of natural direct and indirect effect estimates. We use potential outcomes notation and directed acyclic graphs to explain ``cross-world'' assumptions, illustrate the implications of this assumption via marginal structural models, and discuss ensuing issues of scientific falsifiability and interpretation. We argue that the debate on the relevance of natural direct and indirect effects rests on whether one takes as a target of inference the mathematical object per se, or the change in the world that the mathematical object represents. We argue that public health questions will often be better served by estimating controlled direct effects.

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GENERALIZED ESTIMATING EQUATIONS OR HIERARCHICAL MODELS: WHEN AND WHY? Shabbar Ranapurwala* (University of North Carolina, Chapel Hill, Chapel Hill, NC United States)

Longitudinal and hierarchically nested studies usually accrue data with repeated measures, often called correlated or clustered data. Controlling for the non-independence of outcomes within a cluster involves accounting for both the within-cluster and between-cluster variances. Generalized estimating equations (GEE) and multilevel (hierarchical) models are two commonly employed methods for such data. GEEs are more widely used because of their computational ease and robustness. The robustness assures that the estimate and the standard error would be unbiased even if the working correlation structure is incorrectly specified or based on an informed guess. However, GEEs assume little to no missing data or that the data is missing completely at random; additionally they may fail if there are very few clusters or if the data structure is complex (> two levels of clustering). In contrast, hierarchical models are computationally difficult and need correct specification of the working correlation matrix, but they can be used for more complex data and can help make inferences about the data structure. We compare and contrast these two methods using two empirical examples from scuba diving injury studies: 1) a longitudinal study assessing the effects of repeated daily diving on decompression stress among scuba divers by comparing venous gas emboli (bubbles) grades in the right heart using transthoracic echocardiography and 2) a cluster randomized trial of predive checklists in recreational scuba divers to prevent the incidence of mishaps. Both methods yield similar results however the hierarchical models provide a deeper understanding of the effect process. We will also assess the sensitivity of both the methods based on the number of clusters and missing data.

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EXPOSURE TO POLYCYCLIC AROMATIC HYDROCARBONS DURING PREGNANCY AND PRETERM BIRTH. Amy Padula*, Elizabeth Noth, S. Katharine Hammond, Frederick Lurmann, Wei Yang, Gary Shaw (Stanford University, Stanford, CA United States)

Background: Preterm birth is an important marker of health with a prevalence of 12-13% in the U.S. Polycyclic aromatic hydrocarbons (PAH) are a group of organic contaminants that form from the incomplete combustion of hydrocarbons, such as coal and gasoline. Studies suggest that exposure to PAH during pregnancy is related to several adverse birth outcomes. The aim of this study was to evaluate the association between exposure to PAH during the pregnancy and preterm birth. **Methods**: The study population included births from years 2001-2006 of women whose maternal residence was within 20 km of the EPA supersite in Fresno, California. Data in the Fresno area were used to form a spatio-temporal model to assign daily exposure to PAH with 4, 5, or 6 rings at the maternal residence throughout pregnancy of all of the births in the study area. Gestational age at birth and relevant covariates were extracted from the birth certificate and hospital discharge records. **Results**: We found an association between PAH during the last 6 weeks of pregnancy and birth at 20-27 weeks (OR=2.74; 95% CI: 2.24-3.34) comparing the highest quartile to the lower three. The association was consistent when each quartile was compared to the lowest (OR2nd=1.49, 95% CI: 1.08-2.06; OR3rd=2.63, 95% CI:1.93-3.59; OR4th=3.94, 95% CI:3.03-5.12). Inverse associations were also observed for exposure to PAH during the entire pregnancy and the first trimester and birth at 28-31 weeks and 20-27 weeks. **Conclusion**: An association between PAH exposure during the 6 weeks before delivery and early preterm birth was observed. However, the inverse association with early preterm birth offers an unclear, and potentially complex, inference of these associations.

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MATERNAL URINARY BISPHENOL A DURING PREGNANCY AND MATERNAL AND NEONATAL THYROID HORMONE CONCENTRATIONS. Megan E. Romano*, Glenys M. Webster, Ann Vuong, R. Zoeller, Andrew Hoofnagle, Aimin Chen, Kim Yolton, Bruce P. Lanphear, Joseph M. Braun (Center for Environmental Health and Technology, Brown University, Providence, RI United States)

Bisphenol A (BPA) is an endocrine disrupting chemical found in a variety of consumer products. Animal and human studies suggest that BPA disrupts thyroid function, which may reduce child cognitive abilities. The only prior epidemiologic study suggests that prenatal BPA exposure has sex-specific effects on thyroid hormones (THs). We examined the associations between maternal urinary BPA and maternal or cord serum THs in the Health Outcomes and Measures of the Environment Study, a prospective birth cohort (2003-2006, Cincinnati, Ohio). BPA was measured in maternal urine collected at 16±3 and 26±2 weeks gestation. We measured free and total thyroxine (T4) and thyroid stimulating hormone (TSH) in maternal serum collected at 16±3 weeks (n=185) and cord serum (n=252). In multivariable linear regression, we found no significant associations between 16-week BPA and maternal THs or between BPA and cord T4. However, each 10-fold increase in average maternal urinary BPA level was associated with decreased cord TSH in female newborns (percent change = -31%; 95% CI:-49,-8%) but not males (3%; 95% CI:-26,42; p for effect measure modification=0.04). Maternal urinary BPA level at 16 weeks was not significantly associated with TSH (females:-6%; 95% CI:-31,28%; males:-3%; 95% CI:-33,42%; p for effect measure modification=0.87). Whereas, 26-week maternal urinary BPA level was associated with reduced TSH for females (-43%; 95% CI:-60,-18%) but not males (-1%; 95% CI:-20,24%; p for effect measure modification=0.01). Our findings do not suggest an association between urinary BPA levels and maternal early pregnancy THs or cord T4 levels. In contrast with one prior study that reported reduced TSH among male newborns only, our findings suggest that prenatal BPA exposure may reduce cord TSH among female newborns. Maternal BPA exposure later in pregnancy may have greater influence on newborn TSH than early pregnancy exposure.

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PRENATAL EXPOSURE TO HEAVY METALS AND PERFLUOROALKYLACIDS AND CORD BLOOD LEVELS OF IMMUNE SYSTEM BIOMARKERS. Jillian Ashley-Martin*, Linda Dodds, Tye Arbuckle, Adrian Levy, Robert Platt (Dalhousie University, Halifax Canada)

Heavy metals and perfluoroalkyl acids (PAA) have been hypothesized to be a component cause in atopic disease etiology. Elevated levels of Immunoglobulin E (IgE), Interleukin-33 (IL33) and Thymic Stromal Lymphopoietin (TSLP) are integral to risk of atopic disease. Yet, it is not known whether in utero exposure to the contaminants is associated with elevated levels of TSLP, IL33 and IgE at birth. Despite gender differences in childhood atopy prevalence, potential sex-dependent mechanisms of early life exposures are unclear. The objectives here were1) to examine associations between prenatal heavy metal and PAA exposure and elevated umbilical cord blood immune system biomarker levels and 2) to assess how these relationships differ by infant sex. This study utilized data collected in the Maternal-Infant Research on Environmental Chemicals (MIREC) Study, a trans-Canada cohort study of 2001 pregnant women. 1254 women had a singleton, term birth and cord blood sample. Multivariate logistic regression was used to model associations between continuous log-transformed exposures and odds ratios (OR) of elevated immune system biomarker levels (≥80%ile TSLP/IL33; ≥85%ileIgE). No significant associations between environmental contaminant exposure and elevated IgE, TSLP or IL33 were observed. Effect modification by sex was observed in the relationship between prenatal lead exposure and IgE (females; OR= 1.3, 95% CI: 0.4-4.1; males OR=0.3, 95% CI: 0.1-1.0) and between prenatal exposure to perfluorohexanesulfonate (PFHxS) and TSLP andIL33 (males OR=1.37, 95% CI: 0.7-2.6; females OR=0.6, 95% CI: 0.3-1.1). Prenatal lead and PFHxS exposure may be affecting fetal immune system biomarkers in a sex-dependent manner. The absence of significant findings may suggest that any clinically detectable effect of heavy metals and PAAs in an atopic disease pathway is not evident at birth.

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PRENATAL EXPOSURE TO PERFLUORINATED CHEMICALS AND RISK OF CONGENITAL CEREBRAL PALSY IN CHILDREN. Zeyan Liew*, Beate Ritz, Eva Bonefeld-Jørgensen, Tine Henriksen, Ellen Nohr, Bodil Bech, Chunyuan Fei, Rossana Bossi, Ondine von Ehrenstein, Elani Streja, Peter Uldall, Jørn Olsen (University of California, Los Angeles, Los Angeles, CA United States)

Objectives: Perfluorinated chemicals (PFCs) are persistent pollutants with widespread human exposure. Research data suggest that PFCs have endocrine disruptive properties and may disturb fetal brain development. We investigated whether prenatal exposure to PFCs increases the risk of congenital cerebral palsy (CP), a permanent movement and posture disorder, in children. **Methods**: We studied 83,389 liveborn singleton children and mothers enrolled in the Danish National Birth Cohort (DNBC) during 1996–2002 with an average 10 years of followed-up. In this cohort we identified 156 CP cases from the Danish National Cerebral Palsy Register and randomly selected 550 controls using a case-cohort design. Fifteen PFCs were measured in maternal plasma samples collected in early or mid-pregnancy. We used generalized linear models to estimate Risk Ratios (RRs) for CP. **Results**: Eight PFCs were quantifiable in >45% of the measured samples. We found higher risks of CP in boys with increasing maternal PFC levels (RR=1.74 (95%CI 1.05-2.88) per one unit (natural-log ng/mL) increase in perfluorooctane sulfonate (PFOS) and RR=1.99 (95%CI 1.15-3.44) per unit increase in perfluorooctanoic acid (PFOA)). We also observed a dose-response pattern of CP risks in boys per PFOS and PFOA quartile (p-trend<0.01). PFC was associated with both spastic unilateral or bilateral CP sub-phenotypes. No association between PFCs and CP was found in girls. **Conclusion**s: Prenatal exposures to common PFCs may increase the risk for CP in boys, but the finding is novel and replication is needed.

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LABOR INDUCTION AND CESAREAN DELIVERY: IMPLICATIONS IN THE CHOICE OF COMPARISON GROUP. Valery Danilack*, Elizabeth Triche, David Dore, Janet Muri, Maureen Phipps, David Savitz (Brown University School of Public Health, Providence, RI United States)

Although many studies have explored the impact of labor induction on cesarean delivery (CD), the evidence remains inconclusive because studies have addressed inherently different questions. The question "Does induced or spontaneous labor more often lead to CD?" is answered by comparing type of labor onset at a given point in gestation, whereas the question "Does the decision to induce versus not induce at a given point in gestation affect risk of CD?" addresses the impact of a clinical decision between induction and expectant management. We examined the influence of comparison group choice on the risk ratio (RR) for labor induction and CD among 208,915 mother-newborn dyads from fourteen member hospitals of the National Perinatal Information Center / Quality Analytic Services, 2007-2012. We included singleton births between 34 and 42 completed weeks' gestation, and excluded those with contraindications to vaginal delivery. Women induced at 39 weeks had the lowest incidence of CD (14%), while women induced at 42 weeks had the highest (37%). When comparing induced labor to spontaneous labor, induction had a lower risk for CD at 34-36 weeks (RR 0.6-0.8), but a higher risk at 37-42 weeks (RR 1.5-2.4). However, when comparing induction to expectant management (all future deliveries), the risk for CD after induction was lower at every gestational week (RR 0.4-1.0). RRs were slightly lower (0.5-0.8) when the expectant management group started the week after induction and ranged from 1.0-1.8 when pre-labor cesarean deliveries were excluded. The observed relationship between labor induction and CD is sensitive to comparison group composition and choice of comparison group informs different clinical questions.

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PRENATAL PHTHALATE EXPOSURE AND FAT MASS IN CHILDHOOD: EXAMINING THE OBESOGEN HYPOTHESIS. Jessie Buckley*, Stephanie Engel, Amy Herring, Michelle Mendez, David Richardson, Antonia Calafat, Mary Wolff (University of North Carolina, Chapel Hill, Chapel Hill, NC United States)

Experimental animal studies and limited epidemiologic evidence suggest that phthalates may be environmental obesogens. We examined associations between phthalate metabolite concentrations measured in maternal urine collected during the third trimester of pregnancy and child's fat mass at ages 4-9 years in a birth cohort enrolled in New York City during 1998-2002 (N=404). Fat mass was determined using bioelectrical impedance at multiple visits between ages 4 and 9 (N=181 children with 367 visits). Associations between percent fat mass and the natural log of phthalate metabolite concentrations were estimated using linear mixed models with multiple imputation for missing covariate data. Estimates were adjusted for urinary creatinine, child sex, maternal characteristics, race/ethnicity, pre-pregnancy body mass index, gestational weight gain, and gestational smoke exposure as well as physical activity and age at follow-up. Because some phthalates may have antiandrogenic effects, child sex was assessed as an effect measure modifier. Summed di-(2-ethylhexyl) phthalate metabolites concentrations were associated with decreased percent fat mass at follow-up (ß=-0.81, 95% CI= -1.70, 0.01 per log unit). Estimates for mono-butyl (MBP), mono-isobutyl (MiBP), mono-benzyl (MBzP), and mono-(3-carboxypropyl) (MCPP) phthalate were significantly modified by child sex such that increasing concentrations were associated with higher percent body fat in girls and lower percent body fat in boys. For each log unit increase in MBP, fat mass increased on average by 1.41% (95% CI= -0.22, 3.04) in girls and decreased on average by 1.20% (95% CI= -2.33, -0.06) in boys. Magnitude and precision of estimates were similar for MiBP, MBzP, and MCPP. These results suggest that prenatal exposure to certain phthalates may be related to childhood body composition with some metabolites exhibiting sexually-dimorphic effects.

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SMALL FOR GESTATIONAL AGE INFANTS BORN TO ASTHMATIC MOTHERS IN ASSOCIATION WITH FIRST TRIMESTER AIR POLLUTION. Pauline Mendola*, Candace Robledo, Edwina Yeung, Kira Leishear, Danping Liu, Tuija Mannisto, Seth Sherman, Katherine Grantz (Eunice Kennedy Shriver National Institute of Child Health and Human Development, Rockville, MD United States)

Both asthma and air pollution have been associated with fetal growth restriction. We assessed the joint impact of air pollution and maternal asthma on the risk of small for gestational age (SGA, ≤10th percentile of birthweight for age and gender). The Consortium on Safe Labor (2002-2008) provided gestational age and birth weight for 220,853 singleton infants including 16,896 deliveries with maternal asthma. Adequate birthweight for age/gender (>10th to ≤90th percentile) was the reference group. A modified Community Multi-scale Air Quality model fused with ambient air monitor data estimated exposure. Log linear models with an interaction term for asthma and average interquartile range for each pollutant were used to calculate the relative risk (RR) and 95% confidence interval for SGA associated with first trimester exposure among asthmatics and non-asthmatics adjusting for site, demographic and clinical factors. Compared to women without asthma in the lowest exposure quartile, infants of asthmatic mothers had higher risk for SGA associated with ozone exposure in the 25-75th percentile RR=1.12 (1.05-1.19) and above the 75th percentile RR=1.13 (1.03-1.24); carbon monoxide exposure in the 25-75th percentile RR=1.10 (1.03-1.17) and the highest quartile RR=1.16 (1.05-1.28); nitrogen oxides exposure in the 25-75th percentile RR=1.09 (1.02-1.17) and the highest quartile RR=1.15 (1.04-1.28); and sulphur dioxide (SO2) exposure in the 25-75th percentile RR=1.17 (1.09-1.25) and the highest quartile RR=1.16 (1.05-1.28). Only SO2 exposure was associated with increased SGA risk for infants of non-asthmatic mothers (25-75th percentile RR=1.06 (1.01-1.11) and the highest quartile RR=1.07 (1.00-1.14)). SGA risk may be influenced by maternal asthma.

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CORD BLOOD LEPTIN METHYLATION IS ASSOCIATED WITH THE RISK OF MACROSOMIA: A CASE-CONTROL STUDY. Zi-Wei Liu*, Ji-Tai Zhang, Ke-Le Wu, Yu-Huan Wang, Hong-Tao Yan, Hong-Ying Shi, Xin-Jun Yang (Department of Preventive Medicine, Wenzhou Medical University, Wenzhou China)

Objective- We determined whether leptin gene promoter methylation levels were associated with risk of macrosomia and the possible relations between DNA methylation and key maternal anthropometric characteristics. **Methods**- A case-control study was conducted in Chinese population consisting of 61 macrosomia and 69 normal birth weight infants. All cord blood samples was collected from the Yuying Children's Hospital (January 1st, 2012 to December 31st, 2012). We mapped the DNA methylation status of 36 CpG sites from a CpG island in leptin promoter using MALDI-TOF mass spectrometry. Cord blood leptin concentration was measured by the Enzyme-Linked Immuno-Sorbent Assay (ELISA). **Results**- Twenty two out of 36 CpG sites were associated with risk of macrosomia. The average methylation rate (22 CpG sites) in cord blood showed significant hypomethylation of macrosomia relative to controls (24.4% vs 27.1%, P<0.001). After multivariate adjustment, compared with participants with high methylation rate (25.8~33.8%), those low methylation rate (16.4~25.7%) had OR (95% CI) of 2.26(1.12, 4.56) for giving birth a macrosomic infant (P=0.023). In addition, the leptin concentration in cord blood was positively associated with the risk of macrosomia in a dose-response manner (P=0.001). Furthermore, regression analysis confirmed that maternal pre-pregnant BMI and methylation rate acted additively to increase the chance for a macrosomia. **Conclusion**- Leptin promoter methylation level is negatively associated with macrosomia. Combination of low average methylation and high pre-pregnant BMI increases the risk of occurrence of macrosomic babies. #This work was supported by the National Natural Science Foundation of China (No. 81072378) and the Natural Science Fund, Zhejiang, China (No. Y2101185).

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INFANT SEX-SPECIFIC PLACENTAL CADMIUM AND DNA METHYLATION ASSOCIATIONS: THE OMEGA STUDY. April Mohanty*, Federico Farin, Theo Bammler, James MacDonald, Zahra Afsharinejad, Thomas Burbacher, David Siscovick, Michelle Williams, Daniel Enquobahrie (University of Washington, Seattle, WA United States)

Background: Recent evidence suggests that the association of maternal cadmium (Cd) burden and fetal growth may vary by fetal sex. However, mechanisms contributing to these differences are largely unknown. **Methods**: Among 24 maternal-infant pairs, we examined sex-stratified associations of placental Cd, measured by inductively coupled mass spectrometry, with placental genome-wide DNA methylation, profiled by the Infinium HumanMethylation 450 BeadChip. We used ANOVA models to examine associations of placental Cd (dichotomized into high/low Cd, based on sex-specific median Cd) with DNA methylation at each CpG site or region. Statistical significance was determined using a false discovery rate p-value cutoff (<0.1). **Results**: Placental Cd medians among female and male infants were 5 and 2 ug/g, respectively. For females, three CpG sites (near ARL9, SIAH3, and HS3ST4) and one region on chromosome 7 (including CROT and TP53TG1 genes) were hypomethylated in high Cd placentas. For males, high placental Cd was associated with methylation of three CpG sites, two (hypomethylated) near MECOM and one (hypermethylated) near SALL1, and two regions, both hypomethylated (one on chromosome 3 and one on chromosome 8, including MECOM and ARHGEF10 genes, respectively). Differentially methylated sites are at or in close proximity to transcription start sites of genes involved in cell damage (SIAH3, HS3ST4, TP53TG1) in females, and cell differentiation, angiogenesis and organ development (MECOM, SALL1) in males. **Conclusion**: Our pilot study supports possible infant sex-specific associations of placental Cd and DNA methylation, which may account for observed differences in Cd-fetal growth associations among male and female infants. Future larger studies are needed to replicate and extend these findings and may further our understanding of epigenetic mechanisms underlying maternal Cd burden and suboptimal fetal growth associations.

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PREMASTICATED FOOD AND INFANT WEANING PRACTICES IN A SETTING OF HIGH HIV BURDEN. Sufia Dadabhai*, Newton I. Kumwenda, Jin Sun, Linly Seyama, Fatima Zulu, Taha Taha (Johns Hopkins Bloomberg School of Public Health, Baltimore, MD United States)

Objectives. Case reports from the US provide compelling evidence linking premastication of infant foods or medicines to transmission of HIV and other pathogens through blood in saliva. This is a particular concern among caregivers and infants in areas of high HIV burden, including Blantyre, Malawi where 1 in 6 women are living with HIV. We assessed the prevalence of premasticated feeding and the association with weaning practices. **Methods**. Women aged 18-35 years at health facilities in Blantyre who were currently breastfeeding or had recently weaned a child age <2 years were eligible for the cross-sectional survey. Data included all feeding practices, weaning practices (types of food and drink) and maternal HIV status. We estimated the point prevalence of premastication and conducted multivariable analyses. Findings. Among 544 women interviewed (of 600 approached), median age 24 years and >90% married, 86% were aware of prechew practices. Prevalence of premastication by a caregiver was 52.3% (95% CI 48.1-56.5). Median child age at interview was 12 months and 24 months at weaning. 6% of infants had been weaned; 13% reported incomplete breastfeeding cessation. Self-report revealed that 12% of mothers were HIV-infected; HIV-status was not significantly associated with weaning practices (p>0.10). Mothers started supplementary foods and liquids at median age 6 months (interquartile range [IQR] 5-6); 80% gave supplementation more that once a day. In 3 multivariable models, only increase in infant age (per 1 month) was independently associated with feeding premasticated food (adjusted odds ratio 1.10, p<0.0001). **Conclusion**. Feeding infants pre-masticated food is common. Providers should educate the public about the risk for transmission and identify safe, locally-available alternatives using qualitative research. Infant health implications need further assessment.

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RISK FACTORS FOR HYPERTENSIVE DISORDERS OF PREGNANCY AMONG HIV-NEGATIVE TANZANIAN WOMEN. Ellen O'Neal*, Donna Spiegelman, Ellice Lieberman, Stacey Missmer, Wafaie Fawzi, Ellen Hertzmark (Harvard School of Public Health, Boston, MA United States)

Background: Tanzania has a maternal mortality ratio of 454 deaths per 100,000 live births, ranking 22nd in the world. Hypertensive disorders of pregnancy are the 3rd leading cause of maternal mortality worldwide, affecting 10% of all pregnancies. Research on hypertension during pregnancy in African countries has been limited. **Methods**: We examined risk factors for hypertension in a cohort of 8468 pregnant women in Dar es Salaam, Tanzania who were enrolled at 12-27 weeks gestation in a randomized trial of multivitamins between August 2001 and July 2004. Preeclampsia was defined as systolic blood pressure =140 or diastolic blood pressure =90 with urine protein =1+ in antenatal care or provider diagnosis at delivery. Gestational hypertension was defined by the same blood pressure criteria with absent or trace urine protein, or by provider diagnosis at delivery. Risk factors for hypertensive disorders of pregnancy were examined using log binomial regression. **Results**: Hypertensive disorders were identified in 7.2% of pregnancies. Twins, increased body mass index, and history of miscarriage or abortion were risk factors for both preeclampsia and gestational hypertension. Factors specific to preeclampsia included nulliparity and, among multiparous women, history of preeclampsia, low birth weight, and cesarean section. For gestational hypertension alone, risk factors included blood pressure =120/80 at enrollment, history of diabetes, and family history of hypertension. **Conclusion**: In this Tanzanian cohort, some risk factors appeared to be shared between preeclampsia and gestational hypertension, while others were related to only one disorder. In resource limited settings, presence of these characteristics may warrant closer antenatal surveillance or nutrition-related interventions.

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EVALUATING THE INDIRECT EFFECTS OF MATERNAL HIV STATUS ON BIRTH OUTCOMES WITH EXPOSURE TO HAART AS MEDIATOR: A NEW COUNTERFACTUAL APPROACH. Eric Tchetgen Tchetgen, Kelesitse Phiri*, Roger Shapiro (Harvard School of Public Health, Boston, MA United States)

It is well known that maternal infection to human immunodeficiency virus (HIV) may cause deleterious birth outcomes (BO). Likewise, there is growing evidence that exposure to highly active antiretroviral therapy (HAART) may have negative effects on BO for HIV positive mothers. However, the extent to which the effects of HIV may be attributed to HAART is unknown. Using the modern framework of causal mediation analysis, we evaluate natural direct (NDE) and indirect (NIE) effects of HIV on BO mediated by HAART. We leverage the fact that HAART is not taken by HIV negative mothers in order to identify NDE and NIE under weaker assumptions than previously stated in the literature. Notably, we show that these effects are identified under standard no-unobserved confounding assumptions, even though a key confounder of the mediator, maternal CD4 count is directly affected by maternal HIV status. This result is surprising since such exposure-induced confounding of the mediator is known to typically render NDE and NIE not -identified even if the confounder is observed. We also establish that among HIV positive women, NIE of HIV through HAART is identified even when the total effect and NDE are both subject to unobserved confounding. We analyzed a sample of 5110 HIV positive and 12151 HIV negative pregnancies from Botswana and estimated an adjusted total effect of HIV on stillbirth of RR=2.1 (95%CI= 1.7-2.6). The adjusted NDE was RR=1.6 (95%CI=1.2-2.2), while the adjusted NIE was RR=1.3 (95%CI=1.07-1.59), suggesting that the effect of HIV is partially but not entirely attributed to HAART. Although CD4 count was collected for mothers in the study, key behavioral HIV risk factors were missing for most women. Therefore total and direct effects should be interpreted with caution, but according to our results the estimated NIE of HIV is robust to this potential confounding bias.

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THE CLINICIAN'S PERSPECTIVE: DECISION-MAKING FOLLOWING SUSPICION OR DIAGNOSIS OF A SEVERE CONGENITAL ANOMALY. Lucy Smith*, Robyn Lotto, Elizabeth Draper, Judith Budd, Elizabeth Brewster, Natalie Armstrong (University of Leicester, Leicester United Kingdom)

Objectives: To explore the experiences of clinicians involved in counselling women following suspicion or diagnosis of a suspected fetal anomaly to aid understanding of socioeconomic variation in rates of termination for congenital anomalies. **Methods**: Qualitative study of 18 clinicians involved in the care of women following suspicion of a congenital anomaly, using semi-structured interviews. Data analysed using constant comparative method to identify key themes. **Results**: Two key themes emerged: 1) risk and uncertainty; 2) active decision-making. Clinicians highlighted that uncertainty relating to prognosis was difficult to manage. Parents' ability to understand and accept risk is influential in the decision-making process and was perceived to vary between socioeconomic and cultural groups. Despite consensus on a theoretical definition of 'severe' in terms of anomaly, there was individual clinician variation in relation to when a termination would be offered after the 24 week legal threshold. The same variation is not apparent prior to 24 weeks. With regard to active decision-making, some clinicians expressed concerns regarding the ability of some parents to make an active decision, continuing an affected pregnancy being perceived as the "default" position. **Conclusion**s: The findings emphasise difficulties faced by both clinicians and parents when managing a pregnancy affected by a severe congenital anomaly. Issues relating to clarity and application of legislation, and its potential to perpetuate variations are also discussed.

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HOSPITAL READMISSIONS WITH ENDOMETRITIS IN CALIFORNIA 2004-2010. Kerry Bommarito*, Margaret Olsen, Victoria Fraser (Washington University School of Medicine in St. Louis, Saint Louis, MO United States)

Background: Endometritis (EMM) is the most common maternal infectious postpartum complication. Previous studies focused only on the delivery admission may have missed EMM diagnosed after discharge. **Objective**: To determine the incidence and rate of readmission due to EMM in a state population. **Methods**: We used the 2004-2010 HCUP CA State Inpatient Database to determine the incidence of EMM and 6 week readmission rates in women following vaginal (VAG) and cesarean (CSEC) delivery. Risk factors for EMM were identified using ICD-9-CM codes and demographic variables. Multivariable logistic regression analyses were performed, stratified by type of delivery. **Results**: A total of 2,305,110 deliveries (32.2% CSEC, 67.7% VAG) were identified. 0.63% of CSEC deliveries were coded for EMM during the delivery hospitalization and 0.24% were coded for EMM during a readmission within 6 weeks of the delivery discharge. 0.15% of VAG deliveries were coded for EMM during the delivery hospitalization and 0.15% were coded for EMM during a readmission. Mean days to readmission with EMM were 7.6 in VAG and 7.0 in CSEC. The mean total costs of readmission(s) with EMM were $6632 in VAG and $9449 in CSEC. CSEC patients were 2.9 (95% CI, 2.82-3.04) times more likely to have EMM than VAG patients. When controlling for covariates, chorioamnionitis was associated with increased risk of EMM after VAG (Relative Risk(RR)=4.36; CI, 3.93-4.85) and CSEC (RR=2.17; CI,2.00-2.35). Group B streptococcus was associated with decreased risk of EMM after VAG (RR=0.77; CI, 0.70-0.83) and CSEC (RR=0.80; CI, 0.74-0.87). **Conclusion**: By including readmissions, the overall incidence of EMM after VAG doubled to 0.30% and after CSEC increased from 0.63% to 0.87%. The risk of EMM was higher in patients with chorioamnionitis after VAG than after CSEC delivery. Group B strep was protective in both CSEC and VAG, likely due to prophylactic antibiotic utilization.

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COMPARATIVE SAFETY OF BUPRENORPHINE VS. METHADONE IN PREGNANCY: SYSTEMATIC REVIEW AND META-ANALYSIS. Susan Brogly*, Kelley Saia, Alexander Walley, Haomo Du, Paola Sebastiani (Boston University School of Public Health, Boston, MA United States)

Background: Rising rates of opioid use in pregnant women and of drug withdrawal in their neonates (neonatal abstinence syndrome, NAS) are public health concerns. Prenatal maintenance therapy with buprenorphine (BMT) vs. methadone (MMT) may improve pregnancy outcomes but associations vary. **Methods**: A comprehensive search yielded 14 comparative studies, all were cohort studies or randomized controlled trials; two studies were excluded. We used a random effects meta-analysis model to estimate summary effects of prenatal BMT vs. MMT on pregnancy outcomes and performed sensitivity analyses to assess confounding, publication bias and heterogeneity. **Results**: 502 BMT and 846 MMT exposed neonates were included in the meta-analysis. The unadjusted risk of NAS treatment was lower (risk ratio 0.90, 95% CI: 0.81, 0.98) and subsequently, length of hospital stay shorter (mean difference -6.79 days, 95% CI: -9.01, -4.58) in BMT vs. MMT exposed neonates. In neonates treated for NAS, treatment duration was shorter (-8.46 days, 95% CI: -14.48, -2.44) and total morphine dose lower (-3.60 mg, 95% CI: -7.26, 0.07) in BMT exposed. Mean gestational age at birth, weight, body length and head circumference were higher in BMT exposed neonates. Fewer women treated with BMT used illicit opioids near delivery (risk ratio 0.44, 95% CI: 0.28, 0.70). Simulation of confounding by indication accounted for some of the observed difference. **Conclusion**s: Prenatal BMT vs. MMT exposure may improve pregnancy outcomes. However, studies might be affected bias that augment a protective effect of BMT. Additional evidence is needed to guide providers and pregnant women in treatment choices.

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SOCIAL-BEHAVIORAL CUE ASSESSMENT IN CHILD ABUSE EVALUATIONS. Crystal Silva*, Summer Magoteaux, RN, BSN, David Notrica, MD, FACS, FAAP, Stephanie Zimmerman, MD, Craig Egan, MD, Alaina Raetz, MSW, LMSW, Amira El-Ahmadiyyah, LCSW, Pamela Garcia-Filion, PhD, MPH (Phoenix Children's Hospital, Phoenix, AZ United States)

Background Child abuse (CA) is a public health problem making early detection a priority. Past research identified physical findings and social-behavioral (SB) cues as risk factors and point to emergency departments (ED) as ideal locations for early detection. **Objectives** To evaluate the frequency of SB findings in a retrospective cohort of suspected non-accidental trauma (sNAT) cases to determine if an association exists between SB findings and various patient and injury characteristics. **Methods** Retrospective analysis of patients presenting to an ED with sNAT between January 2012 and July 2013. Subjects were evaluated by the institution's Child Protection Team and classified as probable abuse, not probable, or indeterminate. SB risk factors included patient's response to caregiver, caregiver's response to patient cues and social work (SW), and caregiver's expectation of patient and concern for injury severity. Descriptive statistics were used. Categorical data compared with chi-square test. **Results** 312 sNAT patients were reviewed [median age: 6m (interquartile range: 3,10)]. SB risk factors were documented in 74% (n=232). Documentation was more complete in younger patients (5m vs 11m;$p<0.001$); documentation did not vary by race ($p=0.274$) or CA type ($p=0.542$). The most and least commonly documented RF were responses of caregiver to SW (n=109;35%) and patient to caregiver (n=252;81%), respectively. Documentation of SB risk factors did not vary between CA classification ($p=0.583$). However, presence of SB risk factors increased with likelihood of CA ($p=0.047$); the sensitivity to detect CA was 57% and specificity 62%. **Conclusion** A significant proportion of sNATs are not receiving SB cue assessments. The association of SB risk factors with probable abuse demonstrates the importance of SB evaluation. The low sensitivity of SB risk factors indicates providers need to consider them with other clinical indicators.

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SUSPECTED NON-ACCIDENTAL TRAUMA IN PEDIATRICS: YOUNG CHILDREN WITH SUSPICIOUS INJURY WARRANT FURTHER EXAMINATION. Rebecca Ragar*, Crystal Silva, Stephanie Zimmerman, Summer Magoteaux, Nicole Schuren, Amira El-Ahmadiyyah, David Notrica, Pamela Garcia-Filion (Phoenix Children's Hospital, Phoenix, AZ United States)

Background Early identification of child abuse is important for intervention. Objectives were to examine patient and injury characteristics associated with suspected non-accidental trauma (sNAT) in preparation for a screening algorithm in an emergency department. **Methods** Using a child abuse registry, we conducted a retrospective analysis of consecutively enrolled pediatric (<18 years) patients evaluated at a pediatric level I trauma center and classified as a sNAT based on physical, emotional and/or sexual abuse findings. The study time period is January 2007 - December 2013. Descriptive statistics were used and odds ratios (95%CI) estimated. **Results** The registry contains 916 patients classified as sNAT, constituting one-fifth of annual trauma admissions. Mechanism of injury was unknown in 78% and prior domestic violence was documented in 25%. Physical abuse was identified in 94%: the most common was abusive head trauma (AHT) (56%), followed by extremity fracture (27%), skin findings (19%), and the least common was abdominal injury (4%). Infants (<12months) comprised 61%, 12-24months 18%, preterm gestation 27%, twins 3%, and 82% were uninsured or on medicaid. AHT was more common in younger patients; those <24months were 2.9 times (95%CI: 2.2, 3.8) more likely to have AHT than those older than 24months. Death occurred in 37 (4%) of the patients; of which 60% (n=22) were <24months of age, 81% (n=30) were classified as probable abuse, and 30% (n=11) had prior Child Protective Services involvement. **Conclusion**s Young children, <24 months, comprised over three-quarters of sNAT, identifying an at-risk age group. Head injury in this age group, unknown injury mechanism and/or prior domestic violence should prompt concern for sNAT and warrant an evaluation to rule out abuse. Further research is necessary to assess accompanying socio-behavioral indicators.

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CHILD AND ADOLESCENT PSYCHIATRIC DISORDERS AS A RISK FACTOR FOR SCHIZOPHRENIA: A NATIONWIDE POPULATION-BASED STUDY. I-Ning Tsai*, Sheng-Hsiang Lin (Institute of Clinical Medicine, College of Medicine, National Cheng Kung University, Tainan City Taiwan)

Background: Several studies showed that autism-spectrum disorders, behavioral problems, developmental delays and attention deficit hyperactivity disorder are associated with schizophrenia. The aim of this study was to estimate the risk of child and adolescent psychiatric disorders for patients with young schizophrenia compared with the general population. **Methods**: This case-control study involved a subset of the National Health Insurance Research Database. We included 8- to 30-year-old patients (n = 1682) receiving the diagnosis of schizophrenia from 2000-2011 and their age- and sex-matched comparison insureds using health service in the same year (n = 8410). Each individual patient was retrospectively followed up from 1996 to determine whether had child and adolescent psychiatric disorders. We used logistic regression to conduct the association between child and adolescent psychiatric disorders and schizophrenia. **Results**: After adjusting for age, gender, enrollee category, living area, urbanization and comorbidities, an increased risk of child and adolescent psychiatric disorders [adjusted OR 4.68; 95% CI 2.38-9.20] was found in patients with schizophrenia. Sex-specific analyses revealed that the risk of schizophrenia was increased for males [adjusted OR 2.93; 95% CI 1.16-7.41] and females [adjusted OR 9.30; 95% CI 3.15-27.44]. **Conclusion**: Schizophrenia is associated with a range of developmental antecedents. This population-based study shows that child and adolescent psychiatric disorders might be a risk factor for schizophrenia.

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MATERNAL MIGRATION STATUS AND CHILDHOOD PSYCHOLOGICAL HEALTH: EVIDENCE FROM HONG KONG'S "CHILDREN OF 1997" BIRTH COHORT. Cherry Leung*, C Mary Schooling, Gabriel Leung (University of Hong Kong, School of Public Health, Hong Kong Hong Kong)

Immigration has inconsistent impacts on childhood behavioral and mental health in Western settings. A large proportion of children in Hong Kong, a developed non-Western setting, have migrant mothers. Concerns exist as to how immigration influences child and adolescent psychological health. This study examined the association of maternal migration status with child behavior, self-esteem, and depression in childhood and early adolescence in a non-Western setting. Multivariable linear regression was used in Hong Kong's "Children of 1997" Chinese birth cohort to examine the adjusted associations of parental migration (both parents Hong Kong born n=4,285, both parents migrant n=1,921, mother only migrant n=462, father migrant only n=1,110) with parent-reported Rutter score for child behavior at ~7 (n=6,294, 80% follow-up) and ~11 years (n=5,598, 71% follow-up), self-reported Culture-Free Self-Esteem Inventory score at ~11 years (n=6,937, 88% follow-up) and self-reported Patient Health Questionnaire-9 (PHQ-9) depressive symptom score at ~13 years (n=5,797, 73% follow-up), adjusted for sex, highest parental education and occupation, household income, maternal and paternal age at birth, age of assessment and survey mode (PHQ-9 only). Multiple imputation was used for missing exposures and potential confounders. Parental migration was unrelated to overall self-esteem or depressive symptoms, but both parents migrant was associated with better behavior (lower Rutter scores) at ~7 years [-1.07, 95% confidence interval (CI) –1.48 to -0.66] and ~11 years [-0.89, 95% CI -1.33 to -0.45]. In a non-Western context, parental migration appeared protective for early childhood behavioral outcomes but was unrelated to other mental health outcomes in early adolescence.

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NEUROBEHAVIORAL SCORES AT 5 WEEKS IN RELATION TO AUTISTIC TRAITS AT 4 AND 5 YEARS. Katherine Bowers*, Jane Khoury, Heidi Sucharew, Stephanie Donauer, Yingying Xu, Kimberly Yolton (Cincinnati Children's Hospital Medical Center, Cincinnati, OH United States)

A majority of children eventually diagnosed with autism spectrum disorder (ASD) have abnormalities present in the first year of life. However, it is not known whether behaviors identified in early infancy may be directly related to autistic symptoms evident later in childhood. Our objective was to determine whether neurobehavioral characteristics measured at 5 weeks are associated with autistic traits at 4-5 years. Analyses were conducted within the Health Outcomes and Measures of the Environment (HOME) Study, a prospective pregnancy and birth cohort study that enrolled women during pregnancy and followed the offspring through age 5 years (N=214).We evaluated neurobehavioral performance with standard summary scales from the NICU Network Neurobehavioral Scale (NNNS) that describe early infant neurobehavioral characteristics (eg. attention, regulation).Autistic traits were identified by standardized T scores from the Social Responsiveness Scale (SRS)-2 at ages 4 and 5.Measures of association were estimated with linear regression models using generalized estimating equations to address correlation of the repeated outcomes. We explored potential effect modification with known risk factors for ASD, in particular maternal depression and advanced maternal age, using interaction terms and stratification. Overall, lower NNNS scores on the attention subscale were associated with higher total SRS T scores (β=-0.8, p=0.03). Among a subset of children born to mothers who were ≥35 years of age (n=55), lower attention (β=-2.3, p=0.04), higher lethargy (β=1.9, p=0.003) and higher arousal (β=4.9, p=0.048) were significantly associated with higher total SRS T scores, and greater excitability (β=1.4, p=0.07) and poorer regulation (β=-4.6, p=0.08) demonstrated borderline significance. In summary, poor NNNS performance at 5 weeks was associated with autistic traits at 4-5 years, especially among infants of older mothers.

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PREDICTIVE VALIDITIES OF MINOR PHYSICAL ANOMALIES IN ADOLESCENTS WITH RISK BEHAVIORS. Shu-Ting Gan*, Meng-Che Tsai, Sheng-Hsiang Lin (National Cheng Kung University, Tainan Taiwan)

Background: Risk behaviors are those that can have negative effects on the overall development and well-being of youth, such as violence, substance abuse, sex behavior and emotion. Minor physical anomalies (MPA) are suggested as a biomarker associated with disruptions of fetal development. There were limited researches on the relationship between MPA and risk behaviors which may be derived from abnormal neurodevelopment. **Methods**: We developed a self-administered questionnaire for the assessment of risk behaviors, and subgroup as violence, substance abuse, sex behavior and emotion. Stepwise logistic regression model and ROC curve analysis were used to determine whether a specific pattern could be found with greater predictive validities. **Results**: A total of 118 adolescents aged 11-19 were recruited. The result of ROC curve analysis are as follows: The model of violence vs. controls provided an AUC of 0.74 (Sensitivity: 64 %, Specificity: 64 %); The model substance abuse vs. controls provided an AUC of 0.80 (Sensitivity: 69 %, Specificity: 61 %); The model of sex behavior vs. controls provided an AUC of 0.90 (Sensitivity: 87 %, Specificity: 78 %); The model of emotion vs. controls provided an AUC of 0.79 (Sensitivity: 73 %, Specificity: 62 %). **Conclusion**: We found that the MPA are slightly different in adolescents with risk behaviors compared to controls, which are consistent with the hypothesis of abnormal neurodevelopment in adolescents with risk behaviors.

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SCHOOL START TIME AND SLEEP PATTERNS AMONG U.S. ADOLESCENTS: RESULTS FROM THE NATIONAL COMORBIDITY SURVEY – ADOLESCENT SUPPLEMENT. Diana Paksarian*, Kara Rudolph, Jian-Ping He, Cynthia Zhang, Kathleen Merikangas (Intramural Research Program, National Institute of Mental Health, Bethesda, MD United States)

Research indicates that inadequate sleep in adolescents has important implications for physical and mental health and school functioning. Several U.S. regional studies have reported beneficial results following delayed school start times among adolescents, but national-level data with comprehensive evaluation of sleep patterns and school-level information are scarce. We used information from over 7,000 students attending 245 schools who participated in the National Comorbidity Survey Adolescent Supplement, a nationally representative study of U.S. adolescents ages 13 -18, to investigate associations between school start time and sleep patterns. Data from detailed direct interviews with youth on weeknight bedtime (n=7,206) and sleep duration (n=7,216), and school characteristics based on school authority report were analyzed. There was an association between school start time and weekday bedtime ($p<.0001$), after adjustment for age, sex, school type, urbanicity and school employment. Median weeknight sleep duration was 7.86 (interquartile range: 1.47) hours with only 26.4% meeting the recommended 8.5 hours of weeknight sleep. For start times of 8:00am and earlier, a 1-hour increase in start time was associated with 39.53 (95% confidence interval (CI)=21.37-57.69) more minutes of sleep for boys and 5.82 (95%CI=-12.26-23.89) more minutes of sleep for girls. Those with 1-hour later start times were more likely to report >8.5 hours of weeknight sleep (Boys: odds ratio (OR)=2.84, 95% CI=1.37-5.91; Girls: OR=1.80, 95%CI=.92-3.50). Results from multilevel mixed models will also be presented. Our findings are consistent with prior reports of suboptimal sleep among U.S. adolescents and suggest that later start times, particularly for schools starting at or before 8:00am, may positively impact sleep duration. Ultimately, we hope this may help to reduce the health consequences of insufficient sleep among adolescents.

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A LIFE-TABLE ANALYSIS TO EXPLORE FACTORS ASSOCIATED WITH SELECTIVE STUDY PARTICIPATION IN THE NATIONAL BIRTH COHORT IN JAPAN. Kohta Suzuki*, Zentaro Yamagata, Ichiro Tsuji (University of Yamanashi, Chuo, Yamanashi Japan)

Selective study participation is an important issue to study regarding validity because it can cause selection bias. Previous studies have suggested that socioeconomic status (SES) was related to dropouts from the cohort study. This study aims to detect factors such as SES and characteristics of children and mothers associated with selective study participation in the Japan national cohort study, using a life-table analysis. The Longitudinal Survey of Babies Born in the 21st Century is a large national cohort study in Japan. Children born between January 10 and 26, 2001 and between July 10 and 26, 2001 were recruited for the study. The study data were linked with the birth registration record data of vital statistics. A total of 47,015 respondents participated in the first survey. The number of children included in the 10th follow-up study (i.e., at 10 years of age) was 32,222 (68.5%). We analyzed 43,027 complete data points regarding the sex of the child, parity, whether the pregnancy was single or multiple, birth weight, maternal age, birth month, household income, maternal smoking status during the 1st survey, and breastfeeding information. Of these, 13,177 (31.6%) children dropped out by the 10th survey. The Cox proportional hazard ratio (HR) of each variable was calculated. As a result, second-born child or later (HR 1.17, 95% confidence interval (CI) 1.13 to 1.22), multiple births (HR 1.22, 95% CI 1.09 to 1.38), birth in July (HR 1.07, 95% CI 1.03 to 1.10), maternal age (< 25 vs. ≥ 40; HR 1.83, 95% CI 1.55 to 2.16), lowest quartile income (vs. highest quartile; HR 1.65, 95% CI 1.57 to 1.74), maternal smoking (HR 1.70, 95% CI 1.63 to 1.77), and formula feeding (HR 1.19, 95% CI 1.12 to 1.27) were significantly associated with dropout from the study. These results suggest that it is essential to consider this selection bias when conducting an analysis of a large cohort study.

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MIND YOUR DATA SOURCE: PREGNANCY COMPLICATIONS DIFFER BY SOURCE. Candace Robledo*, Edwina Yeung, Rajeshwari Sundaram, Pauline Mendola, Nansi Boghossian, Erin Bell, Charlotte Druschel (Division of Intramural Population Health, Eunice Kennedy Shriver National Institute of Child Health and Human Development, National Institutes of Heal, Rockville, MD United States)

Multiple data sources exist to identify pregnancy complications in research. Sources were compared in the Upstate KIDS study that oversampled birth certificates (BC) for pregnancies conceived by infertility treatment or that resulted in multiple births. This allowed an opportunity to assess reporting of complications by self-report and discharge data. Accounting for sampling, inverse proportional weighting was used to estimate percent positive agreement (PPA) for pregnancy complications self-reported (4 months postpartum) or identified via discharge data (ICD-9 codes) obtained from the New York Statewide Planning and Research Cooperative System (SPARCS), a mandatory hospital reporting system. PPA disregards subjects when sources agreed no complication was present. Data for 4821 pregnancies (96%) were available from all sources. We also examined PPA for those with infertility treatment and with multiple births. Results are reported for gestational diabetes (GDM) and gestational hypertension (GH) with prevalence of 6.7% and 5.7%, respectively. Among mothers whose BC indicated GDM, PPA was low but higher for SPARCS (58%) than self-report (48%). PPA was lower for GH (17% and 18%, respectively). With infertility, PPA for GDM and GH for SPARCS were 69% and 24%, respectively and for self-report 59% and 24%, respectively. For multiples, PPA for GDM and GH were similar to total group. Despite similar prevalence of complications and regardless of data source, PPAs were higher for GDM than for GH. Availability and cost-effectiveness of these data sources render them useful for research but their differences in capturing pregnancy complications need to be understood.

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PARENT MARITAL STATUS AND OTHER MEASURES OF FAMILY COMPOSITION: WHAT WORKS BEST AS A COVARIATE IN PEDIATRIC RESEARCH? Michelle Garrison*, Davene Wright (Seattle Children's Research Institute: Center for Child Health, Behavior and Development and University of Washington Division of Child Psychiatry, Seattle, WA United States)

INTRO: Parent marital status is commonly used as a covariate in child health and development analyses, and has been seen as a proxy for household stability, resources available, and potential parenting time. However, marital status may not always be the best measure of these underlying constructs, especially given differences across cultural and socioeconomic groups. **METHODS**: Data from the Early Childhood Longitudinal Study (N=21,409) were used to compare the utility of three binary measures of family composition (FC): marital status, number of parents, and number of adults in the home. Bivariate statistics and nested regression models tested FC during Kindergarten as predictor of a range of child health and development outcomes the following year. Stage I tested FC as a predictor of outcome after controlling for baseline; Stage 2 added child gender, age, race/ethnicity, parent education, household income, and language; Stage 3 models were stratified by race/ethnicity and income. **RESULTS**: For both income and education, the strength of association with FC variables was ordered marital status > number of parents > number of adults. Although FC was a significant predictor in Stage I for most outcomes, the association dissipated in Stage 2 for all but three (CBCL externalizing and internalizing scores and healthcare utilization). In adjusted models for those outcomes, all FC variables performed similarly. In Stage 3, some FC measures yielded more consistent effect sizes across strata than others, but the pattern varied across outcomes. **DISCUSSION**: Although there is less colinearity between socioeconomic characteristics when using "number of adults" as opposed to other FC measures, performance of the FC variables was similar in adjusted models. Using a FC measure that maps precisely to the hypothesis rather than always using "marital status" as default may improve generalizability across demographic groups.

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A TASK-BASED ASSESSMENT OF PARENTAL OCCUPATIONAL EXPOSURE TO ORGANIC SOLVENTS AND OTHER COMPOUNDS AND RISK OF ACUTE LYMPHOBLASTIC LEUKEMIA IN THE OFFSPRING. Alice Y. Kang*, Catherine Metayer, Ghislaine Scélo, Robert B. Gunier, Kyndaron Reinier, C. Suzanne Lea, Jeffrey S. Chang, Steve Selvin, Janice Kirsch, Monique Does, Patricia Quinlan, S. Katharine Hammond (University of California, Berkeley, Berkeley, CA United States)

Acute lymphoblastic leukemia (ALL) is the most common childhood cancer. Studies examining paternal occupational exposures and risk of childhood ALL have mainly relied on job titles lacking specificity. We examined the relationship between the father's workplace exposures (except agricultural pesticides) before and after birth and risk of ALL in the offspring. We developed 19 task-based job modules (JMs) based on the prevalence of occupations in the study area and the probability of exposures to carcinogens. Children with ALL (n=667) and controls (n=1,020) were enrolled in a population-based case-control study in California (2000-2008). Of 1,634 fathers, 903 were assigned a JM and 643 (71%) completed the interview (55% Hispanic origin). Unconditional logistic regression models adjusted for socio-demographic factors were used to estimate odds ratios (ORs) and 95% confidence intervals (CIs). Among children with non-Hispanic fathers, we did not observe associations with any exposures evaluated. In contrast, the OR for exposure to organic solvents in Hispanic fathers was 1.48 (95% CI: 1.01-2.16); in multivariable analyses, the OR for chlorinated hydrocarbons was 2.28 (95% CI: 0.97- 5.37) and close to one for aromatic hydrocarbons, glycol ethers, and other hydrocarbon mixtures. We also observed associations with exposure to combustion exhaust (OR=1.70; 95% CI: 1.13-2.57) and metals (OR=2.14; 95% CI: 1.22-3.75). Time-specific analyses were not feasible because paternal exposures before and after birth were highly correlated. Moderate elevated risks were seen with exposure to paints, structural pesticides, and wood dust, although not statistically significant. In conclusion, our data support associations between paternal occupational exposures to known carcinogens contained in organic solvents, combustion exhausts, and metal dust/fumes and childhood ALL and suggest risk difference by ethnic group.

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PLACENTAL WEIGHT AND SMALL FOR GESTATIONAL AGE: A WITHIN-SIBLINGS FIXED-EFFECT VARIANCE COMPONENT ANALYSIS. Miguel Angel Luque-Fernandez*, Cande V. Ananth, Unnur Valdimarsdottir, Anne Eskild, Vincent Jaddoe, Paul Albert, Michael Schomaker, Patrick McElduff, Daniel A. Enquobahrie, Bizu Gelaye, Michelle A. Williams (Harvard School of Public Health, Boston, MA United States)

Background: Large placentas relative to offspring size have been described as an adaptive response to fetal hypoxia in small for gestational age (SGA) infants. We examined the effect of placental ratio (PR), defined as the ratio of birthweight and placental weight, on the risk of SGA after adjusting for measured and unmeasured confounders. **Methods**: We completed a within-siblings analysis using data from the US National Collaborative Perinatal Project. We controlled for unmeasured confounding due to maternal time-invariant covariates, as each mother serves as her own control. However, because within-siblings comparisons remain susceptible to confounding by unmeasured time-varying covariates, we used directed acyclic graphs to guide our analytical strategy and multiple longitudinal imputation strategies for missing data. We used fixed-effects variance component analyses to estimate the effect of PR on the risk of SGA. **Results**: 1,803 women enrolled at their first pregnancy that resulted in 3,949 singleton term infants (1,502 two, 259 three and 42 four-siblings). We found that maternal iron deficiency anemia and placental choriodecidual necrosis, both factors leading to uteroplacental hypoxia, were inversely associated with placental weight. Overall, an infant with a PR=7 had a 50% higher odds (odds ratio 1.50, 95%CI:1.02-2.00) of SGA than their siblings with PR's ranging between 7 and 9. **Conclusion**s: Regardless of maternal genetic and environmental unmeasured time-invariant risk factors and within-siblings measured characteristics, a PR=7 is associated with a higher risk of SGA infants. The PR, in addition to others ultrasonographic markers, may be used as a sign of adverse intrauterine environment.

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DIFFERENTIAL ITEM FUNCTIONING OF THE EVERYDAY DISCRIMINATION SCALE BY AGE ACROSS FIVE RACIAL GROUPS. Sherry Owens*, Alfgeir Kristjansson, Haslyn Hunte (West Virginia University, Morgantown, WV United States)

The goal of our study was to assess the construct validity of the Williams 1997 Everyday Discrimination Scale (EDS) in multi-ethnic/race samples of adults. The EDS is a 9-item scale that measures the frequency of chronic events and is used as a standard evaluation of perceived discrimination in many populations. Data from the National Latino and Asian American Study (NLAAS) and the National Survey of American Life (NSAL) were used in this study. Participants were grouped by 5 race/ethnicities (Asian, Hispanic, Black Caribbean, African American, and White) and 2 age groups (<45 or ≥45). Differential item functioning (DIF) across age groups within race was determined using a structural equation modeling (SEM) technique. The item "People act as if they think you are not smart" functioned with DIF by age in 4 racial/ethnic groups. "You are treated with less respect than other people are" and "People act as if you are dishonest" demonstrated DIF in 3 categories. No DIF occurred in the items "You are called names or insulted" and "People act as if they are afraid of you." Results showed that DIF occurs in the 5 of 9 items for Hispanics and Whites, followed by African Americans and Asians (4 of 9 items) and Caribbeans (0 of 9). The item "You are treated with less respect than other people are," was more likely to be endorsed by older African Americans and Whites and younger Asians ($p \leq 0.01$). Younger Hispanics and whites and older African Americans reported higher occurrences in which "People act as if you are dishonest." The findings suggest that the EDS scale may capture more cultural intricacies than originally hypothesized. Future research may focus on more specific subgroups to determine variation by age in reporting chronic perceived discrimination.

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DISRESPECT AND ABUSE DURING CHILDBIRTH AS A SOCIAL DETERMINANT OF HEALTH CARE UTILIZATION. Stephanie Kujawski*, Godfrey Mbaruku, Lynn P. Freedman, Kate Ramsey, Wema Moyo, Margaret E. Kruk (Department of Epidemiology, Columbia University Mailman School of Public Health , New York, NY United States)

In Tanzania, access to and utilization of life saving care for childbirth at health facilities is critical to mitigate the high maternal mortality ratio. There is a dearth of literature in the global context exploring social determinants of health utilization, particularly disrespect and abuse during childbirth as a deterrent to institutional delivery. We explored the association between disrespectful and abusive treatment during childbirth and delivery satisfaction, assessment of quality of care, and likelihood of recommending the facility for delivery. Structured exit interviews were conducted in the Tanga Region, Tanzania with women discharged from delivery at eight health facilities. A random subsample were re-interviewed 5-10 weeks postpartum. For both sets of data, three multivariable logistic regression models were used to evaluate the association between demographic and delivery experience factors and (1) delivery satisfaction (2) quality of care for delivery, and (3) the likelihood participants would recommend the facility for delivery. 1779 women participated in the exit survey and 593 women were re-interviewed in their homes. In both datasets, disrespect and abuse was associated with substantially lower satisfaction with delivery (exit: OR 0.23, 95% CI 0.16-0.32; follow-up: OR 0.17, 95% CI 0.11-0.26) and reduced likelihood of rating quality of care for delivery as excellent or very good (exit: OR 0.54, 95% CI 0.34-0.85; follow-up: OR 0.55, 95% CI 0.25-1.09). Women who experienced disrespect and abuse were also less likely to recommend the facility for delivery (exit: OR 0.21, 95% CI 0.14-0.32; follow-up: OR 0.47, 95% CI 0.24-0.90). Our study highlights disrespect and abuse during childbirth as an emerging social determinant of health. Negative experiences can thus influence assessments of the health system and future utilization for both facility users and those in their social network.

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LONGITUDINAL NEIGHBORHOOD CHARACTERISTICS AND INCIDENT HYPERTENSION. Paulina Kaiser*, Ana V. Diez Roux, Mahasin Mujahid, Mercedes Carnethon, Alain Bertoni, Sara Adar, Steven Shea, Robyn McClelland (University of Michigan School of Public Health, Ann Arbor, MI United States)

Neighborhood environments have been associated with hypertension prevalence, but little research has considered longitudinal exposure to specific domains of the neighborhood environment. We used data from the Multi-Ethnic Study of Atherosclerosis to explore the associations between neighborhood physical and social environments and incident hypertension in a cohort of 3,401 adults aged 44-84 (mean 59) in six sites in the U.S. over 10 years of follow-up. Participants were free of clinical cardiovascular disease at baseline; those with hypertension were excluded from the analytic sample. The sample was 51% female, 43% white, 23% Hispanic, 20% Black, and 13% Chinese. Cox models were used to model associations of time-varying cumulative average neighborhood exposures (survey-based healthy food availability, walking environment, social cohesion, and safety, and GIS-based density of favorable food stores and recreational resources) with incident hypertension (defined as measured SBP>140, DBP>90, or self-reported use of anti-hypertensive medication at a follow-up exam). Survey-based healthy food availability and safety were both associated with lower risk of incident hypertension after adjusting for age, gender, education, and all other neighborhood exposures of interest. However, only the association with healthy food availability persisted after adjustment for race/ethnicity and area-level socioeconomic status (HR = 0.90 per standard deviation increase, 95% CL 0.83-0.97). Density of favorable food stores and recreational facilities were not associated with hypertension risk. In summary, neighborhood food environments are related to risk of developing hypertension; resident reports about the quality of the food environment may be more relevant to health outcomes than the number of favorable food stores.

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ASSOCIATIONS BETWEEN NEIGHBOURHOOD TYPOLOGY BASED ON FEATURES OF THE BUILT ENVIRONMENT AND SEDENTARY TIME IN YOUTH. Tracie A Barnett*, Marie Eve Mathieu, Yan Kestens, Andraea Van Hulst, Geetanjali Datta (Concordia University, Montreal Canada)

Excessive sedentary time due to prolonged sitting and other low energy expenditure pursuits is an independent risk factor for disease. We tested the association between neighbourhood typology based on features of the built environment and sedentary time in youth aged 8-10 years. Baseline data from the QUALITY cohort, an ongoing study of Québec youth aged 8-10 years with at least one obese parent were used (n=512). Systematic observations of residential neighbourhoods were performed and a GIS was used. Cluster analysis was used to identify distinct neighbourhood types. Physical activity and sedentary behaviour were assessed by accelerometer (Actigraph activity monitor). Participants with at least 10 hours of valid wear time on at least 4 days were retained. Wear time was standardized to 600 minutes/day. Children were categorized as sedentary if they accumulated at least 300 minutes/day of ≤100 counts/minute. Associations between neighbourhood type and being sedentary were examined in multivariate logistic regression models controlling for sex, age, and parental education; we further examined the influence of weight status and of engaging in 60 minutes of MVPA daily. Neighbourhood type was associated with being sedentary among heavy children only. Heavy children living in neighbourhoods with few parks, low land use mix, heavy traffic, and few traffic calming devices were most likely to be sedentary (OR: 3.1, 95%CI: 1.1-9.2). The health risks associated with excessive sedentary time appear to be independent of physical activity behaviour. Neighbourhoods may promote sedentary time, possibly because there are few appealing outdoor alternatives; this in turn is one pathway through which neighbourhoods lead to obesity. Interventions designed to increase land diversity including parks, and to reduce or buffer children's exposure to high volumes of traffic, may be a promising strategy to address youth obesity.

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RELIGIOUS SERVICE ATTENDANCE AND ALL-CAUSE MORTALITY: A MEDIATION ANALYSIS. Shanshan Li*, Tyler VanderWeele (Harvard School of Public Health, Boston, MA United States)

Background: Previous studies have suggested an inverse association between religious services attendance and all-cause mortality. However, the majority of the existing studies are cross-sectional and few have rigorously examined the mechanisms leading to these associations. Longitudinal study with repeated measures of religious service attendance and covariates is needed. **Method**: Based on the Nurses' Health Study, we conducted a prospective cohort study including 49,560 US nurses, with repeated measures of religious services attendance and lifestyles covariates at 1992, 1996 and 2000, and followed up from 1996 until June, 2008. Causal mediation analysis methods were used to estimate the direct and indirect effects of religious services attendance on all-cause mortality mediated through the following mediators: depressive symptoms, smoking, alcohol consumption, diet quality, numbers of friends, have someone close to talk to and phobic anxiety. **Results**: During 12 years follow-up, we identified 4,794 death events. Comparing frequent religious services attendance (greater than once per week) with almost never attendants in 1996, frequent religious attendance is associated with lower all-cause mortality (multivariate adjusted OR=0.62, 95%CI: 0.53-0.74); conservative estimates of the mediated effects were 0.98 (95%CI: 0.96-1.00) for depressive symptoms, 0.97 (95%CI: 0.95-0.99) for current smoking, 0.98 (95%CI: 0.97-0.99) for numbers of friends and 0.99 (95%CI: 0.98-1.00) for have someone close to talk to. The mediated effects were null and for alcohol consumption, diet quality and phobic anxiety. **Conclusion**: Religious services attendance is associated with lower all-causes mortality with at least 6% effects mediated through depressive symptoms, 6% through smoking, 5% through number of friends and 3% through have someone close to talk to.

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LONGITUDINAL RELATIONSHIPS BETWEEN NEIGHBORHOOD PHYSICAL ENVIRONMENTS AND INCIDENT TYPE 2 DIABETES MELLITUS. Paul Christine*, Ana Diez Roux, Amy Auchincloss, Alain Bertoni, Mercedes Carnethon, Brisa Sanchez, Kari Moore, Karol Watson, Tamara Horwich (University of Michigan School of Public Health, Ann Arbor, MI United States)

Background: There is a small but growing literature linking neighborhood environments to type 2 diabetes. However, the extent to which the observed associations are causal remains unclear due to the largely cross-sectional nature of prior studies. **Methods**: Using 10 years of data from the Multi-Ethnic Study of Atherosclerosis, we investigated the relationship between changes in the neighborhood physical environment and incident diabetes in 5,453 diabetes-free individuals aged 45-84 at baseline. Neighborhood healthy food and physical activity resource availability were measured using both GIS-based (density of supermarkets/fruit and vegetable markets, and recreational activity establishments) and survey-based (healthy food availability and walking environment) methods. Marginal Cox proportional hazards models were used to assess the relationship between time-varying cumulative average neighborhood exposures, and incident diabetes, controlling for time-varying confounders. **Results**: Adjusting for age, sex, income, education, race/ethnicity, alcohol and tobacco use, greater cumulative exposure to higher density healthy food and physical activity resources was associated with a small reduction in risk of type 2 diabetes (HRs (95% CIs) for an interquartile range increase in cumulative exposure = 0.97 (0.91, 1.03) and 0.94 (0.90, 0.98), respectively). Survey-based measures of healthy food and walking environments showed similar, but stronger, associations (HRs=0.83 (0.75, 0.91) and 0.77 (0.70, 0.86), respectively). Results were largely unchanged when adjusting for other potential neighborhood and individual-level confounders. **Conclusion**: Neighborhood healthy food and physical activity resource availability is associated with incident type 2 diabetes in middle-aged and older adults. Improving neighborhood physical environments may represent a complementary approach to preventing type 2 diabetes.

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DOES SEATBELT USE EXPLAIN SOCIOECONOMIC DIFFERENCES IN TRAFFIC ACCIDENT MORTALITY? Sam Harper*, Thomas Charters, Erin Strumpf (McGill University, Montreal Canada)

US motor vehicle accident mortality is characterized by persistent socioeconomic differences, but the contribution of seat belt use to these differences, relative to other factors, is unknown. Many states have recently upgraded mandatory seat belt laws so that not wearing a seat belt is considered a primary rather than secondary offense. We exploit the quasi-random timing of these law changes to estimate the differential effect of seat belt use on traffic accident mortality by education. We obtained data on traffic accident deaths from the National Vital Statistics System and denominators from the Current Population Survey for 45 states that reported education consistently on death certificates from 1994-2010. We obtained aggregate estimates of seat belt use by education from the Behavioral Risk Factor Surveillance Surveys. Instrumental variable estimates suggested that a 1 percentage point increase in seat belt use among those with less than 12 years of education reduced motor vehicle accidents by 0.25 deaths per 100,000 population (95%CI -0.53,0.03). Effects were smaller for those with 12 years of education (-0.13, 95%CI -0.34,0.08), and generally null for those with 13-15 years (0.07, 95%CI -0.12,0.25) or 16 or more years (0.07, 95%CI -0.57,0.70). Weaker effects for more educated groups are likely due to a smaller impact of mandatory laws on belt use. Eliminating the current 10 point difference in seat belt use between the lowest and highest education groups would reduce the education difference in motor vehicle accident mortality rates by about 17%. Encouraging states with secondary enforcement of seat belt laws to upgrade to primary enforcement would reduce education-related inequalities in traffic accident mortality. However, factors other than seat belt use, such as driving behavior and car safety, may be more important contributors to socioeconomic differences in traffic accident mortality.

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JOINT EFFECT OF NEIGHBORHOOD CONTEXT AND INDIVIDUAL SOCIAL INTEGRATION ON MORTALITY RISK: AN ANALYSIS OF THE THIRD NATIONAL HEALTH AND NUTRITION EXAMINATION SURVEY (NHANES III). Andrea Fleisch Marcus*, Sandra Echeverria, Bart Holland, Ana Abraido-Lanza, Marian Passannante (Rutgers School of Health Related Professions, Newark, NJ United States)

BACKGROUND: Social relationships and the contexts within which they occur- such as neighborhood conditions – have independently been associated with health. The present study examines the joint effect of neighborhood socioeconomic condition and individual social integration on mortality risk. **METHOD**: We examined data from NHANES III geocoded and matched to census tracts, serving as neighborhood proxies. We operationalized neighborhood poverty as the proportion of residents in a census tract living below the federal poverty level. Social integration was measured via a modified Social Network Index. Data was analyzed using Cox proportional hazards regression models that accounted for the complex survey design. Further, measures of additive interaction were calculated and a joint effect model was built using dummy variables that represented those sub-groups at highest risk (both risk factors present) and lowest risk (both risk factors absent) as well as sub-groups representing the independent effects of each risk factor. **RESULTS**: The association between social integration and mortality risk was significant in this sample (hazard ratio (HR): 1.30; 95% CI: 1.17, 1.49), and remained so after controlling for confounders (HR: 1.44; 95% CI: 1.31, 1.58). While tests for additive interaction were not statistically significant, individuals in the highest risk strata assessing the joint effect of low social integration and high neighborhood poverty had 63% (HR: 1.63; 95% CI: 1.35, 1.96) greater mortality risk than those who were more socially integrated and living in low poverty neighborhoods. **DISCUSSION**: Neighborhood disadvantage and lack of social integration have striking effects on health. The magnitude of this association has practical relevance and warrants further research. These findings may be used to support policies and interventions aimed at neighborhoods with concentrated poverty.

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GENETIC AND SOCIAL ENDOWMENTS FOR THE AGE OF RETIREMENT AS CONTRIBUTORS TO INTERGENERATIONAL HEALTH INEQUALITY. David Rehkopf*, Mark Cullen, Shripad Tuljapurkar (Stanford University, Stanford, CA United States)

The extent to which genetic risk contributes to health inequality is unknown and untested. This manuscript will present a theoretical model, in order to explicate a process where proposed social and biological mechanisms could impact unequal distributions of health risk alleles across generations. Then, in order to examine the empirical basis for a genetic role in explaining socioeconomic disparities in health, we will present analyses from the Health and Retirement Study (HRS) and test whether data is consistent with our model. We formalize our model using a qualitative loop analysis approach which allows the specification of feedback and bi-directional associations without the need to specify exact magnitudes of relationships. We find that our model is consistent with the premise that over multiple generations, relationships between work, illness, socioeconomic position and genetic risk could produce genetic risk differences by social class. Using HRS data, we find meaningful associations between genetic risk and work that are consistent with our model. Central to our model, and our motivation for developing a theoretical model, is a demonstration of the potential role of public policy as key for disrupting a biological basis for intergenerational health inequality.

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CHRONIC FINANCIAL HARDSHIP AND COGNITIVE PERFORMANCE IN MIDLIFE IN A BIRACIAL COHORT. Adina Zeki Al hazzouri*, Stephen Sidney, Tina Hoang, David Jacobs, Kristine Yaffe (University of California San Francisco, San Francisco, CA United States)

Background: There is good evidence that low socioeconomic status is associated with greater risk of cognitive impairment. Prior work has focused on cognition in old-age; whether SES influences cognitive performance earlier in life remains relatively unexplored. **Methods**: We determined how financial hardship over 25 years influences cognitive performance of young to middle-aged adults of the Coronary Artery Risk Development in Young Adults study (N=3,015). Three cognitive tests were administered at the year 25 exam: the Rey Auditory-Verbal Learning Test (RAVLT, range 0 to15), a test of verbal memory; the Digit Symbol Substitution Test (DSST, range 8 to 119), a test of speed and working memory; and the Stroop (range -46 to 127), a test of executive skills. Participants reported their overall financial hardship in paying for basics at baseline and at 6 follow-up visits. We defined chronic financial hardship as: no hardship in any visit (reference,29.5%), hardship in <3 visits (37.4%), hardship in 3-6 visits (30.5%), and all-time hardship (2.5%). **Results**: More hardship was associated with worse cognitive performance on the DSST (lower scores) and the stroop (higher scores), but not on the RAVLT. Compared to subjects with no hardship, mean DSST scores were 2 points lower for subjects who reported hardship in <3 visits (95%CI:-3.3; -0.8), 4.7 points lower for those with hardship in 3-6 visits (95%CI: -6.1, -3.5), and 8.2 points lower for those with all-time hardship (95%CI: -11.4; -4.9), from fully-adjusted linear regression models. Compared to subjects with no hardship, mean stroop scores were 1.2 points higher for subjects who reported hardship in 3-6 visits (95%CI: 0.22; 2.2) and 3.6 points higher for those with all-time hardship (95%CI:1.2, 5.9), from fully-adjusted models. **Conclusion**s: Sustained financial hardship, a measure of chronic economic difficulty, was associated with worse cognitive performance.

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THE EFFECT OF COGNITIVE SOCIAL CAPITAL ON COMMON MENTAL DISORDER IN TAIWAN. YUN-HSUAN WU*, Kellee White (University of South Carolina, Columbia, SC United States)

Probable common mental disorders (CMDs) are a broad diagnostic category for non-psychotic, depressive, and anxiety disorders. Cognitive social capital, which represents perceptions of support, reciprocity, sharing and trust, has been shown to have a negative association with mental disorders in the U.S. and the U.K. However, no prior work has explored the role of cognitive social capital and mental health outcomes among Taiwanese adults. The 2010 Taiwan Social Change Survey, was used to investigate the association between cognitive social capital and prevalence of CMD (n=1,887). The 12-item Chinese Health Questionnaire was used to measure CMDs. Each of the 12 items were summed together and scores of >3 were classified as likely to have CMD. Cognitive social capital, measured using a 7-item scale, was used as a continuous variable, where higher scores reflected greater trust. Multivariate logistic regression models, weighted to account for the complex sampling design, were used to explore the association between cognitive social capital and CMDs after controlling age, gender, self-reported health, daily activities, risky behaviors (i.e. drinking, smoking and betel quid chewing), and marital, educational, working and religious status. The prevalence of CMDs was 24.5%. High cognitive social capital scores were independently associated with lower risk of CMDs (OR= 0.84, 95% CI=0.78, 0.90) after controlling for confounders. Younger age, females, poor self-reported health, and limited daily activity functioning were also associated with high risk of CMDs. The findings of this study provide new evidence of the effect of cognitive social capital on CMDs. In Taiwan, mental health prevention programs primarily focus on individual-level strategies. Initiatives to improve mental health should additionally consider incorporating social contextual factors which have an impact on mental health.

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ESTIMATING THE IMPACT OF RACIAL RESIDENTIAL SEGREGATION ON BIRTH WEIGHT: AN INSTRUMENTAL VARIABLES APPROACH. Nichole Austin*, Sam Harper, Erin Strumpf (McGill University, Montreal Canada)

Racial residential segregation is a persistent problem in the US and a suspected contributor to racial differences in birth outcomes, with several studies reporting associations between segregation and birth weight. However, segregation is likely endogenous: unobserved factors driving segregation are difficult to account for in standard regression models, which could lead to biased estimates. We attempted to address endogeneity concerns by using the Railroad Division Index (RDI) to instrument for segregation. We merged four datasets to create a cross-sectional record of non-Hispanic black and white singleton births to US -born/resident mothers in 2000, linked to measures of segregation and RDI at the metropolitan statistical area (MSA) level (n=574,757 births across 92 MSAs). We compared ordinary least squares (OLS) to two-stage least squares (2SLS) instrumental variables estimates of the effect of racial residential segregation (dissimilarity index, or DI) on birth weight (in grams). We used cluster-robust standard errors and performed several validity checks for the assumptions of instrumental variable analysis. The average DI in our sample was 0.61, indicating that 61% of the population would have to move in order to achieve racial balance across MSAs. Race-stratified OLS models estimated a 1.14 gram decrease in black birth weight for each one percentage point increase in segregation (95% CI: -1.81, -.48), and a .53 gram increase for whites (95% CI: -.23, 1.29). 2SLS models estimated a much larger effect for blacks (-2.89; 95% CI: -6.18, .40), and the effect estimate for whites changed direction (-.70; 95% CI: -3.51, 2.12), though confidence intervals were wider with 2SLS. Our findings suggest a causal impact of segregation on birth outcomes, and are consistent with differential effects by race indicating that residential segregation contributes to persistent racial differences in birth outcomes.

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SELECTING COMPARABLE NEIGHBORHOODS ACROSS CITIES: THE MEDIAN NEIGHBORHOOD INDEX. Usama Bilal*, Julia Diez, Manuel Franco (Johns Hopkins Bloomberg School of Public Health, Baltimore, MD United States)

Studying the effects of neighborhoods on population health is an opportunity to explore population preventive approaches. Given that all neighborhoods within the same city are exposed to city/country-wide effects (e.g.: food system), being able to compare neighborhoods of different cities may represent an opportunity to detect these macro level effects. We present the design of a methodology to select comparable neighborhoods across cities: the Median Neighborhood Index. We tested this method in the cities of Madrid (Spain) and Baltimore (US). Data were obtained from Municipal Registries in Madrid (2012) and the American Community Survey in Baltimore (2009-2011). The Median Neighborhood Index is a composite score of the mean Euclidean rank distances to the median neighborhood of each city in 4 sociodemographic and urban form variables: education (% <8-9 years of education), aging (% >65 years old), segregation (% foreign-born [Madrid] and % non white [Baltimore]) and urban form (population density). Non-urban areas were excluded (density <1000 pop/sq. mi.). The units of analysis were census sections in Madrid (n=2409) and census tracts in Baltimore (n=200). We used the Spatial Scan Statistic to find clusters of median areas (low Median Neighborhood Index) with a maximum of 15,000 pop. The selected variables were similarly distributed in both cities (coefficient of variation=39%, 35%, 48%, 61% and 50%, 48%, 74% and 66% for education, aging, segregation and urban form in Madrid and Baltimore, respectively). The selected areas correspond to 12 census sections in Madrid (pop=15,700) and 3 census tracts in Baltimore (pop=11,708). This methodology allows for the selection of areas in different cities that can be compared in terms of their neighborhood characteristics such as the local food or physical activity environment, allowing detecting macro-level effects otherwise hidden behind homogeneous exposures.

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ECONOMIC CRISES AND ISCHEMIC HEART DISEASE MORTALITY IN EUROPE: EFFECT HETEROGENEITY? Usama Bilal*, Thomas A. Glass (Johns Hopkins Bloomberg School of Public Health, Baltimore, MD United States)

The effects of economic crises on cardiovascular disease have been widely debated. Our objective was to study associations of economic crises and Ischemic Heart Disease (IHD) mortality across countries in Europe for the period 1980-2010 and to examine if these associations are homogeneous. We used economic (World Bank) and vital statistics data (WHO) for all European countries with more than 2 million inhabitants with complete mortality data for 1980-2010. We used unemployment rate as a proxy for economic recessions, centered on a country-specific mean to obtain within-country effects. We computed age-adjusted (2013 European Standard Population) mortality rates for IHD mortality and modelled the association between unemployment as a time-varying exposure and IHD mortality using a mixed-effects model among 26 countries. To explore whether the association differs across four regions (Central, Eastern, Northern, and Southern Europe) we introduced an interaction between region and unemployment. We hypothesized that the association would be strongest in regions with weaker social protection policies (Southern and Eastern Europe). Contrary to our hypothesis, in Central European countries a 1% increase in unemployment was associated with an increase in IHD mortality rate of 1.59/100,000 ($p<0.001$), while in Eastern European countries a 1% increase in unemployment was associated with a decrease in IHD mortality rate of 1.00/100,000 ($p<0.001$). This association differed in Northern and Southern Europe where we could not reject the null hypothesis. This study showed heterogeneity in the association of country-specific unemployment and cardiovascular mortality in Europe for the period 1980-2010. Surprisingly, the deleterious impact of economic downturns was strongest in countries with strong social safety nets (Central Europe) while it was salubrious in countries with weak social safety nets (Eastern Europe).

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BUILDING A SYSTEMS MAP OF CHILDHOOD FOOD SECURITY: A QUALITATIVE MAP TO INFORM QUANTITATIVE MODELING. Nancy Fleischer*, Ross Hammond, Xiaoguang Ma, Sonya Jones, Edward Frongillo, Craig Gundersen, Jay Hirschman, Alisha Coleman-Jensen, Neil Mehta, Angela Liese (University of South Carolina, Columbia, SC United States)

In 2012, one in every five American households with children lacked food security. Despite considerable increases in federal food assistance spending over the past decade, the lack of food security is at its highest since measurement began in the mid-1990s. The goal of this study was to improve understanding of the childhood food security system by developing a map (i.e., a visual model) of it. We convened a two-day workshop in December 2013 with a panel of national experts in childhood food security with backgrounds in demography, economics, epidemiology, health behavior, nutrition, sociology, and systems science to draft the systems map. Following a discussion of key actors, pathways, and processes, the panel identified several key elements for the map. A draft map was generated by the end of the second day. Key actors, sectors, flows, and programs or policy levers were essential elements of the map. Important factors included children, families, teachers, employers, community organizations, food retail, and food production and distribution. Major sectors included governance, school, community, food, health, and economic sectors. Money, food, knowledge, and social capital/social support were identified as important flows throughout the system. Programs aimed at improving childhood food security consisted of food assistance programs, government cash assistance programs, housing programs, nutrition education, financial management education, and food banks. Refinement of the map is ongoing. The map will be used as a basis of a subsequent system dynamics model aimed at identifying key intervention points to improve childhood food security.

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CHARACTERISTICS OF THE HIGH SCHOOL EXPERIENCE AND OBESITY AT AGE 40 IN A US COHORT. Alison Cohen*, Emily Ozer, Barbara Abrams (University of California Berkeley School of Public Health, Berkeley, CA United States)

Introduction: The association between educational attainment and obesity is well-documented, and research suggests that the school setting may also be relevant for health, but less is known about how the high school experience may affect obesity in adulthood. **Methods**: In the USA National Longitudinal Survey of Youth 1979 cohort, school staff reported high school characteristics (e.g., student and faculty demographics, student-teacher ratio, drop-out rate). We regression-calibrated self-reported weight and height at age 40 and then calculated body mass index (BMI) to define obesity (BMI≥30). We used logistic regression, adjusting for race, gender, parental socioeconomic position, and childhood geography, and accounting for sampling design with survey weights. **Results**: For each five percentage point increase in the proportion of their classmates who were disadvantaged, individuals had an increased odds of obesity after adjusting for confounders (odds ratio (OR)= 1.02; 95% confidence interval (CI): 1.004, 1.04). This association persisted after adding educational attainment at age 25 to the model (OR = 1.02; 95%CI: 1.002, 1.03). Other school setting characteristics (student-teacher ratio, faculty racial/ethnic composition, student racial/ethnic composition, percent of 10th graders who drop out) were not associated with obesity after adjusting for confounders. **Conclusion**s: The proportion of disadvantaged students was the only school setting measure statistically significantly associated with adult obesity, and the association was weak. This suggests that peer effects independent of individual socioeconomic position may be somewhat relevant for health. Education policies already target economically disadvantaged students through Title I funding and free and reduced-price lunch programs to mitigate educational consequences; future research should also consider health consequences of these policies.

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NEIGHBORHOOD VARIATION IN ASSOCIATIONS BETWEEN HAVING A CO-RESIDENT FATHER AND CHILDREN'S HEALTH OUTCOMES IN SOUTH AFRICA. Gareth Mercer*, Ying MacNab, Rachel Jewkes, Julie Bettinger (School of Population and Public Health, University of British Columbia, Vancouver Canada)

Background: More than half of all children in South Africa do not live with a father. Conventional wisdom is that father "absence" negatively affects child wellbeing. However, few empirical studies into fathers' influences on the health of young children exist. In theory, fathers contribute time and money, knowledge, and social connections to improve their children's health. Yet anthropological data suggest that, in patriarchal societies when employment is scarce, mothers may be able to better allocate resources for their children's needs when men are absent. **Methods**: We used cross-sectional data from a nationally representative sample of households (the South African Demographic and Health Survey) to address whether having a co-resident father is associated with improvements in health outcomes for children under five. Here we present three-level generalized linear mixed models, fit using Markov Chain Monte Carlo methods, to estimate associations between having a co-resident father and having been breastfed for at least six months. We modeled variation across neighborhoods in the regression coefficient for the co-resident father exposure to explore whether context influences its effect. **Results**: By simple logistic regression, having a co-resident father is associated with 39% lower odds of being breast-fed for at least six months [OR 0.61; 95% CI 0.52-0.71%]. In models with varying coefficients, considering children who live in the same household in the "average" neighborhood, holding potential confounders constant, this association is completely attenuated [OR 0.98; 95% CI 0.69-1.38]. However, there is considerable variation across neighborhoods. The range of ORs estimated to cover 95% of neighborhoods is 0.21-5.71. **Conclusion**s: We discuss interpretations of these findings and approaches for studying neighborhood characteristics related to variations in the effect of having a co-resident father.

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SOCIAL ENVIRONMENTS, GENETICS, AND BLACK-WHITE DISPARITIES IN INFANT MORTALITY. Abdulrahman M El-Sayed*, Magdalena Paczkowski, Katherine M Keyes, Sandro Galea (Columbia University, New York, NY United States)

Genes and environments act in tandem to produce population health. However, in some instances, the scientific literature has leaned toward one explanation, underplaying the other without rigorous testing. For example, infant mortality among Blacks in the US is 3 times higher than among Whites. Most scientific writing about this disparity has attributed it to genetic differences between Blacks and Whites despite no direct evidence to this end, and very little literature in general attempting to compare genetic versus environmental drivers of this disparity. We built on an approach used in other areas to indirectly assess whether genetics do indeed explain racial disparities in infant mortality by analyzing the risk of infant mortality among Black-Black, White-White, and interracial couples over time between 1989-1997 and 1998-2006 and calculated the degree of modification of the relation between maternal race and infant mortality by paternal race. After adjusting for age, education, parity, prenatal care and insurance status, odds of infant mortality among interracial couples decreased with time relative to White-White couples. Odds among Black mother-White father couples decreased from 1.62-1.40, and decreased among White mother-Black father couples from 1.51-1.20. By contrast, the odds of infant mortality among Black-Black couples increased with time from 2.11-2.48. We also found that paternal race modified the relation between maternal race and infant mortality (synergy index=1.49), and the degree of this modification increased with time throughout our study. Genetic explanations for these observations are implausible, suggesting that environmental factors, such as structural or individual discrimination, are likely to play the greater role. Careful testing of potential mechanistic hypotheses is critical to guide inference about whether particular racial differences are driven by genetic factors or shaped principally by environmental exposures.

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A POPULATION-BASED ANALYSIS OF THE SOCIAL DETERMINANTS OF ADULT WOMEN'S HEALTH SERVICE UTILIZATION IN THE U.S. Kelli Stidham Hall*, Vanessa Dalton, Timothy RB Johnson (University of Michigan, Ann Arbor, MI United States)

Objective: Poor and disparate reproductive health outcomes in the United States may be related to inadequate and differential women's health care utilization. We investigated determinants of adult U.S. women's health service use between 2006-2010. **Methods**: Population-based data were drawn from multiple cycles of The National Survey of Family Growth. Between 2006-2010, household interviews were conducted with 12,279 U.S. women ages 15-44 years. We focused on adult women aged 25 and older (n=7,897). Our primary outcome was any women's health service utilization in the previous year. We also examined types of women's health service use including contraception, gynecological exam, sexually transmitted infection (STI) and pregnancy related services. Multivariable logistic regression models were used to identify differentials in service use across sociodemographic groups. **Results**: Nearly three quarters of the sample (74%) reported using women's health services in the past year. Less than half of sexually active, non-infertile women used contraceptive services (47%); even fewer used pregnancy (21%) and STI (14%) services. In multivariable models, older, poor, and unemployed women and women with less educational attainment had greater odds of service use than younger and socioeconomically advantaged women. The odds of using pregnancy, STI and gynecological exam services were greater among Black women than White women (Odds Ratios 1.4-1.6). Lack of insurance was a predictor of service use in all models (ORs 0.4-0.8). **Conclusion**s: While age-related differences in women's health service use may reflect fertility transitions, social disparities mirror reproductive inequalities among U.S. women. Research on women's health service utilization and outcomes across the reproductive life course and forthcoming sociopolitical climates is needed.

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ACCOUNTING FOR SELECTIVE SURVIVAL IN RESEARCH ON DETERMINANTS OF COGNITIVE DECLINE: A SIMULATION FRAMEWORK. Elizabeth Rose Mayeda*, Melinda Power, Jennifer Weuve, M. Maria Glymour (University of California, San Francisco, San Francisco, CA United States)

In longitudinal studies of older adults, substantial attrition due to death or dropout occurs. In research on determinants of cognitive decline, correlates of both exposure and outcome may affect attrition, setting the stage for selection bias. Due to measurement error and time-varying non-linear slopes, it is difficult to anticipate the degree of bias. A few recent papers attempt to account for survival bias with inverse probability weighting (IPW) or joint longitudinal-survival models, but the preferred tools and interpretation of estimates remains controversial. We developed a simulation platform to compare methods to account for selective survival in cognitive decline research. We illustrate with the example of the effect of diabetes on cognitive decline, allowing diabetes, earlier cognitive values, and confounders to affect survival and cognitive decline. We compared bias when ignoring and when using 3 approaches to handle selective survival (IPW, joint-longitudinal survival models, and adjusting for determinants of survival). Observations can be classified into principal strata based on counterfactual survival status with or without diabetes. We focus on effects in those who would survive regardless of diabetes status, defining the effect of interest as the mean rate of cognitive change if individuals were exposed versus mean rate of cognitive change if the same individuals were not exposed. Using a range of parameter inputs drawn from existing cohorts, we show the magnitude of bias when ignoring selective survival. Bias towards the null substantial enough to attenuate estimates by half is easily induced. We compare how the bias is reduced using the 3 approaches, depending on the extent of unmeasured and time-varying confounding. This simulation provides a flexible platform for evaluating biases in cognitive decline studies and illustrating the causal questions addressed by alternative analyses.

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TESTING EMPIRICAL EXPLANATIONS FOR SPOUSAL CAREGIVING AND DECREASED MORTALITY RISK. Benjamin Capistrant* (University of Minnesota, Minneapolis, MN United States)

In contrast to previous literature, a few recent studies have shown informal, family caregiving to be associated with a decreased mortality risk. However, the main hypothesized mechanisms to explain this association (healthy worker selection bias into caregiving roles and psychosocial benefits of altruism) have not been well tested empirically. We assessed the association between spousal caregiving and all-cause mortality using data from 11,476 Health and Retirement Study cohort members between 1998-2010. Spousal caregiving was defined as >=14 care hours/week, self-reported by care recipient at each wave (2000-2008). Mortality was self-reported by next of kin at each biennial HRS survey between 2002 and 2010. We used a stabilized inverse-probability-weighted marginal structural model, specifically a logistic model, to estimate the odds of caregiving on morality. For the healthy worker hypothesis, we weighted models by the inverse of the probability of caregiving treatment conditional on demographic, socioeconomic, caregiver health and care recipient health characteristics (health characteristics lagged by one study wave). For the altruism hypothesis, we estimated the controlled direct effect of caregiving on mortality, accounting for an index of self-reported positive social support from family members. After accounting for both healthy worker selection into caregiving and additionally for the altruism hypothesis, the controlled direct effect of spousal caregiving was a 38% reduced odds of mortality (odds ratio (OR): 0.62, 95% Confidence Interval (CI): 0.47, 0.80). Longer caregiving duration (2 consecutive survey waves) was associated with a statistically significant reduced odds of mortality (OR:0.80, 95% CI: 0.69, 0.91), though smaller in magnitude. Neither health worker selection bias nor altruism mediation can fully account for spousal caregiving being associated with lower odds of mortality.

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EARLY LIFE INSTRUCTION IN FOREIGN LANGUAGE AND MUSIC AND INCIDENCE OF MILD COGNITIVE IMPAIRMENT. Robert Wilson, Patricia Boyle, Jingyun Yang, Bryan James*, David Bennett (Rush Alzheimer's Disease Center, Chicago, IL United States)

Objective: To test the hypothesis that foreign language and music instruction in early life are associated with lower incidence of mild cognitive impairment and slower rate of cognitive decline in old age. **Methods**: At enrollment in a longitudinal cohort study, older persons without cognitive impairment estimated years of musical training and foreign language instruction by the age of 18. At annual intervals thereafter, they completed clinical evaluations that included cognitive testing and clinical classification of mild cognitive impairment. **Results**: There were 262 persons (27.2%) with no foreign language instruction, 576 (59.9%) with 1-4 years, and 124 (12.9%) with >4 years. There were 344 persons (35.8%) with no music instruction, 360 (37.4%) with 1-4 years, and 258 (26.8%) with >4 years. During a mean of 5.4 years of observation (SD=3.3), 394 of 962 participants (41.0%) developed mild cognitive impairment. Higher levels (>4 years) of foreign language (hazard ratio [HR] =0.687, 95% confidence interval [CI]: 0.486, 0.970) and music (HR = 0.711, 95% CI: 0.541, 0.934) instruction by the age of 18 were each associated with reduced risk of developing mild cognitive impairment. Results were comparable after adjustment for early life indicators of cognitive activity, cognitive resources in the home, and household socioeconomic status. In a subsequent mixed-effect model, both foreign language and music instruction were associated with higher initial level of cognitive function, but neither instruction measure was associated with rate of cognitive decline. **Conclusion**s: Higher levels of foreign language and music instruction during childhood and adolescence are associated with lower risk of developing mild cognitive impairment in old age.

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RELATIONSHIPS BETWEEN PARKINSON'S DISEASE AND USE OF CIGARETTES, CANNABIS, ALCOHOL AND COFFEE IN A CASE-CONTROL STUDY. M. Anne Harris*, Hui Shen, Joseph K.C. Tsui, Stephen A. Marion, Kay Teschke (Ryerson University, School of Occupational and Public Health, Toronto Canada)

Parkinson's disease (PD) is a neurodegenerative disease precipitated by dopaminergic neuron loss. Many studies show an inverse relationship between smoking and PD. As dopaminergic pathways are involved in addiction, neurological reward and pathophysiology of PD, common recreational psychoactive drugs comprise an interesting target for risk factor studies. Despite consistent evidence on smoking, relationships for alcohol and coffee are inconsistent and we found no prior studies of cannabis and PD risk. We conducted a population based case-control study in British Columbia, Canada from 2001 to 2008 that ascertained 403 cases from government records about antiparkinsonian drugs and recruited 405 controls from provincial health registers. Questions about personal habits were modeled on the Canadian Community Health Survey. Cumulative measures were calculated: daily pack-years for cigarette smoking, weekly event-years for cannabis use and weekly drink-years for alcohol and coffee. Logistic regression models adjusted odds ratios (ORs) for age, sex and smoking (for variables other than smoking).Of respondents, 83%, 80%, 56% and 26% were ever users of coffee, alcohol, cigarettes and cannabis, respectively. Smoking was inversely related to PD [OR: 0.69 for 25 cumulative pack years, 95% confidence interval (95% CI): 0.57-0.83], but significant effects were not observed for cannabis [OR: 0.95 for 5 cumulative weekly event-years, 95% CI: 0.80-1.13], alcohol [OR: 1.00, 95% CI: 0.86-1.16] or coffee [OR: 1.00, 95% CI: 0.82-1.11]. We replicated the association between PD and smoking but results do not suggest relationships between PD and other common recreational drugs. Due the possibility of non-addicted use of some drugs, the potential for thresholds could be considered. Increased non-response was observed for questions about alcohol and cannabis, introducing potential for differential or non-differential biases.

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PREVALENCE OF MULTIMORBIDITY AMONG U.S. ADULTS IN 2007-2010 – DATA FROM THE NATIONAL HEALTH AND NUTRITION EXAMINATION SURVEY. Lisa R. Staimez, Melissa Y. Wei, Min Kim*, K.M. Venkat Narayan (Rollins School of Public Health, Emory University, Atlanta, GA United States)

Background: With an increasingly aged population, the prevalence of multimorbidity, the coexistence of two or more chronic diseases, is growing. We estimated the prevalence of multimorbidity from four common chronic diseases and evaluated the respective impact of modifiable risk factors in the U.S. population. **Methods**: We analyzed data from non-pregnant adults aged 20-79 years in the National Health and Nutrition Examination Survey, 2007-2010. Cardiovascular disease (CVD) was based on self-reported diagnosis of coronary heart disease, angina, heart attack, congestive heart failure, or stroke; diabetes on HbA1C = 6.5% or self-reported diagnosis or medication use; chronic kidney disease was defined by the CKD-EPI Collaboration equation; and chronic obstructive pulmonary disease as FEV1/FVC < 0.7, FEV1/FVC < lower limit of normal, or self-reported diagnosis of chronic bronchitis, emphysema, or supplemental oxygen. Population attributable fractions (PAF%) for obesity, smoking, hypertension, high total cholesterol, and high-density lipoprotein (HDL) cholesterol were estimated through log-Poisson multivariate regression. **Results**: Of 11,445 individuals with data on all four diseases, the age-standardized prevalence of multimorbidity was 8.4% (95% confidence interval, CI: 7.7, 9.2), and 24.1% (CI: 22.9, 25.3) had one disease only. Multimorbidity increased with age [ages 18-40: 1.5% (1.1, 2.1) versus 65-79: 32.7% (29.2, 36.5)] and was high in those with obesity (12.0% CI: 10.4, 13.6), hypertension (12.5% CI: 11.4, 13.5), and low HDL (11.8% CI: 10.2, 13.3). The PAF of multimorbidity was greatest for hypertension (25%), smoking (14%), and obesity (13%). **Conclusion**s: In this nationally representative sample of U.S. adults, more than 8% have two or more of the common chronic diseases studied. Targeting common risk factors, particularly hypertension, smoking, and obesity may substantially reduce multimorbidity.

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SOY-BASED INFANT FORMULA FEEDING AND FIBROID RISK. Kristen Upson*, Quaker E Harmon, Donna D Baird (National Institute of Environmental Health Sciences, NIH, Research Triangle Park, MD United States)

The effects of early phytoestrogen exposure from soy formula feeding during infancy on adult female reproductive health remain unclear. Uterine fibroids are a common hormonally-mediated condition of reproductive age women associated with substantial morbidity. Three prior studies of infant soy formula feeding and fibroids reported inconsistent results, although these studies were limited by use of self-reported fibroid diagnoses and low frequency of infant soy formula feeding. We examined the association using data from the Study of Environment, Lifestyle & Fibroids (SELF), an ongoing prospective cohort study of 1,696 African American women ages 23-34 years in Detroit, MI who were screened by ultrasound for fibroids at enrollment in years 2010-2012. Soy formula feeding during infancy was ascertained for 1,522 participants. Using enrollment data for which the prevalence of fibroids was 22%, we estimated relative risk (RR) and 95% confidence intervals (CI) using log-binomial regression or Poisson regression, adjusting for participant age, maternal smoking, maternal education, birth weight, and diabetic and hypertensive pregnancy complications. We observed no association between ever soy formula feeding (vs. never) and fibroid risk as well as the number of fibroids detected. However, among women with fibroids, soy formula feeding was associated with a 60% increased risk of larger fibroids (RR 1.6, 95% CI 1.2-2.1, comparing maximum fibroid diameter of =2cm to <2cm). We observed a similar association for volume of largest fibroid. Our study suggests that infant soy-formula feeding is not associated with fibroid initiation but may be associated fibroid growth.

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FRUIT AND VEGETABLE INTAKE, PESTICIDE RESIDUE STATUS, AND SEMEN PARAMETERS AMONG SUBFERTILE MEN. Yu-Han Chiu*, Myriam Afeiche, Paige Williams, John Christopher Petrozza, Cigdem Tanrikut, Russ Hauser, Jorge E. Chavarro (Harvard School of Public Health, Boston, MA United States)

BACKGROUND: Fruits and vegetables have a multitude of health benefits but there is concern about the reproductive health effects of pesticide residues in these foods. We examined the association of fruit and vegetable intake with semen parameters, considering pesticide residue status, among men presenting for infertility evaluation. **METHODS**: Starting in April 2007, 155 men presenting to a fertility center completed a food frequency questionnaire and produced a total of 338 semen samples over an 18-month period. Fruits and vegetables were categorized as high or low pesticide residue based on the USDA pesticide data program. Linear mixed models were used to analyze the association of fruits and vegetables with semen parameters accounting for within-person correlations across repeat samples. Models were adjusted for age, abstinence time, physical activity, race, total energy intake, and data-derived dietary patterns. **RESULTS**: Total fruit and vegetable intake was unrelated to semen parameters. High-pesticide residue fruit and vegetable intake, however, was associated with lower semen parameters. Men in the highest quartile of high-pesticide fruit and vegetable intake (=1.6 servings/day) had 48% (95% CI: 28, 63) lower sperm count and 35% (95% CI: 19, 51) lower percent morphologically normal sperm than men in the lowest quartile of intake (<0.5 servings/day)(p, trend=0.007 and 0.02, respectively). Low-pesticide fruit and vegetable intake was not related to semen parameters. **CONCLUSIONS**: Consumption of fruits and vegetables with high levels of pesticide residues was associated with lower sperm count and lower percent morphologically normal sperm among men presenting to a fertility clinic.

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PATERNAL URINARY LEVELS OF PHENOLS IN RELATION TO REPRODUCTIVE OUTCOMES AMONG COUPLES. Laura Dodge*, Paige Williams, Michelle Williams, Stacey Missmer, Thomas Toth, Hauser Russ (Harvard School of Public Health, Boston, MA United States)

INTRODUCTION: Human exposure to phenols, including bisphenol A and parabens, is widespread. Evidence suggests that paternal exposure to environmental chemicals may adversely affect reproductive outcomes. **METHODS**: Male-female couples in a prospective study of environmental determinants of fertility and pregnancy outcomes were included. Couples underwent in vitro fertilization (IVF) and/or intrauterine insemination (IUI) cycles, and the geometric means of the males' specific gravity-adjusted urinary phenol levels measured prior to the females' cycle were calculated. Generalized linear mixed models were used to evaluate associations of paternal phenol levels with fertilization rate, embryo quality, implantation, and live birth, accounting for multiple cycles per couple. **RESULTS**: Some 218 couples underwent 195 IUI and 211 IVF cycles. In multivariate models, compared to the lowest quartiles of methyl (IVF: =10.5 ng/ml; IUI: =10.7 ng/ml) and propyl (IVF: =1.0 ng/ml; IUI: =0.9 ng/ml) paraben, paternal levels in the highest quartile (methyl =109 ng/ml in IVF, =79 ng/ml in IUI; propyl =14 ng/ml in IVF, =11 ng/ml in IUI) suggested decreased odds of live birth following IVF (odds ratio (OR): 0.76, 95% confidence interval (CI): 0.27–1.27; OR: 0.59, 95% CI: 0.18–1.87, respectively) and IUI (OR: 0.13, 95% CI: 0.02–0.86; OR: 0.03, 95% CI: 0.01–0.37, respectively). Detectable (=0.2 ng/ml) compared to undetectable (<0.2 ng/ml) levels of paternal butyl paraben suggested decreased odds of implantation (OR: 0.65, 95% CI: 0.30–1.40) and live birth following IVF (OR: 0.65, 95% CI: 0.34–1.42). **CONCLUSION**: Although paternal levels of urinary parabens were associated with reduced odds of live birth and implantation, the 95% CIs were wide. These are some of the first data on the association of paternal urinary phenol concentrations with these outcomes. Given the modest sample size, they require confirmation.

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PRECONCEPTION SERUM DDT AND B-VITAMIN STATUS: INDEPENDENT AND JOINT EFFECTS ON WOMEN'S REPRODUCTIVE OUTCOMES. Fengxiu Ouyang*, Matthew Longnecker, Scott Venners, Sara Johnson, Susan Korrick, Jun Zhang, Xiping Xu, Parul Christian, Mei-Cheng Wang, Tina Cheng, Xiaobin Wang (MOE-Shanghai Key Laboratory of Children's Environmental Health, Xinhua Hospital, Shanghai Jiao Tong University School of Medicine, Shanghai China)

Background: Preconception DDT exposure and B-vitamin deficiencies are prevalent in many populations worldwide, and each has been shown to negatively affect human reproductive outcomes. This study sought to examine whether the effects of B-vitamins and DDT are independent or whether B-vitamin sufficiency protects against the adverse effects of DDT on clinical pregnancy (CP) and its two intermediate outcomes: conception and early pregnancy loss (EPL). **Methods**: We measured preconception concentrations of plasma B-vitamins (B6, B12 and folate) and serum total DDT (sum of p,p' and o,p' isomers of DDT and DDE) in 291 nulliparous, Chinese women who were followed prospectively from the time they stopped contraception until CP or 12 months (whichever occurred first). Conception and EPL were identified using daily urinary human chorionic gonadotropin. Findings: Among the 291 study women, a total of 385 conceptions (31% that ended in EPL) and 265 CPs occurred. In general, as compared to women with adequate B-vitamins and low DDT, incidence rates of CP were reduced in women with B-vitamin deficiency and high DDT level ($p < 0.05$ for all). Most notably, among women with sufficient B-12, DDT was not associated with the incidence of CP or conception; in contrast, among women with B-12 deficiency, high DDT was associated with lower incidence of CP (HR=0.44, 95% CI: 0.23-0.84) and conception (HR: 0.40, 0.21-0.74); and test for interaction was significant for both ($p <0.05$). The odds of EPL was decreased by 45% (95% CI 21%- 62%) for each interquartile distance (IQD) increase in folate among women with high DDT level, and test for interaction was significant ($p = 0.006$). Interpretation: Our results provide suggestive evidence that B12 and folate sufficiency may protect against adverse reproductive effects of DDT exposure. Additional studies are needed to confirm our findings.

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INCREASED RISK OF PRETERM BIRTH SUBTYPES IN WOMEN WITH EARLY-PREGNANCY VITAMIN D DEFICIENCY. Lisa Bodnar*, Robert Platt, Cynthia Ferre, Hyagriv Simhan (University of Pittsburgh, Pittsburgh, PA United States)

Our objective was to estimate the association between vitamin D deficiency and the risk of preterm birth by clinical subtypes. We conducted a case-cohort study in a sample of 13,500 pregnant women who received genetic screening at ≤20 weeks and delivered at Magee-Womens Hospital in Pittsburgh. We randomly sampled 2250 pregnancies and selected all remaining preterm births (<37 weeks) in the cohort for a total of 1127 cases. Stored serum samples from genetic screening were analyzed for 25-hydroxyvitamin D (25(OH)D) by liquid-chromatography-tandem mass spectrometry. Multivariable log-binomial regression models with sample weights and robust standard errors were used to estimate the vitamin D-preterm birth association while controlling for confounders. Approximately 6%, 15%, 37%, and 42% of the subcohort had serum 25(OH)D <30, 30-49.9, 50-74.9, and ≥75 nmol/L, respectively. The incidence of preterm birth was 7.4% overall. Spline regression revealed that the incidence of preterm birth declined as 25 (OH)D increased to 80 nmol/L, then plateaued. Adjusted risk ratios were 2.2 (1.3, 3.5), 1.7 (1.2, 2.3), and 1.4 (1.1, 1.8) for mothers with serum 25(OH)D <30, 30-49.9, and 50-74.9 nmol/L, respectively, compared with 25(OH)D ≥75 nmol/L. Adjusted risk differences were 0.029 (0.004, 0.055), 0.018 (0.003, 0.033), and 0.012 (0.003, 0.022) for these groups compared with the same referent. Similar associations were observed when cases were separated into those due to spontaneous labor/rupture of fetal membranes or medical indication and into those occurring at <34 or 34-<37 weeks. Probabilistic bias analysis accounting for unmeasured confounding by fish intake or exercise did not meaningfully change conclusions. Vitamin D supplementation trials are needed to determine the causality of this association. Source of funding: U01 DP003177, PI: Bodnar

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OVERPOWERED: SIGNIFICANCE TESTING AND P-VALUES IN SIMULATION MODELING. Eric Lofgren*, Kristian Lum (Virginia Bioinformatics Institute, Blacksburg United States)

Simulation models are powerful tools in the study of both infectious and non-infectious diseases. These models allow researchers to ask truly counter-factual questions, including those beyond the reach of observational or experimental studies due to logistical or ethical constraints. These studies yield large datasets that must be analyzed using statistical methods. Despite seeming straightforward, the analysis of simulation data carries with it a unique set of caveats. One is the potential for simulation studies to be "overpowered" – for readily available computational resources to create large study sizes that allow for the detection of spurious null or nearly null effects with deceivingly low p-values. Several example simulation models from hospital infection prevention and disaster preparedness illustrate the problems that arise in the analysis of these studies, especially regarding artificially small p-values. A number of alternatives exist for the reporting of simulation results. Unlike genomic studies, which use more stringent significance criteria to address their underlying multiple comparisons problem, simulation studies cannot be judged using more strict criteria, as sample size can be continually increased until any arbitrary threshold is met. Instead, simulation study results must place the emphasis on the practical, noticeable differences in their results through increased focus on effect measure point estimates. Where the use of significance testing is necessary, studies should also report the "Minimum Detectable Effect Size" (MDES), in order to place the study's results in the context of what effect sizes could be considered significant. The MDES can be easily obtained by adapting the formulas for power calculations, and some examples are provided.

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USING PROBABILISTIC BIAS ANALYSIS TO ASSESS THE SENSITIVITY OF A CASE-CONTROL STUDY TO POSSIBLE SURVIVOR BIAS AND SELECTION BIAS DUE TO NON-PARTICIPATION. Xin Cui*, Onyebuchi Arah, Beate Ritz (University of California, Los Angeles, Fielding School of Public Health, Los Angeles, CA United States)

We are conducting a population-based case-control study to identify environmental and genetic factors that separately or in combination contribute to Parkinson's disease (PD) in Denmark. Patients with primary diagnosis of PD between 1996 and 2009 were identified from Danish National Hospital Register. For each eligible patient, 5 to 10 population controls were randomly selected from the Danish Central Population Register matched to their case on sex and year of birth. Among 1,813 PD cases and 1,885 controls enrolled in our case-control study we conducted interviews that allow us to investigate associations between cigarette smoking and PD among other hypotheses. Given high mortality rates among elderly subjects and a moderate response rate among controls, our interview-based analyses condition on individuals who were eligible, alive and agreed to participate in the study. Thus, we may have predominantly enrolled long-term survivors. The Danish Population Registers uniquely allow us to obtain some data for all subjects regardless of survival and active participation, to impute smoking status for those not included in the interview-based study and to predict the accuracy of PD diagnosis for patients for whom we were unable to review medical records. We are conducting probabilistic bias analysis using Monte Carlo simulations to assess potential survivor bias, selection bias due to non-participation inherent in using registry data, and diagnostic bias for idiopathic PD. We specify prior distributions for bias parameters, and we separately model the conditional selection probabilities for survival, participation, and diagnostic accuracy based on factors such as age, gender, socio-economic status and comorbidities for which we have information and which might have affected selection. We outline the assumptions needed to explain whether these biases might have a major influence on the results in our study.

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G-COMPUTATION OF NATURAL EFFECTS IN CAUSAL MEDIATION ANALYSIS. Aolin Wang*, Onyebuchi A. Arah (Department of Epidemiology, University of California, Los Angeles, Los Angeles, CA United States)

Recent work has considerably advanced the definition, identification and estimation of controlled direct and natural direct and indirect effects in causal mediation analysis. The estimation methods employed so far have included linear structural equations modeling, outcome and mediator regression modeling, inverse-probability-weighted fitting of marginal structural models, and sequential g-estimation. Meanwhile, g-computation has been used in estimating total effect and controlled direct effect. However, its potential in mediation analysis remains unexplored. In this study, we demonstrate the utility of (parametric) g-computation in estimating natural direct and indirect effects, using standard statistical software. We used Monte Carlo simulations to examine the natural direct and indirect effects of a categorical or continuous exposure on a general outcome, given a continuous or categorical mediator. For each study subject, we estimated their nested potential outcomes corresponding to the (mediated) effects of an intervention on the exposure wherein the mediator was allowed to attain the value it would have under a possibly counterfactual exposure intervention. We obtained standard errors via bootstrapping. Our method provided consistent point estimates and standard errors for natural effects and an intuitive way of estimating mediated effects through contrasting different potential outcomes. This framework can be extended to complex multivariable settings.

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STOCHASTIC MEDIATION CONTRASTS IN EPIDEMIOLOGIC RESEARCH: THE MEDIATING ROLE OF INTER-PREGNANCY INTERVAL IN THE RELATION BETWEEN MATERNAL EDUCATION AND PRETERM DELIVERY. Ashley Naimi*, Auger Nathalie, Moodie Erica, Kaufman Jay (McGill University, Montreal Canada)

Low maternal education is consistently associated with an increased risk of preterm delivery. The inter-pregnancy interval, defined as the elapsed duration between a woman's previous pregnancy and the conception date of the next pregnancy, may mediate this relation. We estimated controlled direct effects to assess whether interventions to increase inter-pregnancy intervals will reduce the educational disparity in preterm delivery. We introduce a technique to estimate controlled direct effects under interventions that set only a portion of individuals in the population to a specific mediator value. We use data from 840,091 live singleton births in Québec between 1989 and 2010. The overall risk of preterm delivery (< 37 completed weeks gestation) was 5.1%. Compared to women with some university education, women with less than high-school, high-school, and some college education had an excess preterm delivery risk (95% CI) of 2.3% (2.1%, 2.4%), 1.5% (1.3%, 1.6%), and 0.9% (0.8%, 1.1%), respectively. Under an intervention setting all women to inter-pregnancy intervals of between 18 and 24 months, corresponding risk differences were 2.0% (1.9%, 2.2%), 1.4% (1.3%, 1.5%), and 0.7% (0.6%, 0.8%) respectively. Under an intervention corresponding to the "Healthy People 2020" objective of reducing the number of women with inter-pregnancy intervals of <18 months by 3%, corresponding risk differences were 2.1% (1.9%, 2.3%), 1.3% (1.2%, 1.4%), and 0.9% (0.0%, 1.0%) respectively. Our results suggest that realistic interventions to shorten inter-pregnancy intervals as defined by published targets will yield little or no change in the preterm delivery disparity observed across levels of maternal education.

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COMMUNITY CONTEXT AND THE MORTALITY OF ARAB-AMERICANS. Abdulrahman M El-Sayed*, Sandro Galea (Columbia University, New York, NY United States)

Little is known about the health of Arab-Americans, a small but growing ethnic minority group. We have previously shown that Arab-Americans may have lower life expectancy, greater all-cause mortality, and greater mortality from chronic diseases than their non-Arab White counterparts. Previous work among other minority groups has shown that residence in ethnic enclaves may improve mortality in these groups by decreasing discrimination and increasing social cohesion among them through the life course. Building on this work, in an effort to understand the influence of community context on Arab-American mortality, we compared all-cause and cause-specific mortality among Arab-Americans in Wayne County, MI, home to the largest Arab community outside of the Middle East, to those living elsewhere in the state. The same was done among non-Arab Whites for comparison. Both Arab-Americans and non-Arab Whites in Wayne County, MI were less educated than their counterparts in other contexts. However, Arab-Americans in Wayne county had lower all-cause mortality than did their counterparts elsewhere (110 vs 142.6/10,000), although non-Arab Whites in Wayne County had higher all-cause mortality than their counterparts (88.7 vs 76.7/10,000). Among Arab-American males, the Wayne county advantage was largely driven by lower mortality over age 65 and lower cause-specific mortality to cardiovascular disease and cancer mortality. Among women, the Wayne county advantage was largely driven by lower age-specific mortality at the extremes of life, and lower cause-specific mortality to cancer, despite higher cause-specific mortality to cardiovascular disease. The findings have implications for improving the health of the Arab-American community and our broader understanding of the roles of social context, discrimination, and social cohesion over the life course in the etiology of morbidity and mortality among this group.

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EXAMINING THE ASSOCIATION BETWEEN SALIVARY CORTISOL AND NEIGHBORHOOD CHARACTERISTICS: EVIDENCE FROM THE MULTI-ETHNIC STUDY OF ATHEROSCLEROSIS. Anjum Hajat*, Kari Moore, Brisa Sanchez, Teresa Seeman, Sharon Stein Merkin, D. Phuong Do, Naresh Punjabi, Ana Diez Roux (University of Washington, Seattle, WA United States)

Although several studies have examined the association between cortisol and individual socioeconomic status (SES), few have looked at the association between neighborhood stressors and cortisol. In studies that have assessed this association, neighborhood stress has been operationalized as low SES. Using data from the Multi-Ethnic Study on Atherosclerosis (MESA), we examined cross-sectional and longitudinal associations of salivary cortisol rhythms with neighborhood characteristics (SES, social cohesion and safety) over five years among 1393 white, black and Hispanic participants; 541 participants were measured twice (approximately 5.6 years apart) and 852 were measured once. Cortisol rhythms were characterized using 6 – 8 measures per day over 2 – 3 days. In cross-sectional analyses, a one standard deviation (SD) increase in percent neighborhood poverty and unemployment was associated with a 3.3% and 5.8% flatter decline over the day (approximately midmorning to evening), respectively (95% CI: 0.8%, 6.6% and 3.3%, 9.2%). A one SD increase in social cohesion was associated with 6.2% higher wake up cortisol (CI: 1.6, 11%), a 4.1% steeper decline after the morning peak (CI: -6.5%, -1.4%) and 4.9% steeper decline over the rest of the day (CI:-6.9%,-1.6%). Initial results from the longitudinal analysis revealed that persons living in neighborhoods with a 1 SD higher social cohesion at baseline had 9.1% greater increases in wake up cortisol over 5 years (CI: 1.8%, 16.9%). Flatter cortisol rhythms were observed for participants living in neighborhoods with lower SES or less social cohesion and higher social cohesion was associated with greater increases in morning cortisol over 5-6 years.

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WHAT RENDERS A COMMUNITY OBESOGENIC? USING CONDITIONAL RANDOM FORESTS TO CHARACTERIZE A RISK REGIME. Claudia Nau*, Hugh Ellis, Hongtai Huang, Annemarie Hirsch, Lisa Bailey-Davis, Brian Schwartz, Jonathan Pollak, Ann Liu, Thomas Glass (Bloomberg School of Public Health, Baltimore, MD United States)

The concept of obesogenic environments posits that individuals' bodyweight is influenced by a complex set of environmental risk factors. Past research has focused on assessing the association of single community features with obesity and has ignored their spatial co-occurrence. We use conditional random forests (CRF), a non-parametric machine learning approach, to identify the combination of risk factors that are most important for differentiating obesogenic and obesoprotective environments for children. For the outcome we draw information from electronic health records for the year 2010 for 22,497 children aged 10-18 years whose addresses were geo-coded to one of 1288 Pennsylvania communities. Communities that fall into the highest and lowest quartile of the distribution of average Body Mass Index CDC z-scores are defined as obesogenic (N=47) and obesoprotective (N=48), respectively. Features of the community social, food and physical activity environment (8,19 and 17 features, respectively) come from the American Community Survey (2005-09) and from InfoUSA and Dun & Brad Street. All features jointly classify 67% of communities correctly. We identified 13 features across three environmental domains, conditioned on each other, that contribute most to classification accuracy. Six of these features are characteristics of the social environment. Physical activity features better classified obesogenic environments while food features classified obesoprotective places better. Some risk factors that have attracted prior interest (e.g. proximity to grocery stores or outdoor public activity spaces) do not contribute to classification accuracy. **Results** suggest that a diverse set of risk factors from three domains cluster to form obesogenic and obesoprotective environments. CRF allows consideration of the neighborhood as a system of risk factors, an approach more likely to reflect residents' experiences.

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NEIGHBORHOOD INCOME INEQUALITY AND AGGRESSION AND VIOLENCE AMONG ADOLESCENTS LIVING IN BOSTON, MASSACHUSETTS. Roman Pabayo*, Beth Molnar (Harvard School of Public Health, Boston, MA United States)

Purpose: Being a perpetrator or victim of assaults, can have detrimental effects on the development and health of adolescents. Area-level income inequality has been suggested to be associated with crime and aggressive behavior. However, most prior research on this association has been ecological. Therefore, the purpose of this investigation is to describe the association between neighborhood-level income inequality and aggression and violence outcomes. **Methods**: Data were collected from a sample of 1,878 adolescents living in 38 neighborhoods participating in the 2008 Boston Youth Survey. We used multilevel logistic regression models to estimate the association between neighborhood income inequality and attacking someone with a weapon, being attacked by someone with a weapon, being physically assaulted, being shown a gun by someone in the neighborhood, shot at by someone in the neighborhood, witnessing someone getting murdered in the past year, and having a close family member or friend murdered. Race and Income inequality cross-level interactions were tested. Analyses were stratified by sex. **Results**: Among non-black boys, after adjusting for nativity, age, neighborhood-level income, crime, disorder, and proportion of the neighborhood that is black, income inequality was associated with an increased risk for committing acts of aggression and being a victim of violence. For example, among non-black boys, those in neighborhoods with high income inequality were more likely to be shot at in their neighborhood (OR=2.72, 95% CI=1.12,6.58) in comparison to those living in more equal neighborhoods. Among non-black girls, those living in neighborhoods with high-income inequality were more likely to witness someone die a violent death in the previous year (OR=1.64, 95% CI=1.11,2.42), in comparison to those in more equal neighborhoods. **Conclusion**: Income inequality appears to be related to aggression and victimization outcomes among non-black adolescents living in Boston.

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HYPERTENSIVE DISORDERS IN PREGNANCY AND CARDIOVASCULAR RISK FACTOR DEVELOPMENT. Jennifer Stuart*, Tamarra James-Todd, Stacey Missmer, Eric Rimm, Donna Spiegelman, Eileen Lividoti Hibert, Janet Rich-Edwards (Harvard School of Public Health, Boston, MA United States)

Background: To identify potential targets for cardiovascular screening and intervention among women with a history of gestational hypertension (GHTN) or preeclampsia, we examined the association between hypertensive disorders in pregnancy (HDP) and post-pregnancy risk factor development in the Nurses' Health Study II (NHSII) cohort. **Methods**: Parous NHSII participants free of cardiovascular disease and risk factors of interest at baseline, based on 1989 questionnaire, comprised the study sample (n=61,254). Lifetime pregnancy experience was retrospectively reported in 2009 and used to assign and date HDP. Women were followed for self-reported physician-diagnosed hypertension (HTN), type 2 diabetes (T2DM), and hypercholesterolemia from first birth (regardless of HDP) through 2009. We used Cox proportional hazards models to estimate hazard ratios (HR) and 95% confidence intervals (CI), adjusting for age, race/ethnicity, family history, parental education, and pre-pregnancy smoking, physical activity, and body mass index. **Results**: Relative to women with a normotensive first birth, those with a history of preeclampsia (7.3%) or GHTN (4.3%) had an increased risk of hypertension (HR=1.9, CI: 1.8-2.0; HR=2.3, CI: 2.2-2.4), T2DM (HR=1.9, CI: 1.7 -2.1; HR=1.9, CI: 1.7-2.2), and hypercholesterolemia (HR=1.2, CI: 1.1-1.3; HR=1.3, CI: 1.2-1.4), respectively. This increased relative risk of HTN was strongest within the 5 years after first birth—preeclamptics had a 5.1-fold increased risk (CI: 4.2-6.3) while women with GHTN had a 7.0 -fold increased risk (CI: 5.5-8.8). Over 42 years of maximum follow-up, there were 146/1000 excess cases of HTN among preeclamptics and 209/1000 among women with GHTN. **Conclusion**: Women with HDP have an increased risk for HTN, T2DM, and hypercholesterolemia that persists for several decades. These women may benefit from screening and lifestyle intervention to reduce cardiovascular risk.

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NEIGHBORHOOD-LEVEL RACIAL/ETHNIC RESIDENTIAL SEGREGATION AND INCIDENT CARDIOVASCULAR DISEASE: THE MULTI-ETHNIC STUDY OF ATHEROSCLEROSIS (MESA). Kiarri N. Kershaw*, Ana V. Diez Roux, Peter J. De Chavez, D. Phuong Do, Theresa L. Osypuk (Northwestern University, Chicago, IL United States)

Racial residential segregation may be a fundamental cause of health disparities, but most segregation-health research is cross-sectional. We examined the relationship between neighborhood-level racial/ethnic residential segregation and incident cardiovascular disease among 1,597 Black, 2,347 White, and 1,289 Hispanic MESA participants aged 45-84 years free of CVD at baseline. Racial/ethnic residential segregation was measured using the local Gi* statistic, a z-score measuring the extent to which the racial/ethnic composition of a given neighborhood (census tract) deviates from the composition of the larger surrounding counties. Cox proportional hazards modeling was used to estimate hazard ratios (HR) for incident CVD (first definite angina, probable angina followed by revascularization, myocardial infarction, resuscitated cardiac arrest, CHD death, stroke, or stroke death) over a median 10.2 years of follow-up. Among Blacks, each unit increase in Black segregation was associated with an 11% increase (95% Confidence Interval (CI): 1.02, 1.21) in the hazard of developing CVD after adjusting for age, sex, study site, education, and income. This association persisted after adjustment for neighborhood-level characteristics and individual-level behavioral and biological CVD risk factors (HR: 1.12; 95% CI: 1.03, 1.23). For Whites, White segregation was inversely associated with CVD risk after adjusting for sociodemographics (HR: 0.90; 95% CI: 0.83, 0.98); fully adjusted findings were similar. Hispanic segregation levels were unassociated with incident CVD among Hispanics (sociodemographic-adjusted HR: 0.99; 95% CI: 0.93, 1.06). Similar results were obtained after adjusting for time -varying covariates. In summary, segregation was differentially associated with incident CVD by race/ethnicity, possibly reflecting differences in the processes that lead to segregation across these different groups.

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STATUS OF CARDIOVASCULAR HEALTH IN MISSISSIPPI DELTA ADULTS. Vanessa Short, Tameka Walls*, Larry Smith, Vincent Mendy (Mississippi State Department of Health, Jackson, MS United States)

Introduction: The 18-county Mississippi Delta, a predominately rural, disadvantaged region, has some of the highest rates of cardiovascular disease (CVD) in the nation. Recent recommendations from the American Heart Association (AHA) aim to improve cardiovascular health (CVH) by encouraging the general population to meet ideal levels of several CVH metrics. Assessing CVH status may help inform public health efforts aimed at preventing CVD, however, current estimates of the status of CVH in the Mississippi Delta have not been examined. **Methods**: Preliminary data from 650 participants of the Mississippi Delta Cardiovascular Health Examination Survey, an ongoing population-based, cross-sectional study that uses an in-home data collection model to collect survey data, anthropometric measures and blood specimens on a representative sample of adults in the Mississippi Delta, were analyzed. Six CVH metrics were defined as poor, intermediate, or ideal based on AHA guidelines and included measures of blood pressure, total cholesterol, fasting blood glucose, body mass index (BMI), physical activity and smoking. The percentage of the population with ideal CVH (i.e., 6 ideal metrics present) and poor CVH (i.e., 0, 1, or 2 ideal metrics present) was determined. **Results**: Overall, less than 1.5% of adults exhibited ideal levels for all six metrics; nearly two-thirds (64.4%) were in poor CVH. The mean number of ideal CVH metrics was 1.6. For CVH behaviors, nonsmoking was most prevalent (56.8%) whereas ideal physical activity was least prevalent (10.3%). For CVH factors, normal fasting blood glucose was most prevalent (74.8%) while normal BMI was least prevalent (18.1%). **Conclusion**: The CVH status of Mississippi Delta adults is less than ideal. Efforts to increase the prevalence of ideal CVH could have a significant impact on reducing the burden of CVD in this high-risk population.

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METABOLIC SYNDROME AND PHTHALATE METABOLITE EXPOSURE IN US ADULTS. Cara L. Frankenfeld*, Taara Bhat, Anna Z. Pollack (George Mason University, Fairfax United States)

Metabolic syndrome (MetS) is associated with a 7-fold increased risk of type 2 diabetes and a 1.5-2-fold increase in lifetime cardiovascular disease risk. Evidence suggests that endocrine disruptors are associated with MetS. Phthalates are plasticizers found in numerous commercial products, and have endocrine-disrupting properties. Our objective was to evaluate MetS in relation to 13 phthalate metabolites in adults (21-64 years; n=1963) who participated in the National Health and Nutrition Examination Survey (2003-2010). Individuals were classified as having MetS if they had three or more of high C-reactive protein (>3.0 mg/dl), low HDL cholesterol (<50 mg/dl for females, <40 mg/dl for males), high triglycerides (>150 mg/dl), high glucose (=100 mg/dl), high blood pressure (systolic =130 mm Hg and diastolic >85 mm Hg), or abdominal obesity (waist circumference >88 cm for females, >102 cm for males), resulting in 19% MetS. Logistic regression was used to evaluate MetS in relation to log-transformed phthalate metabolites, adjusted for age, gender, race/ethnicity, current smoking, education, and urinary creatinine. Higher odds of MetS were associated with: mono-(2-ethyl-5-carboxypentyl) phthalate (OR=1.17, 95 CI: 1.02-1.34), mono-(3-carboxypropyl) phthalate (OR=1.16, 95% CI: 1.02-1.31), mono-(2-ethyl -5-hydroxyhexyl) phthalate (OR=1.17, 95% CI: 1.03, 1.31), and mono-(2-ethyl-5-oxohexyl) phthalate (OR=1.16, 95% CI: 1.03, 1.30). Metabolic syndrome was not associated with monobutyl, monocyclohexyl, monoethyl, mono-(2-ethyl)-hexyl , monoisononyl, monooctyl, monobenzyl, monomethyl, monoisobutyl, monocarboxyoctyl, and monocarboxynonyl phthalates. These findings from a large sample of adults expand on other studies that have observed phthalate and endocrine disruptor associations with diabetes and cardiovascular disease. These findings indicate a possible contribution to the burden of MetS by select phthalates.

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DOES GENETICS HAVE A ROLE IN SOCIAL EPIDEMIOLOGY? CONCEPTUAL AND METHODOLOGICAL CHALLENGES. Abdulrahman El-Sayed* (Columbia University, New York, NY United States)

Since the sequencing of the human genome, genetics has dominated the health research enterprise. Countless billions of dollars have been spent on research to characterize the roles of genetic and epigenetic phenomena in the etiology and treatment of myriad diseases. Reluctantly, epidemiologists interested in the social determinants of population health have also turned to genetics as a means of exploring the 'mechanisms' by which social structures get under the skin. In that respect, research exploring gene x environment association and epigenetic markers in population health has grown dramatically. However, the adoption of genetic markers as exposures or mediators in social epidemiology poses a number of challenging conceptual and methodological questions for the field: a) Does the adoption of biologics in social epidemiology represent a fundamental departure from the focus on the social determinants of health? b) Can a mechanistic understanding of the roles of genetics and epigenetics in social epidemiology actually improve our understanding of the social production of health or educate population health interventions? c) Do methods that use genetics in ancillary ways, such as 'Mendelian Randomization', pose the same conceptual challenges as those that consider genetic markers as exposures and mediators? d) Are the methods employed in genetic and epigenetic studies adequate with respect to causal inference in the field? In this symposium, we will explore the conceptual and methodological implications of the adoption of genetic markers in social epidemiology with a focus on articulating if and how these markers can shape our understanding of the social determinants of health moving forward.

Speakers:

- *Genetic Data and Theories of the Heredity of Health Inequalities*
  Daniel Rehkopf
- *Applications of Genetic Instrumental Variables in Social Epidemiology*
  Maria Glymour
- *Genetics and the Social Determinants of Health: Helpful Tool or Harmful Distraction?*
  Abdulrahman El-Sayed
- *Discussant*
  Patricia O'Campo

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WEIGHT AND MORTALITY – WHAT ARE THE CONTROVERSIES? Katherine Flegal* (National Center for Health Statistics, Hyattsville, MD)

Studies of weight and mortality raise multiple methodological issues that should be of interest to epidemiologists but that have not been well-examined. Much of the appearance of controversy arises from methodological differences in analytic approaches. Panelists will discuss a variety of issues and suggest some new strategies. Dr. Stevens will describe the evidence behind some of the current approaches being used with emphasis on issues of residual confounding and reverse causation. Dr. Kaufman will provide a critique of some of these approaches and suggestions for future analyses. Dr. Kalantar-Zadeh will discuss the epidemiologic evidence regarding a possible protective effect of obesity on survival in groups such as the elderly or those with chronic disease states.

Speakers:

- *Approaches to the Analysis of Weight and Mortality Data*
  June Stevens, Department of Nutrition, UNC
- *Current Approaches and Suggestions for the Fu*ture
  Jay Kaufman, McGill University
- *The So-Called "Obesity Paradox"*
  Kamyar Kalantar-Zadeh, MD, PhD, University of California

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EMERGING AND CONTROVERSIAL ISSUES IN RADIATION EPIDEMIOLOGY. Lydia Zablotska*, Roy Shore (UCSF, San Francisco United States)

In the last few years there have been heightened concerns about radiation risks to the general population, prompted by, e.g., the accident at Fukushima and recent large epidemiologic studies of cancer risks following pediatric computed tomography (CT). The rise in the use of diagnostic radiation procedures highlights the urgent need for better understanding of the risks of low-low radiation exposures in general. While most low-dose radiation studies have lacked statistical power and precision in their risk estimates, a new study of over 1 million radiation workers will help provide much needed answers. Recently, and controversially, there are emerging reports of excess risks of cardiovascular diseases after low-dose radiation exposures.

Speakers:

- *How large are the radiation doses and risks from Fukushima?*
  Kazunori Kodama (Chief Scientist, Radiation Effects Research Foundation (RERF)
- *Cancer risks from pediatric CT scans: recent results and methodological challenges*
  Amy Berrington de González (Senior Investigator, Radiation Epidemiology Branch National Cancer Institute)
- *What do we and don't we know about radiation risks from low-dose occupational exposures?*
  John Boice (President, National Council on Radiation Protection and Measurements and Professor, Vanderbilt University School of Medicine)
- *Is there risk of cardiovascular diseases from low-dose radiation exposure?*
  Lydia Zablotska (Associate Professor, Department of Epidemiology and Biostatistics, University of California, San Francisco School of Medicine)

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DESPERATELY SEEKING VALIDATION: A GUIDE FOR DESIGNING AND USING THE RESULTS OF VALIDATION STUDIES. Lisa Bodnar*, Matthew Fox (University of Pittsburgh, Pittsburgh, PA United States)

Measurement error is common in epidemiologic research, yet researchers rarely quantify its implications. Validation studies provide an opportunity to obtain estimates of the amount of bias in the main study and adjust study estimates. Nevertheless, validation studies remain underutilized, likely because of their high cost and investigators' lack of training in cost-efficient design. Even when validation studies are performed, the results are used only cursorily in analysis. The objective of this session is to provide a practical guide for epidemiologists interested in conducting a validation study on how to plan for, and utilize the result of, a well-designed validation study. An overview of the need to plan for validation studies will be presented, followed by three examples of recent validation studies. One validates nationwide Medicaid data on congenital cardiac malformation diagnoses in a study of the safety of antidepressant use during pregnancy. The second uses validation data on heart valves to improve estimates of the relationship between vitamin K antagonist therapy and site specific cancers. The third is a validation study of birth certificate data on maternal weight and weight gain that used a balanced design to estimate accuracy across 48 strata defined by key maternal characteristics. Presenters will discuss practical aspects of the validation including the choice of design, the plan for collecting validation data, issues that arose during data collection, how the study could be improved in retrospect, and how the results were incorporated to study the main effect using bias analysis.

Speakers:

- *On the need to plan for validation studies*
  Matthew Fox
- *Validation of nationwide Medicaid data on congenital cardiac malformations in a study of the safety of antidepressant use during pregnancy*
  Kristin Palmsten
- *Validation of heart valve replacement as a proxy for exposure to anticoagulants in a study of vitamin K antagonist therapy and site-specific cancer incidence*
  Thomas Ahern
- *Validation of birth certificate-based maternal weight data in a study of obesity, gestational weight gain and adverse pregnancy outcomes*
  Lisa Bodnar

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GENERALIZABILITY, TRANSPORTABILITY AND REPRESENTATIVENESS: TO WHOM MAY WE INFER INTERNALLY -VALID EFFECTS? Stephen Cole* (University of North Carolina, Chapel Hill, Chapel Hill, NC United States)

Generalizability (or external validity) is central to knowledge. Perhaps not surprisingly, epidemiologists have concentrated efforts on clarifying issues surrounding interval validity. But to what populations an internally-valid epidemiologic finding applies (or transports) provides crucial information for policy makers and others who wish to use the finding. In this symposium speakers will define and discuss generalizability, and contrast this concept against two related yet distinct concepts of representativeness and selection bias. Speakers will also discuss quantitative methods that may be used to explore the generalizability of findings, as well as key assumptions necessary for these methods to provide accurate inferences.

Speakers:

- Katherine Keyes (Columbia)
- Joel Greenhouse (Carnegie Mellon)
- Elizabeth Stuart (Johns Hopkins)
- Miguel Hernan (Harvard)

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FATHERHOOD AND PROSTATE CANCER RISK: INFERTILITY, PATERNITY, AND OFFSPRING GENDER. Andrea Spence*, Marie-Claude Rousseau, Marie-Élise Parent (INRS-Institut Armand-Frappier, Université du Québec, Laval Canada)

Background: Little is known as to how fertility may relate to prostate cancer (PCa). Two studies assessing the risk associated with infertility showed conflicting results. Other studies, using the number of children fathered as a surrogate measure of infertility, reported either a reduced PCa risk among childless men, or no association. Gender of one's offspring may be reflective of PCa risk since sex-linked mutations have been implicated in both PCa development and offspring gender. Objective: To examine the association between male infertility, number of biological offspring, offspring gender, and PCa risk. **Methods**: A case-control study set among the French population in Montreal, Québec was used. Cases (n=1937) were diagnosed with histologically-confirmed PCa at Montreal-area French hospitals between 2005 and 2009. Age-matched (±5 years) controls (n=1995), residents in Montreal, were selected from the French population-based provincial electoral lists. In-person interviews elicited information on many factors, including fertility and number of offspring. Unconditional logistic regression estimated ORs and 95% CIs, adjusting for age, ancestry, PCa screening history, first-degree PCa family history, and education. **Results**: Male infertility was not associated with PCa (OR 0.74, 95% CI 0.44-1.24). Childless men, versus having at least one child, had a greater risk of more aggressive PCa (OR 1.46, 95% CI 1.12-1.89). Men having at least 3 sons, compared with 1 son, also had a greater PCa risk (OR 1.56, 95% CI 1.17-2.08); corresponding values for less and more aggressive PCa were OR 1.48, 95% CI 1.08-2.02 and OR 1.76, 95% CI 1.19-2.61, respectively. Stratifying by presence or absence of first-degree family history of PCa produced similar results. Number of daughters did not affect PCa risk. **Conclusion**: Men with no biological children and those fathering several biological sons showed an excess risk of PCa.

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ORAL CONTRACEPTIVE USE AND COLORECTAL ADENOMAS IN THE NURSES HEALTH STUDY. Brittany Charlton*, Kana Wu, Ed Giovannucci, Charlie Fuchs, Stacey Missmer, Bernard Rosner, Karin Michels (Harvard School of Public Health, Boston, MA United States)

Most colorectal cancers (CRC) arise from colorectal adenomas. The influence of reproductive factors on CRC, including oral contraceptive (OC) use, has been examined for years, but less is known about the role of OC use on adenomas. Our objective was to examine this association using data from the Nurses' Health Study; established in 1976 among 121,701 female nurses 30-55 yrs of age. We categorized OC use according to ever and never use, duration of use, and time since last use. Participants had to undergo a lower bowel endoscopy during the study period to be eligible for the current analyses. All colorectal adenoma cases identified at endoscopy were included from 1986 through 2010 and stratified by subsite, stage/size, and number of adenomas. Multivariable logistic regression models for clustered data were used to estimate odds ratios and 95% confidence intervals and were adjusted for age, body mass index, height, physical activity, smoking, processed and red meat, folate, calcium, total energy, alcohol, aspirin use, age at first birth, parity, hormone therapy use/duration, family history of CRC, time period, as well as endoscopy information including reason, number, and yr since most recent. Ever OC use was associated with a slight increase of small/early stage adenomas [OR=1.12 95% CI (1.03-1.22)] but not with any other outcome. Duration of OC use was not associated with adenomas but longer times since last OC use were associated with increased odds for all of the adenoma outcomes [e.g., compared to never use, 15+ yrs since last use: OR=1.18 (1.08, 1.29)]. Shorter times since last OC use were inversely associated [e.g., =4 yrs since last use: OR=0.76 (0.67, 0.86)]. The null association between OC use and colorectal adenomas may be more nuanced than initially described in the literature and exploration of the time since last OC use associations is warranted.

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REPRODUCTIVE FACTORS AND RISK OF ENDOMETRIAL CANCER IN US BLACK WOMEN. T.R. Sponholtz*, J.R. Palmer, L. Rosenberg, L.A. Wise (Slone Epidemiology Center, Boston, MA United States)

Background: Studies in white women have consistently shown inverse associations of age at menarche, age at first (and last) birth, and parity with endometrial cancer incidence. Black women, who have a lower incidence but higher mortality from endometrial cancer incidence than white women, tend to have earlier and greater parity. We investigated the association between reproductive factors and endometrial cancer incidence in the Black Women's Health Study, a U.S. prospective cohort study. **Methods**: We followed 47,121 participants with an intact uterus from 1995 through 2013. Reproductive history data were obtained on the 1995 (baseline) questionnaire and updated biennially. Self-reported cases of endometrial cancer were confirmed by medical records or cancer registries. We estimated incidence rate ratios (IRRs) and 95% confidence intervals (CIs) using Cox proportional hazards regression. **Results**: We ascertained 207 incident endometrial cancer cases between 1995 and 2013. Ages at menarche <12 years (IRR=1.87, CI 1.28, 2.72) and ≥14 years (IRR=1.72, CI: 1.24, 2.38) were associated with higher endometrial cancer incidence relative to 12-13 years. Endometrial cancer incidence decreased with increasing age at first birth (age 20-24: IRR=0.88, CI 0.60-1.30; ≥25: IRR=0.70, CI 0.42, 1.16; vs. age <20) and with older age at last birth (age 25-29: IRR=0.87, CI 0.53, 1.41; 30-34: IRR=0.76, CI 0.42, 1.36; and ≥35: IRR=0.70, CI 0.42, 1.16 vs. age <25). Incidence of endometrial cancer was 17% lower among parous than nulliparous women (IRR=0.83, CI: 0.59, 1.16), but there was little evidence of a dose-response association with greater parity. **Conclusion**s: Reproductive factors were associated with endometrial cancer in black women. The lack of decreasing incidence with increasing age at menarche and higher parity contrasts with observations in white women, and may relate to differences in timing of childbearing.

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OVARIAN CANCER RISK FACTORS BY HISTOLOGIC TYPE IN THE OVARIAN CANCER COHORT CONSORTIUM (OC3). Elizabeth Poole*, Alan Arslan, Lesley Butler, James Lacey, Jr., I-Min Lee, Alpa Patel, Kim Robien, Dale Sandler, Leo Schouten, V. Wendy Setiawan, Kala Visvanathan, Elisabete Weiderpass, Emily White, Nicolas Wentzensen, Shelley Tworoger (Brigham and Women's Hospital and Harvard Medical School, Boston United States)

Introduction: Previous studies have suggested differences in ovarian cancer risk factors by histologic subtypes, but had limited sample size. In the OC3, which includes more than 20 prospective cohorts, we evaluated the associations of oral contraceptive (OC) use, parity, tubal ligation, smoking, body mass index, family history of breast or ovarian cancer, age at menarche and menopause, and height by histologic subtype (serous [N=2661], endometrioid [N=472], mucinous [N=245], and clear cell [N=216]). **Methods**: Histology was abstracted from pathology reports or cancer registries. We used competing risks Cox proportional hazards regression to compute associations by histologic subtype. Models were stratified on study, age, and year of birth and adjusted for parity and OC use; subtype heterogeneity was evaluated by likelihood ratio test (p-het). **Results**: Higher parity was more strongly associated with endometrioid (RR per child: 0.78; 95%CI: 0.73-0.84) and clear cell (RR: 0.67; 95%CI: 0.59-0.76) than with serous or mucinous tumors (p-het<0.0001). OC use was only significantly associated with serous tumors (RR per year: 0.96; 95%CI: 0.95-0.97; p-het=0.13). Age at menopause was positively and tubal ligation was inversely associated only with endometrioid and clear cell tumors (p-het=0.01 for both). Family history of breast cancer was only associated with increased risk of endometrioid tumors (RR: 1.47; 95%CI: 1.13-1.91; p-het=0.02) and family history of ovarian cancer was only significantly associated with serous tumors (RR: 1.51; 95%CI: 1.22-1.86; p-het: 0.49). **Discussion**: In this large pooled prospective study, we observed heterogeneous associations of risk factors with ovarian cancer subtypes; in particular, several factors were only associated with endometrioid and clear cell tumors. This study demonstrates the importance of consortial efforts to increase sample size to study rare ovarian cancer subtypes.

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SELECTION BIAS DUE TO LOSS: AN OLD AND OFTEN IGNORED PROBLEM REVISITED. Jessie K Edwards*, Chanelle Howe (Department of Epidemiology, University of North Carolina at Chapel Hill, Chapel Hill, NC United States)

Missing outcome data from loss to follow-up plagues randomized trials and observational studies. When the outcome of interest is masked by loss to follow-up, both estimates of disease trends and the causal effects of exposures can be biased if losses are informative. Standard approaches that simply censor individuals who become lost to follow-up can produce misleading results if loss is substantial and individuals remaining in the study do not represent individuals who are lost. In this symposium speakers will discuss methods to identify, quantify, and mitigate bias due to informative loss to follow-up. Specifically, the first speaker will use causal diagrams to characterize the sources of bias due to loss to follow-up and review established, but underutilized approaches to address such bias. The second talk will focus on outcomes after loss and how knowledge of such outcomes can be used to quantify bias due to losses. The third speaker will present newer methods to appropriately account for informative loss to follow-up. The fourth talk will focus on caveats and considerations when identifying, quantifying and mitigating bias due to loss. In general we expect this symposium to communicate two main points. First, identifying and quantifying potential bias due to loss to follow up remains an important epidemiologic undertaking. Second, a variety of underutilized techniques are available to improve inference in the context of informative loss to follow up.

Speakers:

- *Absolute and Relative Selection Bias due to Loss in Cohort Studies: Sources and Non-standard Approaches*
  Chanelle J. Howe
- *Loss to Follow-up and Mortality among U.S. HIV-infected Antiretroviral Therapy Initiators*
  Jessie K. Edwards
- *Targeted Learning to Mitigate Bias in Effect Estimates when Some Outcome Data Are Missing*
  Susan Gruber
- *Caveats and Considerations*
  Miguel Hernán

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OPIOIDS AND BREAST CANCER RECURRENCE: A DANISH POPULATION-BASED COHORT STUDY. Deirdre Cronin-Fenton*, Uffe Heide-Jørgensen, Thomas Ahern, Timothy Lash, Peer Christiansen, Bent Ejlertsen, Per Sjøgren, Henrik Kehlet, Henrik Toft Sørensen (Aarhus University, Dept. Clinical Epidemiology, Aarhus Denmark)

In theory, lack of pain relief following surgery for breast cancer may suppress natural killer cells, increasing the risk of breast cancer recurrence (BCR). On the other hand, opioid pain relief may also inhibit cell-mediated and humoral immunity, inducing apoptosis. We investigated the association between post-diagnosis opioid use and BCR among Stage I-III breast cancer patients. We identified incident Stage I-III breast cancer cases diagnosed 2005-2008 in Denmark, and reported to the Danish Breast Cancer Cooperative Group registry. Opioid prescriptions were ascertained from the Aarhus University Prescription Database. Follow-up began on the date of breast cancer primary surgery and continued until the first of BCR, death, emigration, or 31/12/2012. We used Cox proportional hazards regression models to estimate the hazards ratio and 95% confidence intervals (HR & 95%CI) for opioid prescriptions, and BCR, adjusting for potential confounders (age, menopausal status, stage, histologic grade, estrogen receptor status, surgery type, pre-diagnosis hormone replacement therapy, Charlson Comorbidity Index, and concurrent prescriptions for aspirin, statins, and non-steroidal anti-inflammatory drugs). We treated opioid prescriptions as a time-varying exposure lagged by one year, and in sensitivity analyses, lagged by two years. All statistical tests were two-sided. We identified 12,554 patients, with a total of 65,660 person-years of follow-up. Median follow-up was 5.3 years. 41% of the patients received opioid prescriptions. Ever use of opioids had no effect on the rate of BCR in both crude and adjusted analyses (crude HR=1.06, 95%CI=0.89, 1.25; adjusted HR=1.03, 95%CI=0.87, 1.24), with similar results in the sensitivity analyses (crude HR=0.92, 95%CI=0.73, 1.14; adjusted HR=0.92, 95%CI=0.73, 1.15). Findings from this prospective cohort study do not suggest an association between opioid prescriptions and rate of BCR.

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BREAST CANCER OUTCOMES BY DIABETES STATUS AND DIABETES MEDICATION USE. Denise Boudreau*, Onchee Yu, Jessica Chubak, Erin Bowles, Heidi Wirtz, Monca Fujii, Diana Buist (Group Health Research Institute, Seattle, WA United States)

Background: Breast cancer tends to occur in an older age group also burdened with comorbidities such as diabetes and cardiovascular disease. COMBO (COmmonly used Medications and Breast Cancer Outcomes) was developed for comparative safety of medications used in the management of co-morbid conditions and risk of poor breast cancer outcomes. Here we report on diabetes and diabetes medications. **Methods**: A retrospective cohort study among female health plan enrollees aged 18+ and diagnosed with incident early stage breast cancer (1990-2008) via tumor registry. Medication use, co-morbidities, and other covariates were obtained from health plan databases and medical record review. Our primary outcome measure of second breast cancer events (SBCE) was defined as the first occurrence of recurrence or second primary breast cancer. We used multivariable Cox proportional hazards models to estimate hazard ratios (HR) and 95% CIs while accounting for competing risks. **Results**: 4,216 women were followed for a median of 7 years and 13% experienced a SBCE. Median time to the first SBCE was 3.3 years. 14% of women had a diagnosis of diabetes. During follow-up, 8% used metformin, 9% sulfonylureas, and 7% insulin. Women with diabetes had a non-significant increase in SBCE (HR=1.3; 95% CI, 0.9-1.8) compared to women with no diabetes. This appeared driven by recurrence (HR=1.3, 0.8-2.0) and not second primaries (HR=1.0, 0.4-2.2). Among women with diabetes, insulin use was associated with an increased risk of SBCE (HR=1.6, 1.0-2.6) and driven by a 2-fold (1.1-3.5) increase in recurrence. No associations with SBCEs were observed for metformin or sulfonylureas. **Conclusion**s: Women with diabetes may be at higher risk for poor breast cancer outcomes, especially if using insulin. Other commonly used diabetes therapies appear safe with respect to SBCE, but not necessarily preventive as previously hypothesized for metformin.

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BREAST CANCER RECURRENCE IN RELATION TO ANTIDEPRESSANT USE IN WOMEN WITH EARLY STAGE BREAST CANCER. Jessica Chubak*, Erin Aiello Bowles, Onchee Yu, Diana S.M. Buist, Heidi Wirtz, Monica Fujii, Denise M. Boudreau (Group Health Research Institute, Seattle, WA United States)

Antidepressants, especially strong CYP2D6 inhibitors such as fluoxetine and paroxetine, may increase breast cancer recurrence risk. We assessed these associations in women diagnosed with stage I-II breast cancer (1990-2008) in an integrated healthcare delivery system. We collected information from a pharmacy dispensing database (antidepressants, tamoxifen); chart abstraction (recurrence, treatment, and covariate information); and a population-based tumor registry (tumor characteristics). We used survival analysis with time-varying exposure and covariates to compute hazard ratios (HR) and 95% confidence intervals (CI) to compare recurrence risk among antidepressant users (overall and specific drugs) with non-users of any antidepressants. Analyses were adjusted for age at diagnosis, diagnosis year, cancer stage, estrogen and progesterone receptor status, cancer treatment, body mass index, smoking status, menopausal status, and comorbidity score. We conducted an unadjusted analysis limited to tamoxifen users in which the exposure was ≥30 days of antidepressant use. Among the 4216 participants, 54.6% used any antidepressants after diagnosis. Paroxetine and fluoxetine were used by 13.1% and 21.4%, respectively. There were 415 recurrences during a median follow-up of 6.7 (interquartile range: 4.2-10.4) years. There was no association between antidepressant use after diagnosis and breast cancer recurrence (adjusted HR: 1.16, 0.94-1.44). Paroxetine was associated with increased recurrence risk (adjusted HR: 1.91, 1.17-3.11), especially among tamoxifen users (unadjusted HR: 2.71, 1.31-5.61). Fluoxetine was not associated with recurrence risk (adjusted HR: 0.93, 0.53-1.64). Our study is consistent with others that have not observed an increased risk of breast cancer recurrence with antidepressant use; however, our study suggests an increased risk of recurrence with paroxetine use after breast cancer.

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PROGNOSTIC SIGNIFICANCE OF CHANGE IN MAMMOGRAPHIC DENSITY AFTER INITIATION OF TAMOXIFEN THERAPY FOR ER-POSITIVE BREAST CANCER. Sarah Nyante*, Mark Sherman, Ruth Pfeiffer, Amy Berrington, Louise Brinton, Erin Bowles, Robert Hoover, Andrew Glass, Gretchen Gierach (National Cancer Institute, Rockville, MD United States)

Background: Tamoxifen reduces mortality from estrogen receptor-positive (ER+) breast cancer. A decline in mammographic density (MD) following tamoxifen initiation has been associated with a favorable prognosis, but the only prior study to address mortality excluded premenopausal women, the group most likely to be prescribed tamoxifen in clinical practice today. Therefore, we analyzed change in MD and breast cancer death among patients in a pre-paid health plan. **Methods**: The study included 352 ER+ breast cancer patients, aged 32-87 years, who were treated with tamoxifen at Kaiser Permanente Northwest (1990-2008): 97 who died from the disease and 255 who did not, matched on age, tumor stage, diagnosis year, and follow-up time. Percent MD in the unaffected breast was measured at baseline (mean 6 months prior to tamoxifen) and follow-up (mean 12 months after tamoxifen start). Odds ratios (ORs) and 95% confidence intervals (CIs) for associations between change in MD (per tertile) and breast cancer death were estimated using conditional logistic regression, adjusted for baseline MD. **Results**: Overall, patients had a reduction in MD (mean, among: deaths 3%; non-deaths 5%). Patients whose MD declined had a lower risk of breast cancer death (OR 0.77, 95% CI 0.55-1.08, P=0.13). The association varied by baseline MD. MD reduction was associated with lower risk of death among women with higher baseline MD (=18% at baseline: OR 0.53, 95% CI 0.33-0.83, P<0.01), but not those with a lower baseline MD (<18% at baseline: OR 1.67, 95% CI 0.60-4.60, P=0.33) (P-interaction=0.09). The association did not differ by age group (=50 vs. >50) and was unaffected by gaps in tamoxifen prescription coverage, other adjuvant treatments, or body size. **Conclusion**: These data provide further evidence that MD declines during tamoxifen therapy for ER+ breast cancer may predict survival, particularly among patients with higher baseline MD.

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PILOT TESTING A NEW METHOD FOR MEASURING SENSITIVE HEALTH BEHAVIORS. Heidi Moseson* (University of California, San Francisco, San Francisco, CA United States)

Background: Unsafe abortion is a leading cause of maternal morbidity and mortality worldwide, yet abortion is notoriously difficult to measure due to stigma. Self-reported abortion via surveys leads to under-reporting of up to 60%. This study estimates the cumulative lifetime incidence of induced abortion in Liberia using a new method with the potential to reduce under-reporting. **Methods**: In a randomly selected population-based sample of n=3,567 women (1,985 rural, 1,582 urban) ages 15-49 years in Liberia, this study piloted the list experiment, which protects the respondent's privacy in a simple and intuitive way, thereby reducing the pressure to underreport. Each woman is read two lists: a list of non-sensitive behaviors, and a list of similar non-sensitive behaviors with a sensitive behavior added (abortion). For each list, the respondent reports a count of how many options on the list she has experienced without indicating which options. The sensitive item, abortion, is randomly added to either the first or second list. A simple difference in means calculation between the average counts for both lists provides an estimate of the population proportion that has had an abortion. **Results**: The list experiment estimates that 32% of respondents surveyed had an abortion at some point in their lives (26% of women in urban areas, and 36% of women in rural areas), with a 98% response rate. The survey required approximately 5 minutes for implementation, a significant improvement over other random response techniques. **Conclusion**: The only previous representative estimate of abortion in Liberia reported that 6% of women had ever had an abortion (DHS 2007). The list experiment generated an estimate of five times this magnitude, consistent with anecdotal evidence, indicating the potential utility of this method for measuring sensitive health behaviors.

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IF YOU ARE NOT COUNTED, YOU DON'T COUNT: ESTIMATING THE NUMBER OF AFRICAN-AMERICAN MEN WHO HAVE SEX WITH MEN IN SAN FRANCISCO. Paul Wesson*, Mark Handcock, Willi McFarland, Henry Fisher-Raymond (University of California, Berkeley, Berkeley, CA United States)

Introduction: The HIV epidemic has disproportionately affected African-American (AA) men who have sex with men (MSM). Resource allocation for programs targeting key populations such as AA MSM require reliable estimates of their numbers. Current population size estimation (PSE) methods rely on assumptions that are difficult to meet, potentially producing large biases. **Methods**: We applied a new method to estimate the number of AA MSM in San Francisco (SF) using a respondent-driven sampling (RDS) survey. The approach uses respondents' self-reported network size (i.e., the number of other AA MSM known to them in SF), along with a specification of the prior knowledge about the population size, to model the total size of the target population based on their probability of recruitment. A Bayesian approach is used to quantify the amount of information on population size available in the survey. The plausibility of the resulting estimate was corroborated against an independent estimate of all MSM in SF and HIV case reporting data. **Results**: 259 AA MSM were recruited in the RDS survey. The method calculated a median of 6,230 AA MSM living in SF (95% CI: 1,984-35,545). The prevalence of diagnosed HIV in the survey (17.3%) projects 1,078 known HIV cases among AA MSM, comparable to the 1,170 actually reported to city's surveillance system. A previous independent survey estimating 66,487 total MSM in SF, 6.1% AA, estimates 4,055 AA MSM. **Conclusion**s: The new method produced a robust, plausible, and consistent population size estimate for AA MSM. Given that RDS surveys are frequently done in many hidden populations worldwide, the method provides a simple, appealing tool to rapidly produce estimates of the size of high risk populations – a fundamental public health measure that has been scarce for much of the HIV epidemic. It is a useful complement to existing methods, especially when only RDS data are available.

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IMPROVING THE GENERALIZABILITY OF SMALL POPULATION INFERENCES IN EPIDEMIOLOGIC SURVEYS USING BLENDING APPROACHES: POST-9/11 MILITARY CAREGIVERS. Rajeev Ramchand*, Michael Robbins, Bonnie Ghosh-Dastidar, Terri Tanielian (RAND Corporation, Arlington, VA United States)

Probability-based samples are the gold standard for providing inferences that are generalizable to a larger population. However, this approach is unlikely to identify sufficient samples of smaller population-groups to yield precise inferences. Convenience-based sampling often provides the necessary sample size to yield efficient estimates, but selection bias may compromise the generalizability of results to the broader population. To identify informal caregivers to service members and veterans who were taken ill, injured, or wounded in the Iraq and Afghanistan since 2001 (i.e., post-9/11 caregivers), we used an approach that combined data from post-9/11 caregivers from a probability -based sample (N=72), post-9/11 care recipients who relied on caregiving from a probability-based sample (N=61), and post-9/11 caregivers from a list of an organization that serves this population (N=281). We derived weights that blended these three groups together using Iterative Proportional Fitting based on characteristics that differentiated care recipient respondents from caregiver respondents (e.g., cognitive functioning of the care recipient), and from probability-based caregivers and convenience-based caregivers (e.g., caregiver sex, VA disability rating). Diagnostic checks were performed to ensure that outcome measures of interest were jointly congenial when calculated across multiple sources. This approach increased the final total sample from 72 to 414, which after applying weights resulted in a 50% increase in the final effective sample size. This ultimately enabled us to draw generalizable inferences about post-9/11 caregivers that can be used to inform policies and services that serve them.

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HOW DOES A SEVERE, ADVERSE CLINICAL EVENT IMPACT OBSTETRICAL DECISION MAKING AT A HOSPITAL? UTERINE RUPTURE AND THE MANAGEMENT OF PATIENTS WITH PREVIOUS CESAREAN DELIVERY. Corinne Riddell*, Jay Kaufman, Erin Strumpf, Haim Abenhaim, Jennifer Hutcheon (McGill University, Montreal Canada)

Introduction: The rate of vaginal birth after previous cesarean delivery has declined over time and is below 10%. The fear of a uterine rupture during a labour attempt has contributed to this decline. The extent to which a rupture influences decision making in the care of subsequent patients with a previous cesarean (CS) has not been studied. **Objective**: To determine whether the occurrence of a rupture at a hospital impacts: i) the trial of labour (TOL) attempt rate, or ii) the TOL success rate, in women with a previous cesarean delivery. **Methods:** We use the Nationwide Inpatient Sample, 1998-2010, and extract the deliveries to women with a previous cesarean. Using the Difference-in-Differences design, we compare rates of each outcome at hospitals with severe rupture before and after the event and use hospitals without ruptures to estimate secular time trends. This is operationalized using logistic regression, where terms for time account for common secular trends in the outcomes and terms for hospitals account for stable hospital-specific characteristics (including unmeasured characteristics). The effect of interest is captured through indicator variables for time since rupture and the risk difference is estimated. **Results:** 385 hospitals with a rupture and 2219 hospitals without rupture are analysed. Approximately 1 million women with a previous CS are included: 25% attempt labour, 61% of whom deliver vaginally. After a rupture, the hospital TOL success rate decreases by 2.6/100 labours (95% confidence interval: -4.4/100 to -0.9/100). This implies that about 2.6/100 labours that would have resulted in vaginal deliveries are diverted to emergent CS, after accounting for downward time trends. **Conclusion:** In the month after a uterine rupture, the threshold at which clinicians at the hospital opt to perform an intrapartum CS in women with a previous CS may be lowered.

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TRENDS IN SOCIOECONOMIC INEQUALITIES IN ACCIDENTAL DRUG POISONING MORTALITY IN THE UNITED STATES, 1994-2010. Robin A Richardson*, Thomas J Charters, Nick King, Sam Harper (McGill University, Montreal Canada)

Widespread prescription drug abuse in the US has contributed to a doubling of accidental drug poisoning death rates over the past decade in the US. While overall educational differences in mortality are increasing, trends in accidental drug poisonings by education have not been examined. We estimated trends in accidental drug poisoning deaths by education from 1994 to 2010 using data from the National Vital Statistics System linked to population denominators from the Current Population Survey. We used negative binomial regression models to estimate age-adjusted rates by gender, race, and years of educational attainment (<12, 12, 13-15, 16+), and we tested whether trends in educational inequalities differed by gender or race. There were 265,544 accidental drug poisoning deaths from 1994-2010. High school educated white men had the highest rates in 2010 (26.0 deaths per 100,000), whereas college-educated black women had the lowest rates (2.2). Absolute and relative mortality increases were greater for those with 12 years of education relative to other groups. Education-related inequalities increased considerably more for whites than blacks, and among whites the increase was similar in magnitude for both women and men. Among whites the age- and gender-adjusted rate difference between those with 12 vs. 16+ years increased from 3.1 in 1994 to 17.2 in 2010 (change=14.1, 95% CI: 10.3,17.8). Among blacks the corresponding increases were 5.8 and 9.1 (change=3.3, 95% CI: -0.8,7.5). We found strong educational patterning in accidental drug poisoning, chiefly among whites compared to other race groups. Rather than following an educational gradient, rates are highest and increasing the fastest among high school educated individuals. The specific reasons for this particular patterning are unknown, but may be related to differential access to the prescription drugs involved in most drug-related accidental deaths.

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NORMS, STIGMA, AND SOCIAL ISOLATION IN THE OBESE: AN AGENT-BASED APPROACH. Stephen Mooney*, Abdulrahman El-Sayed (Columbia University/Mailman School of Public Health, New York, NY United States)

Obesity and depression are comorbid more often than chance predicts. However, depression among the obese tends to be more common in contexts where obesity is less common. This suggests that stigmatization in contexts where obesity is less normative may contribute to depression in the obese. We developed an agent-based social network model to explore mechanisms by which obesity norms may shape social isolation in the obese. Each agent started with a baseline body mass index (BMI), susceptibility to environmental influences, and an average of four network peers. At each of 120 simulated months, each agent updated her BMI based on previous BMI, a static factor conditional on susceptibility to environmental influence, and a stochastic factor. After updating BMI, each agent checked each peer for a) a BMI score more than 3 points higher than the agent's, b) a BMI score more than 2 points higher than the mean BMI of other peers, and c) a BMI higher than the community average. If all conditions were met, the connection was dropped with a probability proportional to the non-obese population in the network. We ran simulations with 1000 agents, comparing a 'high obesity' context where 75% of agents were susceptible to environmental influence and 35% of agents were obese at baseline, to a 'low obesity' context where 25% of agents were susceptible to environmental influence and 15% of agents were obese. Over 20 simulations in each context, the low-obesity context had more than twice as many isolated agents and a mean BMI of 27.1 (95% CI: 26.8-27.3) compared to 34.5 (95%CI: 34.1-34.9) in the high obesity context. Our findings demonstrate a plausible mechanism by which obesity norms may influence depression through the stigmatization that occurs due to deviance from norms.

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NEIGHBORHOOD FITNESS FACILITIES AND DEPRESSION IN PEOPLE WITH TYPE 2 DIABETES: A MEDIATION ANALYSIS OF SEVEN PATHWAYS. Norbert Schmitz, Genevieve Gariepy* (McGill University - Douglas Mental Health Institute, Montreal Canada)

INTRODUCTION: Evidence suggests that the neighborhood environment can have an impact on the mental health of people with diabetes. In a previous study, we found that the number of fitness facilities available in the neighborhood was significantly associated with a reduction in depression incidence in a sample with type 2 diabetes. The aim of this project was to examine seven different lifestyle and health-related pathways that could explain this association. **METHODS**: We used 5 waves of data (2008-2013) from a representative sample of 1298 adults with type 2 diabetes from Quebec, Canada. We assessed depression using the Patient Health Questionnaire. We used geospatial data to determine the number of physical activity facilities in neighborhoods. We estimated direct and indirect effects using the novel additive hazard model approach, adjusting for individual-level demographic and socioeconomic variables. **RESULTS**: Every additional fitness facility in the neighborhood was associated with a reduction of 12 cases of depression per 1000 person-years. Of these cases, 4 cases could be attributed to the pathway through fewer diabetes complications and 3 cases through better perceived diabetes control. None of the reduction of cases of depression could be attributed to the pathways through physical inactivity, smoking, self-rated health, body-mass index or disability score. **CONCLUSION**: The availability of fitness facilities in the neighborhood was associated with a reduction in depression in part through its effect on diabetes complications and perceived diabetes control.

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CAN SOCIAL POLICY REDUCE SOCIO-ECONOMIC DISPARITIES IN MENTAL HEALTH? ELIGIBILITY FOR GI BILL BENEFITS AND DEPRESSIVE SYMPTOMS. Anusha Vable*, David Canning, Maria Glymour, Ichiro Kawachi, SV Subramanian (Harvard School of Public Health, Boston, MA United States)

Background: The Korean War GI Bill provided educational subsidies, as well as home loan and unemployment benefits; numerous studies have examined the economic benefits from military service and GI Bill eligibility, however the effect of these benefits on health conditions remains unclear. **Methods**: Data come from 249 Korean War veterans and 201 non-veterans from the nationally representative Health and Retirement Study. Using Coarsened Exact Matching, male veterans and non-veterans were matched on birth year, southern birth, race, height, and childhood health conditions. Regression analyses were stratified into low (at least one parent < 8 years of schooling / missing data, N = 134) and high (both parents ≥ 8 years of schooling, N = 316) childhood SES groups. Information on number of depressive symptoms in 2010 was assessed through a modified Center for Epidemiologic Studies Depression Scale, dichotomized at ≥ 4 as an indicator of major depression. **Results**: Veterans who experienced low childhood SES had, on average, 0.66 fewer depressive symptoms [95% Confidence Interval (CI): (-1.26, -0.05)] and lower odds of major depression [OR = 0.34, 95%CI: (0.12, 0.98)] compared to non-veterans from low childhood SES backgrounds. There was no difference between veterans and non-veterans who experienced high childhood SES. **Conclusion**s: We find evidence that men from disadvantaged backgrounds disproportionately benefit from military service / GI Bill benefits through reduced depressive symptoms and lower odds of major depression.

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POPULATION-BASED VS. INDIVIDUAL-BASED APPROACHES TO DELIVERING MENTAL HEALTH SERVICES AFTER A MASS TRAUMATIC EVENT: AN IN SILICO EXPERIMENT AFTER HURRICANE SANDY. Melissa Tracy*, Sarah R Lowe, Carolyn Herzig, Tanya Kaufman, Jorge Luna, Xiaoliang Wang, Sandro Galea (Columbia University, New York, NY United States)

Hurricane Sandy caused massive flooding and power outages throughout New York City (NYC) in October 2012. Increases in mental health problems like posttraumatic stress disorder (PTSD), along with substantial unmet need for mental health services, have been well-documented in populations exposed to mass traumatic events. However, little empiric evidence is available to compare the potential impact of population-based approaches such as Internet-based psychoeducation interventions to more traditional efforts targeting services to individuals at high risk of mental health problems after mass traumatic events. We developed an agent-based model comparing population- and individual-based interventions to reduce PTSD in the adult population of NYC after Hurricane Sandy. Individual agents were embedded in households, peer networks, and neighborhoods reflecting the Census 2010 population, with agent behaviors parameterized using data from several NYC sources. The individual-based strategy of increasing the use of cognitive behavioral therapy (CBT) by 20% among those who developed PTSD after exposure to Hurricane Sandy reduced PTSD prevalence by 10.2% and PTSD incidence by 7.5% in the decade after the hurricane (compared to baseline CBT use with no intervention). The population-based approach of a citywide campaign promoting an Internet-based psychoeducation intervention did not significantly reduce PTSD prevalence or incidence, even with dissemination through households and peer networks. In our model, the long-term increased population burden of PTSD after Hurricane Sandy emerged from a relatively small number of individuals experiencing ongoing stressors and chronically high PTSD symptoms in the aftermath of this mass traumatic event; in similar situations, an individual-based approach targeting mental health services to those at highest risk may provide the greatest benefit for population mental health.

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THE EFFECT OF SCHOOL-LEVEL ADHERENCE TO WATER, SANITATION, AND HYGIENE INTERVENTIONS ON INDIVIDUAL DIARRHEAL ILLNESS. Joshua Garn*, Babette Brumback, Timothy Lash, Matthew Freeman (Department of Epidemiology, Rollins School of Public Health, Emory University, Atlanta United States)

Background: The SWASH+ trial took place in 185 schools in Nyanza province, Kenya (2006–2012). The intention-to-treat analyses have been reported. There was, however, sub-optimal implementation and adherence to the interventions at many schools. The primary goal of our study is to use an instrumental variable analysis to measure the unconfounded causal effect of school-level adherence to water, sanitation, and hygiene (WASH) on pupil diarrheal illness and on diarrheal illness of pupils' under-five siblings. **Methods**: "Water scarce" schools (N=50) were randomized to either a control arm, or a water supply, hygiene promotion, water treatment, and sanitation arm. "Water available" schools (N=135) were randomized to either a control arm; a hygiene promotion, water treatment, and sanitation arm; or a hygiene promotion and water treatment arm. Adherence was categorized by the number of intervention components to which the school adhered. We used a weighted generalized structural nested mean model to calculate risk ratios (RR), and the jackknife estimator of the variance to calculate 95% confidence intervals (CI). **Results**: In the water scarce group, pupils attending schools that better adhered to WASH had a decreased risk of diarrheal illness (RR = 0.27, 95% CI: 0.10, 0.74), compared to their potential risk had these same schools not adhered to WASH. Pupils' under-five siblings also showed an imprecisely measured decrease in diarrheal illness (RR =0.50, 95% CI: 0.12, 2.07) and in clinic visits (RR =0.40, 95% CI: 0.05, 3.09). In the water available group, no decreases were observed in either pupil diarrheal illness or in diarrheal illness of pupils' under-five siblings. **Conclusion**s: Our instrumental variable analysis to account for WASH adherence yielded point estimates that suggested protective effects with increased adherence, although some estimates were imprecisely measured.

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COMMUNITY MOBILIZATION AND ALCOHOL USE AMONG YOUNG ADULTS IN RURAL SOUTH AFRICA. Hannah H. Leslie*, Jennifer Ahern, Audrey E. Pettifor, Kathleen Kahn, Xavier F Gómez-Olivé, Sheri A. Lippman (University of California, Berkeley, Berkeley, CA United States)

Background: Alcohol consumption, particularly heavy drinking, is associated with increased frequency of sexual risk behaviors and greater human immunodeficiency virus (HIV) transmission. Prevalence and quantity of alcohol consumption is high and may be increasing among young adults in South Africa, who face elevated risk of HIV. While limited research addresses social factors that shape alcohol use in this context, HIV prevention approaches increasingly seek to modify social factors through community mobilization, a multidimensional expression of group capacity to enact social change. We tested the hypothesis that domains related to mobilization, specifically informal social control and cohesion, are associated with alcohol use in rural South Africa. **Methods**: A representative sample of 1181 adults aged 18 to 35 in 22 villages in Mpumalanga, South Africa was interviewed at baseline of a mobilization intervention. We measured drinking with the Alcohol Use Disorders Identification Test consumption questions and estimated the association of village informal social control and cohesion with drinking outcomes using logistic regression and marginal modeling. **Results**: Fewer than 12% of women reported drinking in contrast with 59% of men. Village characteristics were not significantly associated with women's drinking. Informal social control and cohesion showed significant protective associations with men's heavy drinking: a 1 standard deviation higher level of each was associated with a -5.0% (95% confidence interval [CI] -9.6%, -0.3%) and -4.8% (95% CI -10.2%, -0.6%) lower prevalence of heavy drinking respectively. **Conclusion**: These results support the hypothesis that village cohesion and informal social control shape heavy drinking among young adult men. While preliminary, this evidence suggests that further research is warranted on a causal link from modifiable social factors through alcohol consumption to HIV risk.

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INCREASES IN PAID MATERNAL LEAVE ASSOCIATED WITH REDUCTIONS IN NEONATAL MORTALITY: A MULTILEVEL ANALYSIS OF 300,000 BIRTHS FROM 20 LOW-AND-MIDDLE-INCOME COUNTRIES. Alissa Koski*, Mohammad Hajizadeh, Jody Heymann, Erin Strumpf, Sam Harper, Arijit Nandi (McGill University, Montréal Canada)

Maternal leave, defined as federally guaranteed, paid leave from employment during the time surrounding birth, is associated with lower neonatal and infant mortality rates in high-income countries. The impact of maternal leave on these outcomes has not been evaluated in low and middle-income countries (LMIC). We used birth history data collected via Demographic and Health Surveys to assemble a panel of over 300,000 live births in 20 countries from 2000–2008; these data were merged with longitudinal information on the number of full-time equivalent weeks of paid maternal leave provided by each country. We used multilevel linear probability models to estimate the effect of maternal leave in the prior year on the probability of neonatal (< 28 days) and infant (<1 year) mortality. Fixed effects for country and year were included to control for unobserved, time-invariant confounders that varied across countries and temporal trends in mortality shared across countries. We included individual sample weights and calculated robust standard errors that accounted for clustering by country. Average rates of neonatal and infant mortality over the study period were 27.4 and 52.7 per 1000 live births, respectively. Each additional month of paid maternal leave was associated with 3.0 fewer neonatal deaths per 1000 live births (95%CI=-5.3,-0.6), an 11% decline relative to the mean. Estimates were robust to adjustment for maternal age, education, employment, socioeconomic status, urban residence, short birth interval and per-capita gross domestic product. We found no evidence for an effect of maternal leave on the probability of infant mortality. Our findings highlight the positive impact of maternal leave policies on neonatal health. Further work is needed to elucidate the mechanisms that explain this benefit and understand why it is concentrated in the neonatal period.

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THE RISK OF FETAL DEATH WITH PREECLAMPSIA. Quaker E. Harmon*, Lisu Huang, David M. Umbach, Kari Klungsøyr, Stephanie M. Engel, Per Magnus, Rolv Skjærven, Jun Zhang, Allen J. Wilcox (National Institute of Environmental Health Sciences, Durham, NC United States)

Background: Preeclampsia is known to increase the risk of stillbirth. However, fetal risk in the presence of preeclampsia at specific gestational weeks has not been estimated because of the difficulty in obtaining data. Fetal risk with preterm preeclampsia would be relevant to clinical decisions regarding timing of delivery. **Methods**: We estimated gestational-age-specific risk of stillbirth for 554,333 singletons delivered in Norway 1999-2008, using a life-table approach. The onset of preeclampsia was extrapolated from a subset of 1857 preeclamptic pregnancies for which prenatal records had been obtained. Risks are expressed as simple absolute and relative risks. **Results**: Preeclampsia was recorded at delivery for 3.9% (21,610) of pregnancies. Risk of stillbirth was 3.6/1000 overall and 5.2/1000 among pregnancies with preeclampsia (relative risk (RR) = 1.45, 95% confidence interval (CI) =1.19, 1.76). Using the subset of preeclampsia pregnancies with clinical data, we estimated that 8% of preeclamptic pregnancies emerged by the end of week 28, 36% by end of week 34, and 71% by end of week 37. Risk of stillbirth was far higher with preeclampsia in early pregnancy. In week 26 there were 11.6 stillbirths per 1000 preeclamptic pregnancies, compared with 0.1 stillbirth per 1000 without preeclampsia (RR = 86, 95% CI = 56, 131). Fetal risk with preeclampsia declined as pregnancy advanced, but remained consistently higher than in non-preeclamptic pregnancies. **Conclusion**s: Preeclampsia in early pregnancy constitutes a particular hazard to the fetus. Fetal death should be included among the important risks clinicians must balance in the management of preterm preeclampsia.

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LONGITUDINAL CHANGES IN MATERNAL WEIGHT GAIN AND INTRAUTERINE FETAL GROWTH. Stefanie Hinkle*, Alicia Johns, SungDuk Kim, Paul Albert, Katherine Grantz (Eunice Kennedy Shriver National Institute of Child Health and Human Development, Rockville, MD United States)

Total pregnancy weight gain is associated with infant birthweight; however, few have examined associations between longitudinal changes in maternal weight and intrauterine changes in fetal anthropometrics. We used data from a prospective cohort of 1,764 Scandinavian singleton pregnancies with a median of 12 maternal weight and 4 ultrasound measurements (17, 25, 33, and 37 weeks). In separate linear mixed (random effects) models we estimated trajectories across gestation of maternal weight and fetal biometrics [abdominal circumference (AC, mm), biparietal diameter (BPD, mm), femur length (FL, mm), and calculated estimated fetal weight (EFW, grams)]. We examined correlations between trajectories of maternal weight and fetal size by correlating linear functions of the estimated random effects for the two processes. Using linear regression we estimated the association between maternal weight changes (per 5kg) and corresponding fetal growth from 0-17, 17-28, and 28-37 weeks adjusting for prepregnancy body mass index, age and smoking. As gestation increased, correlation between maternal weight and fetal anthropometrics increased with the strongest correlation with maternal weight observed at 37 weeks with AC [r=0.22, 95% confidence interval (CI) 0.18, 0.26]. From 0-17 weeks, changes in maternal weight were most strongly associated with changes in BPD [β=0.81 (95%CI 0.48, 1.13)] and FL [β=0.95 (95%CI 0.64, 1.27)]. Comparatively, from 28-37 weeks, AC [β=4.29 (95%CI 3.33, 5.25)] and EFW [β=131.55 (95%CI 101.0, 162.2)] were more strongly associated with changes in maternal weight. In conclusion, changes in maternal weight later in pregnancy have a greater impact on AC and EFW than BPD and FL.

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DIFFERENCES IN RISK FACTORS FOR INCIDENT VERSUS RECURRENT PRETERM DELIVERY. Katherine Laughon Grantz*, Stefanie Hinkle, Pauline Mendola, Lindsey Sjaarda, Kira Leishear, Paul Albert (Eunice Kennedy Shriver National Institute of Child Health and Human Development, Rockville, MD United States)

Risk factors for preterm delivery have been described, but whether risk factors for recurrent versus incident preterm delivery differ is less understood. We assessed whether known risk factors were different in women with versus without prior preterm delivery using medical records of the first and second singleton deliveries in 27,077 Utah women (2002-2010). Longitudinal transition models with modified Poisson regression calculated adjusted relative risks (aRR) and 95% confidence intervals (CI), with multiplicative interactions between each preterm risk factor and prior preterm delivery status to explore whether the significance of a particular risk factor varied between incident and recurrent preterm delivery < 37 weeks. Preterm delivery occurred in 2,097 (7.7%) of first pregnancies. In second pregnancies, 1,913 (7.1%) delivered preterm, of which 1,374 (5.5%) occurred among 24,980 women without prior preterm delivery (incident) and 539 (25.7%) among 2,097 women with prior preterm delivery (recurrent). Significant differences in risk patterns between second pregnancy incident and recurrent preterm delivery were observed for smoking (P=0.01), alcohol consumption (P=0.005), chronic hypertension (P=0.02), and interpregnancy interval < 12 months (P=0.04). Incident preterm delivery risk was increased in association with smoking (aRR 1.97; 95%CI 1.54-2.51) as was hypertension (aRR=1.52; 95% CI 1.10-2.09) and short pregnancy interval (aRR=1.33; 95% CI 1.15-1.54) but these factors did not increase risk for recurrent preterm delivery. Drinking alcohol was associated with increased risk for recurrent preterm delivery (aRR= 2.32; 95% CI, 1.50-3.60) but not incident preterm delivery (aRR= 1.01; 95% CI, 0.69-1.46). Risks associated with weight, insurance, and other chronic conditions were similar. Risk patterns for incident and recurrent preterm delivery differed somewhat with respect to modifiable factors.

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TIMING OF INTRODUCTION TO SOLID FOODS IS ASSOCIATED WITH F2-ISOPROSTANE LEVELS THROUGHOUT CHILDHOOD IN HEALTHY CHILDREN AT HIGH RISK FOR TYPE 1 DIABETES. Brittni Frederiksen*, Jennifer Seifert, Miranda Kroehl, Molly M. Lamb, Marian Rewers, Jill M. Norris (Colorado School of Public Health, Aurora, CO United States)

Type 1 diabetes results from destruction of insulin-producing pancreatic ß-cells that have been shown to be particularly susceptible to free radical-mediated oxidative stress damage. Timing of solid food introduction in infancy has previously been associated with type 1 diabetes risk. To explore potential mechanisms, we related timing of solid food introduction to urinary F2-isoprostanes - a marker of free radical-catalyzed peroxidation of arachidonic acid and oxidative stress. Creatinine-adjusted urinary F2-isoprostanes were assessed in 336 healthy children < age 11.5 years with 1,266 clinic visits (mean 3.8 visits per child) in the Diabetes Autoimmunity Study in the Young. We analyzed the association between F2-isoprostane levels and infant diet exposures using linear mixed models adjusted for age, HLA-DR3/4, DQB1*0302 genotype, first-degree relative with type 1 diabetes, maternal age, maternal education, sex, and exposure to maternal cigarette smoking during pregnancy. Childhood F2-isoprostane levels were, on average, 0.24 ng/mg lower in those who were breastfed at introduction of solid foods (-0.24 (0.12), p-value = 0.04) compared with those who were not breastfed. Moreover, the later the infant was introduced to solid foods, the lower their F2-isoprostane levels in childhood (on average, 0.10 ng/mg per month of age at introduction) (-0.10 (0.04), p-value = 0.01). These associations remain significant after limiting the analyses to F2-isoprostane levels after 2 years of age. Our results suggest a long term protective effect of later introduction of solid foods, as well as breastfeeding at solid food introduction, against oxidative stress throughout childhood.

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THE RISK OF DEVELOPING TYPE II DIABETES IN CHILDREN AND ADOLESCENTS USING ATYPICAL ANTIPSYCHOTICS. Minji Sohn*, Jeffery Talbert, Karen Blumenschein, Daniela Moga (University of Kentucky, Lexington, KY United States)

OBJECTIVES: The purpose of this study was to estimate the risk of type II diabetes (T2DM) in children and adolescents initiating atypical antipsychotic (AAP) therapy. **METHODS**: We conducted a retrospective cohort study using a new user design approach. Medical and pharmacy claims data between January 1, 2007 and December 31, 2009 for dependents ages 4 to 18 from an employed, commercially insured population from across the United States were included in our study. Exposure to an AAP was defined as the presence of an AAP pharmacy claim with no observed history of receiving the medication for at least six months. We constructed a propensity score including variables selected based on causal diagrams to identify and match incident AAP users and non-users. The outcome of interest, new-onset T2DM, was defined based on medical and pharmacy claims. Each subject was followed until the date of new-onset T2DM or the end of study period. The risk of T2DM was evaluated in an intent-to-treat fashion using the Kaplan-Meier estimator and Cox proportional hazard regression that provided hazard ratio (HR) and associated 95% confidence intervals (CI). The study was approved by the University of Kentucky Institutional Review Board. **RESULTS**: Our study included 6,236 new users and 22,080 non-users. In this propensity score matched sample, the estimated risk of T2DM was twice as high in AAP users as non-users (HR 2.18; 95% CI 1.45-3.29). The noticeable risk differences between AAP-treated and control groups began to appear within four months of AAP initiation and it became constant after six months until the end of the follow-up. **CONCLUSIONS**: Children and adolescents who were prescribed an AAP medication had a two times higher risk of developing T2DM within six months of initiating medication when compared to non-users. Our study raises questions about continued AAP use in children and adolescents.

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EFFECTS OF A COMMUNITY HEALTH ADVISORS TRAINING CURRICULUM TO ADDRESS ORAL CANCER SCREENING IN ABORIGINAL VILLAGES. Wei-Chih Huang*, Chien-Hung Lee, Ted Chen, Pei-Shan Ho, Hsiao-Ling Huang (Kaohsiung Medical University, Kaohsiung City Taiwan)

The use of tobacco, alcohol and betel nut among aboriginals living in mountainous community are higher than the general population, lead to higher incidence rate of oral cancer. However, the oral cancer screening rate among them is still low (14%) because of the language and cultural differences, medical care inaccessibility and other barriers. The use of Community Health Advisors (CHAs) can be an effective way to increase access to care for medically underserved population. We evaluated the effects of CHAs training curriculum for addressing oral cancer screening in aboriginal villages in Southern Taiwan. CHA trainees were recruited from aboriginals in mountainous areas. Seven training class were held. Each training cycle went for 4 consecutive weeks including 12 hour lecture and 3 hour practicum. Each session was taught by oral health professionals. The training manual included the knowledge on oral cancer, oral self-examination and screening, teaching techniques, communication skills, and hands-on practice session. Overall, 45 trainees finished the course and passed post-training exam. The pre-and post -data were collected by self-administered questionnaire. The logistic regression analyzed the pre- and post-training related to oral health behaviors. The level of oral cancer knowledge and self-efficacy toward screening were observed significantly increased in CHAs after training (P<.001). There was a significant and over two-fold increase in trainees' oral self-examination behaviors. After training, CHAs were more likely to have oral self-examination [Odds Ratio (OR) = 7.01, 95%CI: 2.63-18.66].The CHA training course was effective in increases of CHA's oral cancer knowledge, self-efficacy toward screening, and oral self-examination.

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EVALUATING THE EFFECT OF A COMMUNITY HEALTH ADVISORS TRAINING CURRICULUM TO ADDRESS ORAL HEALTH CARE IN ABORIGINAL VILLAGES IN MOUNTAIN AREA. Tsung-Nan Hsieh*, Pei-Shan Ho, Chin-Shun Chang, Heng Lee, Hsiao-Ling Huang (Kaohsiung Medical University, Kaohsiung City Taiwan)

In Taiwan, more than half of the aboriginal family from mountain area are living in households with the lowest household income and educational achievement. Low income and minority families were found to have poorer oral health outcomes, fewer dental visits, and fewer protective behaviors. Aboriginal families living in mountain areas have less opportunity to be exposed to oral health campaign messages that are transmitted through newspapers, television, radio, or via pamphlets. Previous programs had not designed the culturally adequate Community Health Advisor (CHA) training curriculum to address oral health care for medically underserved population. We evaluated the effects of CHAs training curriculum for addressing oral health care in aboriginal villages in Southern Taiwan. CHA trainees were recruited from aboriginals in mountainous areas. Seven training class were held. Each training cycle lasted 4 consecutive weeks including 12 hour training sessions. Each session was taught by one well-trained dental hygienist. The curriculum included training in knowledge of oral health and care, oral hygiene demonstrations, teaching techniques, communication skills, and hands-on practice session. Forty-five trainees finished the course and passed post-training exam. The pre-and post-data were collected by self-administered questionnaire. The logistic regression analyzed the pre- and post-training related to oral care behaviors. The level of oral health care knowledge, attitude and self-efficacy toward oral health care were observed significantly increased in CHAs after training (P<.001). After training, LHAs were more likely to have modified Bass method use of tooth brushing [Odds Ratio (OR) = 5.73], brushing longer than 3 min (OR=3.32), and fluoride toothpaste use (OR=3.75). The cross-cultural training curriculum designed for aboriginals serving as LHAs was effective in improvement of oral hygiene behaviors.

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MATERNAL CHARACTERISTICS ASSOCIATED WITH SIGNIFICANT CARIES IN URBAN CHILDREN. Ying-Ling Liu*, Ying-Chun Lin, Hsiao-Ling Huang (Kaohsiung Medical University, Kaohsiung City Taiwan)

The dental caries prevalence in preschoolers is high and caries in primary teeth are often left untreated. Severe caries and untreated caries adversely affected children's quality of life and their growth. Previous to this research, most studies on the prevalence and incidence of dental caries are conducted on schoolchildren and the data on preschoolers are comparably scant. This study identified the high caries prevalence group expressed by the Significant Caries Index (SiC) on urban children aged 4–6 years and associated maternal characteristics. We used a cross-sectional study design to collect data from a cluster randomly selected sample in Taiwan. A total of 590 urban preschoolers participated in dental examinations; their mothers completed a structured self-administered questionnaire. The association between three groups (children with caries-free, non-SiC and SiC group) and maternal characteristics were examined simultaneously, using polytomous logistic regression analysis. The SiC was 9.37 and 78.28% of preschoolers had caries. An elevated proportion of these children's molars were carious (mandibular molars: 85.3% to 91.9%; maxillary molars: 60.3% to 70.2%); 17.8% to 30.3% of children had maxillary labial caries on the anterior teeth. The factors associated with SiC group children were sugary beverage consumption more than twice weekly (adjusted odds ratio [aOR] = 1.89; 95% CI 1.08–3.72) and irregular visits to a dentist (aOR = 2.52; 95% CI 1.34 – 4.78). The findings suggest preventive strategies should be directed toward recognizing the importance of dietary management and regular dental checkups in mothers.

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THE BROADER SOCIAL ENVIRONMENT FACTORS ASSOCIATED WITH CHILDREN'S SMOKING IN SOUTHERN TAIWAN. Wen-Chen Hsu*, Yuan-Jung Hsu, Chien-Hung Lee, Hsiao-Ling Huang (Kaohsiung Medical University, Kaohsiung Taiwan)

The early initiation of smoking increases the likelihood of adult smoking dependence. Many studies have examined individual characteristics and characteristics in immediate social environment (e.g. friends and family members) that can influence youth smoking behavior. However, a better understanding of major factors in the broader social environment (e.g. school and community) that affect youth smoking behavior would be useful for policy formulation of tobacco control programs. The purpose of this study is to explore the school and community factors associated with children's smoking behavior. Data on smoking and related variables was obtained from Control of School-aged Children Smoking Study surveys of 2008-2009. Stratified cluster sampling was used to obtain a representative sample (n=5,335) among 3rd to 6th graders from 65 elementary schools in southern Taiwan. The association among 3 groups (never-, ever-, and current-smokers) and the potential variables were simultaneously examined using polytomous logistic regression models. The significant factors for current-smokers were school located in mountain [Adjusted Odds Ratio (aOR)=2.75], antitobacco education curricula at school (aOR=0.52), occasional or always get free sample cigarette (aOR =3.68 and 3.50, respectively), tobacco retailer sold cigarette to children (aOR=2.61) and cigarette accessibility (aOR=2.39). School located in mountain (aOR=2.49), children perceived cigarette advertisement (aOR=1.36) and exposure to smoking in TV/movies/Video (aOR=1.43), antitobacco education curricula at school (aOR=0.69), tobacco retailer sold cigarette to children (aOR=2.32) and cigarette accessibility (aOR=1.52) were found to have a significant effect on the risk of being ever-smokers. The findings provide a basis for school and community to design and implement effective anti-smoking programs to further reduce youth smoking prevalence.

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THE EFFECTIVENESS OF USING LAY HEALTH ADVISOR INTERVENTION APPROACH ON IMMIGRANT MOTHER'S ORAL HEALTH KNOWLEDGE, ATTITUDE AND BEHAVIORS. Sin-Hua Moi*, Ted Chen, Chien-Hung Lee, Hsiao-Ling Huang (Kaohsiung Medical University)

With growing transnational marriages in Taiwan, health disparities have been demonstrated in maternal and child health. The Lay Health Advisor (LHA) strategy is feasible and effective for promoting health care, especially among immigrant and children populations. Prior to this study, no oral health promotion programs for immigrant mothers and their children were conducted. Our aim is to evaluate the effectiveness of LHAs outreach program among immigrant women in Taiwan. A randomized experimental design was used. Vietnamese and Indonesian women who have 2-6 years old children were recruited and randomized into the LHA intervention or brochure only group. Overall, 16 and 11 mothers were assigned into experimental and control group. Qualified LHAs used training manual, bilingual brochure, dental model and teeth cleaning kit in their outreach. Each LHA taught assigned mother about oral hygiene knowledge and techniques four times at 4-week period. Participants in control group were asked to read the brochure by their own. Questionnaire was used to collect the data in knowledge, attitude and behaviors from baseline to follow-up. McNemar's exact tests, Wilcoxon signed-rank test and fisher test were used to examine the pairwise differences between the pre- and the post-data. Compared to control group, mothers in LHA group had a >20% increase in tooth brushing frequency, cleaning teeth after meals, modified Bass brushing technique and dental floss use. The proportion of participants in LHA group increased in helping their children brushing tooth from 75% to 100%, using Bass brushing technique from 31.25% to 62.50%, using dental floss from 18.75% to 43.75% and cleaning their tooth after meals from 68.75% to 87.5%. The LHA intervention strategy was efficacious in improving oral hygiene behaviors.

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ASSOCIATIONS OF HEALTH BEHAVIORS WITH RETURN TO WORK AFTER COLORECTAL CANCER. Brigid Lynch*, Allan Wiseman, Gabor Mihala, Vanessa Beesley, Louisa Gordon (Baker IDI Heart and Diabetes Institute, Melbourne Australia)

Background: Return to work is widely acknowledged as an important issue in cancer rehabilitation. Return to work helps cancer survivors achieve a sense of 'normalcy', as well as improving their economic independence and quality of life. There is a dearth of information relating to whether health behaviors facilitate return to work amongst cancer survivors. We examined associations of health behaviors and return to work following a diagnosis of colorectal cancer in middle-aged men and women (45-64 years). **Methods**: This prospective study recruited 239 participants through the Queensland Cancer Registry between January 2010 and September 2011. Data were collected through telephone-administered interviews and postal questionnaires at six and 12 months post-diagnosis. Logistic regression examined likelihood of ceasing/reducing work (by more than 4 hrs/week); Cox regression examined factors associated with time to return to work. **Results**: No significant associations were observed for fruit and vegetables consumption, alcohol consumption, smoking status, physical activity or sitting time at six months with ceasing/reducing work at 12 months post-diagnosis. However, participants who reported excess sleep (≥ 9 hrs/day) were 2.85-times more likely to reduce work time or retire (relative to those sleeping the recommended 7 to 8.5 hrs/day; crude 95% CI: 1.16, 7.02). In Cox regression analysis, excess sleep (≥ 9 hrs/day) was associated with a longer work re-entry time (relative to sleeping 7 to 8.5 hrs/day; crude HR = 0.37; 95%CI: 0.17, 0.82). No confounding factors were identified with multivariable analysis. **Conclusion**s: Excessive sleep may be an indicator of inadequate rehabilitation or poor health in colorectal cancer survivors. Interventions to improve sleep duration and/or quality may assist colorectal cancer survivors to return to work and enhance their quality of life.

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FACTORS THAT MOTIVATE INCREASED PHYSICAL ACTIVITY/EXERCISE. Elise Bowen*, Ray Merrill (Brigham Young University, Provo, UT United States)

Objective: To identify whether a family history of chronic disease, desire to minimize the risk of physical and mental health problems, and elevated health risk factors influence change in physical activity/exercise. **Methods**: A convenience sample was obtained among 674 participants at the World Senior Games in St. George, Utah, and 213 participants in the Good Life Expo in Spanish Fork, Utah. Both events occurred in October of 2013. **Results**: A clinical diagnosis of a chronic disease or condition significantly affected physical activity/exercise. Those with pre-diabetes, diabetes, depression, and anxiety were less physically active, whereas a diagnosis of hypertension, high cholesterol, and ADHD was not significantly associated with level of physical activity. Of those diagnosed with these chronic diseases or conditions, the majority indicated that it motivated them to be more physically active: 76.0% for pre-diabetes, 77.8% for diabetes, 67.3% for hypertension, 67.4% for high cholesterol, 59.5% for depression, 58.6% for anxiety, and 53.3% for Attention Deficit Hyperactivity Disorder. Family history of disease did not significantly motivate increased exercise activity. Major motivating factors for aerobic and anaerobic exercise included wanting to manage stress, prevent or slow physical health problems, and prevent or slow down cognitive decline. Other factors were only associated with aerobic exercise: to provide social opportunities, to feel physically and mentally better now. **Conclusion**: Diagnosis of chronic disease or conditions can motivate greater physical activity. Selected items that help motivate physical activity were identified. Identifying factors associated with greater physical activity is important in disease prevention and control programs.

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PREVENTION TRIAL IN THE CHEROKEE NATION: DESIGN OF A RANDOMIZED COMMUNITY TRIAL. Kelli A. Komro*, Alexander C. Wagenaar, PhD, Misty L. Boyd, PhD, B.J. Boyd, PhD (University of Florida, College of Medicine, Gainesville, FL United States)

Despite advances in behavioral epidemiology and prevention science in recent decades, the U.S. continues to struggle with significant alcohol-related risks and consequences among youth, especially among vulnerable rural and Native American youth. The Prevention Trial in the Cherokee Nation is a research trial partnership between behavioral epidemiologists at the University of Florida and Cherokee Nation Behavioral Health to design, implement and evaluate a new, integrated community-level intervention to prevent underage drinking and associated negative consequences among Native American and other youth living in rural high-risk underserved communities. The intervention builds directly on results of multiple previous randomized trials of two conceptually distinct approaches: (1) updated version of CMCA, an established community organizing environmental change intervention, and (2) CONNECT, our newly developed population-wide intervention based on screening, brief intervention and referral to treatment (SBIRT) research. The new CONNECT intervention expands traditional SBIRT to be implemented universally within schools. Six key research design elements optimize causal inference and experimental evaluation of intervention effects, including a controlled interrupted time-series design, purposive selection of study towns with high proportions of Native population, random assignment to study condition, nested cohorts as well as repeated cross-sectional observations, a factorial design crossing two conceptually distinct interventions, and multiple comparison groups. This presentation focuses on the intervention trial design elements central to strong inference combined with the many special considerations in designing randomized field trials in particularly disadvantaged communities.

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A MULTILEVEL ANALYSIS OF FACTORS ASSOCIATED WITH PHYSICAL ACTIVITY IN LEISURE TIME IN BRAZILIAN ADULTS. Fernanda Penido Matozinhos*, Crizian Saar Gomes, Alexandra Dias Moreira, Larissa Loures Mendes, Milene Cristine Pessoa, Gustavo Velásquez-Meléndez (Universidade Federal de Minas Gerais, Belo Horizonte, Brazil, Belo Horizonte Brazil)

It has been recognized that neighborhood environment may offer opportunities or barriers to adopt healthy habits and it is related to the physical activity (PA) practice among individuals. Objective: To examine the relationship between variables of the built and social environment and physical activity in leisure time in urban area from Brazil. Data generated in 2008, 2009 and 2010 by the Telephone-based Surveillance of Risk and Protective Factors for Chronic Diseases (VIGITEL) from the city of Belo Horizonte were used. Individuals with the habit of practicing PA for at least 150 minutes of moderate-intensity PA or at least 75 minutes of vigorous-intensity PA throughout the week in leisure time were classified as active in leisure time. Individual-level data included sociodemographic, lifestyle habits and health status information were collected. To characterize the built and social environment, we used georeferenced data of places for physical activity, population density, food stores, neighborhood income and homicide rate. For data analysis we used weighted multilevel logistic regression. Cluster variability of PA practice in leisure time between the neighborhoods was observed (median OR=1.31). The environment variables that associated with PA practice in leisure time were homicide rate (OR=0.98; 95%CI=0.96-0.99), number of unhealthy food stores (OR=0.99;95%C=0.99-0.99) and number of places for practicing PA (OR=1.02; 95%IC=1.01-1.03). This associations remained statistically significant after controlled for age (OR=0.98;95%CI=0.97-0.98), sex (OR=0.56;95%CI=0.49-0.65), poorer self-reported health status (OR=0.30;95%CI=0.18-0.49) and obesity (OR=0.74, 95%CI=0.59-0.93). The neighborhood environment may influence the PA practice in leisure time and should be considered in future interventions and health promotion strategies.

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AVAILABILITY OF PLACES FOR PHYSICAL ACTIVITY ACCORDING TO NEIGHBORHOODS' INCOME IN BRAZIL. Fernanda Penido Matozinhos*, Crizian Saar Gomes, Larissa Loures Mendes, Milene Cristine Pessoa, Gustavo Velásquez-Meléndez (Universidade Federal de Minas Gerais, Belo Horizonte, Brazil, Belo Horizonte Brazil)

Evidence has shown that built environment characteristics can play an important role in practice of physical activities. Studies reveal that neighborhood may offer opportunities or barriers to adopt healthy habits. Therefore, to better understand the relationship between the built environment and physical activity patterns, specific socioeconomic characteristics should be considered. There is growing research from low-income and middle-income countries in Latin America about the correlates of physical activity for socioeconomic characteristics. The goal of this study was to compare the availability of places for physical activity according to neighborhoods' income in urban area. We used dataset from the Surveillance of Risk Factors for Chronic Diseases through Telephone Interview (VIGITEL). Sample from the years 2008, 2009 and 2010 from the city of Belo Horizonte were used. The covered area by basic health care units was used as the neighborhood cluster. Environmental variables were available in Geographic Information System (GIS) databases. Quartiles of global income neighborhoods were used to compare the average number of places for physical activity. We conducted ANOVA analysis with Bonferroni correction to compare responses, considering $p < 0.05$. All analyses were performed in STATA 12.0. Average availability of all kinds of places for physical activity was generally found in high-income neighborhoods. These data indicate that the environmental characteristics may be needed to encourage greater levels of physical activity. Places for physical activity practice tend to be located in high-income neighborhoods and it may significantly influence health behaviors and outcomes. These results could support policies of socioeconomic equity for future planning of urban cities in Brazil.

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IS GREENSPACE ACCESS ASSOCIATED WITH SLEEP DURATION AMONG PRESCHOOLERS? Diana Grigsby-Toussaint*, Kedir Turi, Mary Christoph, Kendal Hellman, Barbara Fiese (University of Illinois-Urbana Champaign, Champaign, IL United States)

Introduction: Exposure to greenspace may improve health behaviors among children such as increased levels of physical activity, which may be associated with sleep quality. To date, however, few studies exploring the relationship between green space access and sleep duration among children exist. **Methods**: A subsample (n=359) of 2-to-5 year old children from the Synergistic Theory and Research on Obesity and Nutrition Group (STRONG) Kids program, a family-based longitudinal study of childhood obesity in Central Illinois, was used to examine the association between sleep duration and greenspace access. Sleep duration was defined using parental responses of how many hours/night their child slept on average in the past week. Sleep duration was dichotomized as sufficient (>8 hours) or insufficient (<=8 hours). Geocoded home addresses were used to assign a normalized difference vegetation index (NDVI) score based on satellite imagery to capture greenspace access for each child. The multinomial logistic regression adjusted for child physical activity, gender, and race; parental education and sleep time, parental play time with children, and the number of televisions in the home. **Results**: On average, children slept 9.5 (±1.1) hours per night. Children exposed to higher levels of green space were less likely (Odds ratio (OR) = 0.90; 95% confidence interval (CI), 0.69, 1.17, P=0.43) to sleep for more than 8 hours per night, but this was not statistically significant. White children (OR=2.64, 95% CI, 1.46, 4.77; P=0.00) (reference: non-White), children with parents with a college degree (OR=3.15, 95% CI, 1.79, 5.51; P=0.00) (reference: parents with less than a college degree); and children of parents with higher levels of sleep duration (OR=1.31; 95% CI, 1.02, 1.68; P=0.038) were more likely to sleep for more than 8 hours per night. Higher numbers of television in the home were associated with less sleep duration for children (OR=0.85, 95%CI, .708, 1.02; P=0.08) but this was not statistically significant at the p=0.05 level. **Conclusion**: Higher exposure to green space was not significantly associated with increased sleep duration in this sample of preschool aged children. Additional factors in the home (e.g., chaos), and parental characteristics, may be more important for determining sufficient sleep duration among preschoolers.

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NEUROBEHAVIORAL FUNCTION IN SCHOOL-AGE CHILDREN EXPOSED TO MANGANESE IN DRINKING WATER. Youssef Oulhote*, Donna Mergler, Benoit Barbeau, David Bellinger, Therese Bouffard, Marie-Eve Brodeur, Dave saint-Amour, Melissa Legrand, Sebastien Sauvé, Maryse Bouchard (Université de Montréal, Montréal Canada)

Background: Manganese neurotoxicity is well documented in individuals occupationally exposed to airborne particulates, but few data are available on risks from drinking water exposure. Objective: We examine the association between manganese exposure from water and hair manganese concentration and memory, attention, motor function, and parent- and teacher-reported hyperactive behaviors. **Methods**: We recruited 375 children and measured manganese in home tap water (MnW) and hair (MnH). We estimated manganese intake from water ingestion. Using structural equation modeling, we assessed the association between neurobehavioral functions and MnH, MnW, and manganese intake from water (log10-transformed), and exposure-response relationships using generalized additive models. **Results**: After adjusting for potential confounders, a standard deviation (SD) increase in MnH was associated with significant differences of -24% (95% CI: -36, -12) SD in memory and -25% (-41, -9) SD in attention. The relations between MnH and poorer memory and attention were linear. A SD increase in MnW was associated with a significant difference of -14% (-24, -4) SD in memory, and this relation was nonlinear, with a steeper decline in performance at MnW above 100-200 µg/L. For manganese intake from water, a SD increase was significantly associated with a motor function lower by -11% (-21, -0.4) SD, and this relation was nonlinear. There was no significant association between manganese exposure and hyperactivity. **Conclusion**s: Exposure to manganese in water is associated with poorer neurobehavioral performances in children, at low levels commonly encountered in North America.

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GENDER AND RELATED FACTORS AS EFFECT MODIFIERS IN THE ASSOCIATION BETWEEN SMOKING AND DEPRESSION. Greta Kilmer* (RTI International, Atlanta, GA United States)

Introduction- A complex interaction of behaviors and mental health play a role in cigarette smoking among adults. The goal of this study is to determine if gender is an effect modifier in the association between lifetime smoking and lifetime diagnosed depression, and consider other key factors related to gender and behavioral health. **Methods**- The Behavioral Risk Factor Surveillance System is an annual state-based telephone survey of non-institutionalized U.S. adults. In 2012, information regarding lifetime cigarette smoking and lifetime diagnosed depression was collected. A large sample size (475,687) allowed for age-adjusted odds ratios to be calculated for subgroups of interest when a statistically significant interaction with gender existed. Gender-related factors that were analyzed include body mass index, marital status, and the presence of children in the household. **Results**- In age-adjusted logistic regression models, the association between smoking and depression was significantly higher (p=0.008) for females (OR= 2.31) than males (OR=2.07). Furthermore, statistically significant gender interactions were found for age group (3 groups), body mass index (5 groups), marital status (married, previously married, and unmarried), and presence of children in the household (yes, no). The age-adjusted association between smoking and depression was statistically significant among all subgroups except for underweight males. The strongest associations existed among females who were age 18 to 34, underweight, never married, or had children in the household. **Conclusion**- Smoking prevalence was influenced by depression differently among males than females. These findings suggest that future studies examining a longitudinal association should stratify by gender. Programs that address smoking cessation in the context of mental health may be more successful among women if they address social or family stressors.

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HOW MILITARY CULTURE DISCOURAGING TOBACCO USE INFLUENCES ACTIVE DUTY MILITARY PERSONNEL. Kathleene Ulanday*, Diana Jeffery, Linda Nebeling, Shobha Srinivasan (National Cancer Institute/National Institutes of Health, Rockville, MD United States)

Tobacco use has long been part of the U.S. military culture. There is growing recognition among military leaders that there are adverse effects of tobacco use including on fitness levels, readiness and performance, and health care costs. This recognition has led to implementation of numerous policy changes, cessation and prevention interventions. Yet rates of tobacco use are rising in the military and are higher than the civilian population (24% vs. 21%). In this paper we examine whether the military culture of discouraging tobacco use is associated with decreasing use of tobacco among active duty military personnel (ADMP). Using the Department of Defense 2011 Health Related Behaviors Survey, we analyzed tobacco use and its association with military leaders' promotion of cessation programs. Cigarette smoking levels were defined by the 2010 National Health Interview Survey. There were 59% 'Abstainers', 17% 'Former Smokers', 8% 'Infrequent Smokers', 13% 'Light/Moderate Smokers' and 3% 'Heavy Smokers'. Multivariate regression analyses indicate a significant relationship between the military culture of discouragement and the use of tobacco among ADMP, after adjusting for sociodemographic and mental health factors. Military personnel have higher odds of smoking with a perception of a supervisor that 'not at all' or 'somewhat discourages' compared to those with a supervisor that 'strongly discourages' the use of tobacco. However, across military services, perceptions of supervisor discouragement of tobacco use are low at 21% and even lower among Army ADMP at 17%. **Conclusion**: Discouragement of tobacco use by military leadership has an impact on its use by ADMP. Prevention and cessation programs that recognize the influence of supervisors on the culture of tobacco use within their units are necessary for any anti-tobacco efforts.

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SOCIAL GUN CULTURE AND LIKELIHOOD OF GUN OWNERSHIP. Bindu Kalesan*, Sandro Galea (Mailman School of Public Health, New York, NY United States)

The ubiquitous availability of guns in the United States is a core driver of the endemic rates of firearm violence in the United States. To better understand the social norms that underlie gun availability in the US, we examined whether an individuals' connection with social gun culture (including friend and family attitude toward guns and gun involvement in social life with friends or family) is associated with gun ownership while taking into account state-level (strength of state gun policy, state gun fatality rate) and individual-level factors. We also explored whether unemployment modifies the potential relation between social gun culture and likelihood of gun ownership. We used data from a representative sample of 4000 US adults (>17 years) that assessed individual socio-demographic information, gun ownership, social gun culture, and attitudes towards guns. After accounting for individual and state-level characteristics, those who reported being a part of a social gun culture (compared to not) were 4.74 times more likely (95% confidence intervals (CI)=3.63-6.21) to report owning a gun. Those who reported excitement about guns were more likely than those who did not (OR=2.41, 95% CI=1.63-3.57) while, those who reported discomfort about guns were less likely (OR=0.29, 95% CI=0.20-0.41) than those who did not, to report to own guns. The increased risk of gun ownership among those reporting being a part of a social gun culture was much greater among the unemployed (OR=18.3, 95% CI=6.94-48.2) than the employed (OR=4.21, 95% CI=3.14-5.64), p-interaction=0.014. Involvement in social gun culture was associated with owning a gun in the US, even after accounting for state- and individual-level factors. Public health efforts to influence firearm ownership may need to tackle social norms around firearms and help develop alternative national narratives that do not include firearm culture as a central feature.

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SERUM ANTIOXIDANT LEVELS AND ENDOMETRIAL CANCER. Beverly J. Wolpert*, Lee Hurt, Kathy J. Helzlsouer, Judith Hoffman Bolton, Debra A. Street (US Food and Drug Administration, Center for Food Safety and Applied Nutrition, College Park, MD United States)

In vitro studies have shown some antioxidants inhibit endometrial cancer cell progression. A pilot nested case-control study was conducted to assess the relationships between serum antioxidants and the risk of endometrial cancer. A study of 25,803 participants who gave blood in 1974 to CLUE I, Campaign Against Cancer and Stroke, was linked with Washington County's cancer registry to identify 32 postmenopausal women over age 50 at baseline; diagnosed with endometrial cancer between 1976 and 1990; not diagnosed with any other, except possibly nonmelanomatous skin, cancer; and not taking hormones. To each case, 2 controls with the same characteristics were matched on age and race. High-performance liquid chromatography measured serum retinol, alpha- and beta-carotene, total carotenoids, cryptoxanthin, lutein, lycopene, and alpha- and gamma-tocopherol. Cholesterol was also measured. Conditional logistic regression estimated matched ORs based on levels at or above control medians for each micronutrient. Likelihood ratio tests assessed trends across thirds based on control values. High serum lycopene was marginally significantly associated with lower endometrial cancer odds (OR 0.45, 95% CI 0.19-1.04). No significant associations between high levels of the other evaluated micronutrients and endometrial cancer odds were detected, but a significant trend was noted for high gamma-tocopherol and greater risk of cancer (p 0.04). Adjustment for cholesterol attenuated the observed gamma-tocopherol effect (p 0.08). The possible protective association with lycopene and the possible harmful association with gamma tocopherol suggest that a larger study is warranted to better assess the associations between micronutrients and endometrial cancer.

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THE ASSOCIATION BETWEEN DAIRY INTAKE AND CALCIUM AND THE INCIDENCE OF COLORECTAL CANCER. Yessenia Tantamango-Bartley*, Jing Fan, Synnove Knutsen, Gary Fraser (Loma Linda University. School of Public Health, Loma Linda, CA United States)

Background: Colorectal cancer (CRC) is the third most common cancer among Americans. Diet plays a major role in colorectal tumorigenesis. However mixed results have been reported by epidemiological studies regarding the association between dairy products and calcium intake and the risk of CRC. **Methods**: We examined the association between grams and nutrients from dairy (proteins, carbohydrates and fat) and calcium intake (total, diet, dairy, supplements) and CRC incidence among 75,096 participants of the Adventist Health Study-2 (AHS -2). Cancer cases were identified by matching to cancer registries. Cox-proportional hazard regression analysis was performed to estimate hazard ratios, with "attained age" as the time variable. Models were adjusted by: gender, race, family history of CRC, screening, body mass index (BMI), physical activity, red meat, fiber, and Kcal. **Results**: 271 incident cancer cases were identified. Grams of dairy and nutrients from dairy intake did not show any statistically significant effect on the risk of CRC. Total calcium intake (from diet and supplements) showed not statistically significant protective effect for the risk of CRC (Hazard Ratio (HR)=0.82; 95% Confidence Interval (CI): 0.57, 1.17; highest vs. lowest quartile). The association was strongest for calcium from supplements (HR=0.67; 95%CI: 0.45, 1.00; highest vs. lowest quartile; p=.05). No association was observed between calcium from dairy and incident CRC cancer. **Conclusion**: Dairy does not seem to confer any effect on the risk of CRC. But calcium, especially from that from supplements may reduce the risk of CRC.

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VEGETARIAN DIETARY PATTERNS AND THE RISK OF COLORECTAL CANCER. Michael Orlich*, Pramil Singh, Jing Fan, Gary Fraser (Loma Linda University, Loma Linda, CA United States)

Background: Considerable epidemiologic evidence links the consumption of certain meats to an increased risk of colorectal cancer, yet studies of vegetarian dietary patterns have been inconsistent, with some surprisingly finding vegetarian diets to be associated with increased risk. **Methods**: Adventist Health Study-2 (AHS-2) is a cohort of 96,194 Seventh-day Adventists (SDAs) recruited between 2002 and 2007. For this analysis, diets were classified into two patterns: vegetarian and nonvegetarian. Colorectal cancer incident cases were obtained by matching with state cancer registries. Proportional hazards regression was used to analyze the relationship of these diets to colorectal cancer, adjusting for important potential confounders (age, race, sex, smoking, alcohol, aspirin, supplemental calcium, family history, education, and marital status). **Results**: During an average follow-up period of 4.7 years among 75,096 study participants, there were 220 cases of colon cancer and 53 cases or rectal cancer. Compared to nonvegetarians, vegetarians had a lower risk of colorectal cancer of any type HR=0.72 (95%CI: 0.54,0.96), of colon cancer HR=0.78 (95%CI: 0.57,1.07), and of rectal cancer HR=0.43 (95%CI: 0.22,0.87). **Conclusion**: Preliminary results suggest an association between a vegetarian dietary pattern and reduced incidence of colorectal cancers. This is consistent with the hypothesis that certain meats may increase colorectal cancer risk and certain plant foods may diminish this risk.

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BODY SIZE AND RISK OF ENDOMETRIAL CANCER IN US BLACK WOMEN. T.R. Sponholtz*, J.R. Palmer, L. Rosenberg, L.A. Wise (Slone Epidemiology Center, Boston, MA United States)

Background: Black women have a lower incidence of endometrial cancer than white women, but higher mortality. Little is known about determinants of endometrial cancer in black women. We investigated the association between body size measures and endometrial cancer incidence in a U.S. prospective study of black women. **Methods**: We followed 47,121 women with an intact uterus at baseline in the Black Women's Health Study through 2013. Height, weight, weight at age 18, and waist and hip circumference were reported on the 1995 questionnaire. Weight was updated in biennial questionnaires and waist and hip circumference were updated in 2005. Self-reported cases of incident endometrial cancer on the biennial questionnaires were confirmed by pathology data from hospital records or cancer registries. We estimated incidence rate ratios (IRRs) and 95% confidence intervals (CIs) using Cox proportional hazard regression. **Results**: During 625,307 person-years, 207 incident endometrial cancer cases were ascertained. In multivariable-adjusted models, compared with body mass index (BMI) <25, IRRs for BMIs 25-29, 30-34, and ≥35 were 1.13 (CI 0.72, 1.76), 1.47 (CI 0.93, 2.34), and 1.84 (CI 1.50, 2.27), respectively. Endometrial cancer incidence was also associated with BMI at age 18 (BMI ≥30 vs. 18.5-24: IRR=2.16, C: 1.25, 3.71) and weight gain since age 18 (gain ≥25 vs. 0-10 kg: IRR=2.23, CI 1.11, 4.48). Associations of endometrial cancer with waist circumference (WC) (WC ≥89 cm vs. ≤80 cm: IRR=1.76, CI 1.13, 2.77) and waist-to-hip ratio (WHR) (WHR ≥0.85 vs. <0.75: IRR=1.70, CI 1.13, 2.55) persisted after adjustment for BMI. **Conclusion**s: Similar to studies of white women, higher levels of overall and central obesity are associated with increased incidence of endometrial cancer in black women. Obesity earlier in life is also an important predictor of risk.

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CHILDHOOD ACUTE LEUKEMIA AND INDICATORS OF EARLY IMMUNE STIMULATION: A CHILDHOOD LEUKEMIA INTERNATIONAL CONSORTIUM (CLIC) STUDY. Jeremie Rudant*, Tracy Lightfoot, Kevin Y. Urayama, John D. Dockerty, Corrado Magnani, Elizabeth Milne, Eleni Petridou, Logan G. Spector, Alice Y. Kang, Eftichia Stiakaki, Laurent Orsi, Eve Roman, Catherine Metayer, Claire Infante-Rivard, Jacqueline Clavel (Inserm, Centre for Research in Epidemiology and Population Health, Environmental Epidemiology of Cancer Team, University Paris-Sud, Villejuif France)

We investigated the association between childhood acute lymphoblastic leukemia (ALL) and several proxies of early stimulation of the immune system, using data from 11 case-control studies participating in the Childhood Leukemia International Consortium. The sample included 8,030 ALL cases and 12,725 controls aged 1-14 years. The data were collected by questionnaires administered to the parents. Pooled odds ratios (ORs) and 95% confidence intervals (CIs) were estimated by unconditional logistic regression adjusted for age, sex, study, maternal education and maternal age. Attendance at day-care centers in the first year of life was associated with a reduced risk of ALL (OR=0.80, 95% CI: 0.74, 0.87), and a marked inverse trend with earlier age at start was noted (p for trend <0.0001), a finding made possible by the enhanced statistical power of this pooled analysis. A significant inverse association was also observed with breastfeeding duration of six months or more (OR=0.85, 95%CI: 0.78, 0.92), but not with history of common infections in the first year of life (OR=0.96, 95%CI: 0.88, 1.04). In summary, the results presented show that attendance at day-care was associated with decreased risk of ALL but there was no association between self-reported infections and ALL risk.

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EARLY LIFE GROWTH AND MAMMOGRAPHIC BREAST DENSITY IN AN URBAN BIRTH COHORT. Tomi Akinyemiju*, Parisa Tehranifar, Julie Flom, Ying Wei, Mary Beth Terry (Columbia University Mailman School of Public Health, New York, NY United States)

Early life characteristics including in-utero and childhood growth rates, and socio-economic status (SES) are increasingly recognized as important predictors of breast cancer risk. The associations with mammographic breast density (MD), a well-established intermediate marker of breast cancer, are less clear. Some studies suggest a positive association between higher birth weight and MD, while others have shown no association. The inconsistent results may be due to lack of detailed, prospective data on early life growth in infancy. In addition to a lack of data on early life growth, few studies have detailed data on early life socioeconomic conditions, which may impact on early life growth conditions. We examined the association between prospectively measured early life growth, early life SES and MD in a racially and ethnically diverse (38% white, 40% African American, and 22% Puerto Rican) birth cohort (n=151). Women in our cohort were born between 1959 and 1963, and recruited into the New York site of the US National Collaborative Perinatal project. We assessed early life growth measures at birth, and prospectively at ages 4 months, 1 year and 7 years (childhood weight and height) with breast density in adulthood. We also created an index of socio-economic status based on family information at birth. We used linear regression models to generate standardized beta estimates. SES at birth was positively associated with breast density before (β =0.18, 95% CI: 0.01, 0.27)) and after adjusting for race, prenatal, birth and early infant growth (β =0.20, 95% CI: 0.01, 0.29). Early infant and childhood growth (percentile weight change from birth to 4 months (β=-0.34, 95% CI: -0.28, -0.04), and percentile weight change from 1 year to 7 years (β=-0.37, 95% CI: -0.29, -0.06)) were inversely associated with percent mammographic density in adulthood after adjusting for race, family SES at birth and other birth and prenatal variables. If replicated in larger birth cohorts, these results suggest that early life SES and childhood growth patterns may influence breast cancer risk susceptibility through their relation with breast density.

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EVALUATION OF MATERNAL HEALTH AND LABOR AND DELIVERY CONDITIONS AS RISK FACTORS FOR CHILDHOOD LEUKEMIA IN CHILDREN WITH DOWN SYNDROME. Thomas Meath*, Philip Lupo, Susan Carozza (Oregon State University, Corvallis, OR United States)

Children with Down syndrome (DS) have 10- to 20-fold increased risk of developing leukemia compared to children without DS, yet only an estimated 2% of children with DS develop leukemia. Trisomy of chromosome 21, the condition leading to DS, may result in overexpression of genes involved in leukemogenesis, however, this susceptibility likely operates primarily in the presence of environmental exposures. Factors related to maternal health during pregnancy, labor, and delivery may be critical for this high risk population. To further explore factors related to leukemia risk in DS children, we conducted a nested case-control study of DS cases with (n=103) and without (n=315) a leukemia diagnosis before age 15, identified among all births occurring in Texas during 1996-2009. Birth certificate, Texas Cancer Registry, and Texas Birth Defects Registry data were used to classify study subject exposure status. More of the study population was Hispanic (46%) than non-Hispanic white (35%). Case mothers were more likely to be older than non-case mothers but were otherwise similar; demographics for fathers were similar regardless of case status. Of the total leukemia cases, 40% were acute lymphoid leukemia (ALL) and 41% were acute myeloid leukemia (AML). Of the ALL cases, 88% were diagnosed by age 6 years, and all but one of the AML cases were diagnosed before age 3 years. We evaluated mother's risk factors, delivery and obstetric procedures, labor complications, and abnormal infant conditions. For the majority of these factors, there was no association with leukemia, however, ultrasound (OR=1.55 (95% CI:0.92-2.62), ventilation during delivery (OR=1.67 (95% CI:0.71-3.69), and additional birth defects (1.40 (95% CI:0.79-2.58)) showed evidence of increased risk, while low birth weight (OR=0.77 (95% CI: 0.28-1.83) and pregnancy length <32 weeks (OR=0.59 (95% CI:0.09-2.30)) were associated with lower risk.

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FERTILITY TREATMENTS, GETTING PREGNANT ON BIRTH CONTROL, FOLIC ACID SUPPLEMENTATION AND CHILDHOOD ACUTE LEUKEMIA: THE ESTELLE STUDY. Roula Ajrouche*, Jeremie Rudant, Laurent Orsi, Denis Hémon, Jacqueline Clavel (Inserm, Centre for Research in Epidemiology and Population Health, Environmental Epidemiology of Cancer Team, Paris -Sud University, Villejuif France)

We investigated the potential involvement of fertility treatments, infertility, getting pregnant on birth control, and folic acid supplements in the etiology of childhood acute leukemia (CL). The ESTELLE study included 748 cases of CL diagnosed in France in 2010-2011 and 1421 population controls frequency-matched with the cases on age and gender. Data were obtained from structured telephone questionnaires administered to mothers. The odds ratios (OR) and their 95% confidence intervals were estimated using unconditional regression models adjusted for potential confounders. CL was not associated with difficulty in becoming pregnant (OR=0.9 [0.7-1.1]), in vitro fertilisation (OR=0.5 [0.2-1.3]) or the use of any fertility treatment (OR=0.7 [0.5-1.1]) for the index pregnancy. CL was neither associated with becoming pregnant on contraception (OR=1.2 [0.8-1.8]). Folic acid supplementation during pregnancy was not associated with CL, but an inverse association was observed for supplementation initiated in the 3 months preceding pregnancy (OR=0.7 [0.5-1.0]). The findings do not suggest that infertility and fertility treatments are associated with CL. The results support the hypothesis that folic acid supplements during preconception may reduce the risk of childhood leukemia.

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SPORADIC RETINOBLASTOMA AND PARENTAL SMOKING AND ALCOHOL CONSUMPTION BEFORE AND AFTER CONCEPTION: A CASE CONTROL STUDY. Saeedeh Azary*, Arupa Ganguly, Greta Bunin, Beate Ritz, Julia Heck (Department of Epidemiology, UCLA Jonathan and Karin Fielding School of Public Health, Los Angeles, CA United States)

Background: Retinoblastoma is the most frequent tumor of the eye in children and very little is known about the etiology of non-familial (sporadic) retinoblastoma. In this study we examined whether parental tobacco smoking, alcohol consumption (preconception or post conception) contribute to the two phenotypes (bilateral or unilateral) of retinoblastoma. **Methods**: Two large multi-center case control studies identified 488 cases through eye referral centers in the United States and Canada or the Children's Oncology Group. Controls (n=424) were selected from among friends and relatives of cases matched by age. Risk factor Information was obtained via telephone interview. We employed multivariable logistic regression (conditional and unconditional) to estimate the effects of parental tobacco smoking and alcohol consumption on retinoblastoma. **Results**: Maternal smoking prior to or during pregnancy contributed similarly to unilateral retinoblastoma risk in the child (Odds Ratio (OR), 2.5; Confidence interval (CI), 1.3-4.7 and OR, 2.8; CI, 1.2-7.0 respectively). Also, maternal passive exposure to tobacco during pregnancy increased the risk of unilateral retinoblastoma (OR, 1.9; CI, 1.0-3.6). No association was found for maternal alcohol consumption. Paternal smoking of more than 10 pack-years and more than 10 cigarettes per day in the year before pregnancy doubled the risk of bilateral retinoblastoma in the child (OR, 2.0; CI, 1.0-3.9 and OR, 1.7; CI, 0.9-3.0 respectively). **Conclusion**: The results of this study indicate that paternal smoking prior to pregnancy and maternal active and passive smoking during pregnancy maybe risk factors for bilateral and unilateral retinoblastoma respectively. Our study supports a role for tobacco exposures in embryonal tumors.

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POST-TRANSPLANT MALIGNANCY IN INCOMPATIBLE KIDNEY TRANSPLANTATION: A NATIONAL STUDY. Lauren Kucirka*, Babak Orandi, Robert Montgomery, Dorry Segev (Johns Hopkins Bloomberg School of Public Health, Baltimore, MD United States)

Introduction: HLA-incompatible kidney transplantation (IKT) is rare but rising in light of the organ shortage. Desensitization for IKT requires additional immunosuppression compared to compatible patients, potentially leading to an increased rate of malignancy. No national studies have compared post-transplant malignancy rates in HLA-IKTs to compatible patients. These two rare events require a large study population with extensive follow-up to test associations. **Methods**: Data on IKT status was collected on 3,683 patients with Medicare from 20 centers nationally. To obtain follow-up data, patients were linked to 3 national datasets (The United States Renal Data System, the United Network for Organ Sharing, and Medicare claims data). Those with diagnoses of malignancy within 3 years post-transplant were identified. Rates of malignancy were compared between 501 IKT patients and 2068 age and gender matched cohort of compatibles, using Fisher's exact tests. **Results**: IKTs were significantly less likely to develop multiple myeloma compared to non-IKTs (0 IKTs versus 18, 0.87% of non-IKTs, p =0.036, Table 1). Rates of Hodgkin's disease and non-Hodgkin's lymphoma were 1.69 and 2.06 times higher among IKTs; however, these differences were not statistically significant. IKTs had 2.75 times the rate of head and neck cancer and 2.06 times the rate of stomach cancer (not statistically significant). Rates of other cancers were similar. **Discussion**: Rates of most malignancies were similar 3 years post-transplant. Multiple myeloma may be less common in IKTs due to use of B-cell ablative therapies for induction and treatment of antibody mediated rejection. Rates of cancers with an infectious component (e.g non-hodgkins lymphoma, head and neck cancer) may be elevated in IKTs due to intense immunosuppression; however, longer follow-up is needed to determine if differences are significant.

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A PROSPECTIVE STUDY ON ORAL CONTRACEPTIVE USE AND COLORECTAL CANCER. Brittany Charlton*, Kana Wu, Ed Giovannucci, Charles Fuchs, Stacey Missmer, Bernard Rosner, Karin Michels (Harvard School of Public Health, Boston, MA United States)

Oral contraceptive (OC) use has been reported to decrease the incidence of colorectal cancer (CRC). However, not all studies have observed this inverse association, others have been unable to examine aspects such as duration of use, time since last use, and cancer subsites, and all the studies have weighed heavily on younger rather than older women, where the spectrum of cancers may be different. We therefore used data from a large well-designed cohort to evaluate whether OC use is associated with CRC risk. Among 88,691 women of the Nurses' Health Study, we assessed OC use every 2 years between 1976-1982 and categorized this use according to ever (≥2 mo) and never use (reference), duration of use (never, ≤1, >1-<2, ≥2-<5, ≥5-<10, 10+ years), and time since last use (never, ≤4, >4-<10, ≥10-<15, 15+ years). We included all incident colorectal adenocarcinoma cases through 2010. Cox proportional hazards regression including a duplication method were used to estimate multivariable hazard ratios and 95% confidence intervals. Models were adjusted for age, body mass index, height, physical activity, smoking, processed and red meat, folate intake, calcium, total energy intake, aspirin use, hormone therapy (HT) use, HT duration, and previous endoscopy screening. The prevalence of OC use was 49.0% (N=43,454). OC use was associated with a marginal increase in risk of CRC [1.03 (0.93, 1.14)] as well as colon cancer [1.06 (0.95, 1.20)] and a slight decrease in risk of distal [0.93 (0.77, 1.13)] as well as rectal cancer [0.91 (0.72, 1.14)], though none were statistically significant. Women who used OCs had 1.17 (1.00, 1.36) times the rate of proximal cancer compared to never users. Duration or time since last OC use were not associated with risk of cancer. In conclusion, OC use may not be protective for CRC diagnosed at older ages, particularly as certain subsites become more prevalent (e.g., proximal). Further research into proximal cancers, including adenomas and molecular subtypes, may help elucidate this association.

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DO CANCER SURVIVORS DESIRE FEWER CHILDREN THAN WOMEN WHO HAVE NOT HAD CANCER. Penelope P Howards*, Jessica B Spencer, Pamela J Mink, Ann C Mertens (Emory University, Atlanta, GA United States)

Studies linking cancer and birth registries suggest that young adult cancer survivors have fewer children than women who have not had cancer. However, registry-based studies are unable to provide insight into the reproductive goals of cancer survivors. The FUCHSIA Women's study interviewed women aged 22-45 years about their desire for children. Survivors of young adult cancers (diagnosed ages 20-35 years, n=1,282) and women who had not been diagnosed with cancer (n=1,071) were interviewed. Cancer survivors and comparison women reported desiring a median of 2 children (interquartile range (IQR): 2-3) at age 20 and at their current age. At the time of their cancer diagnosis, 72% of the survivors had fewer children than they desired with 50% having no children. By the interview, 55% of the cancer survivors still had fewer children than desired compared with 43% among comparison women. After adjustment for socio-demographic factors including current age, cancer survivors were more likely than comparison women to have fewer children than desired (odds ratio (OR) 1.7; 95% confidence interval (CI) 1.4-2.0). Among women who had not met their reproductive goals at the time of the interview, cancer survivors were more likely than comparison women to expect to raise fewer children than desired (59% vs. 51%). For both groups, the most common reason for expecting to raise fewer children than desired was concern about their age; being unable to get pregnant or concern about their ability to get pregnant was also common in both groups. Cancer survivors were more likely to report concerns about their health and longevity, whereas comparison women were more concerned about the cost of raising a child. In this study, differences in the number of children raised by female survivors of young adult cancers and comparison women did not seem to be explained by differences in the number of children desired.

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PROSTATE-SPECIFIC ANTIGEN TESTING AND SHARED DECISION MAKING FOR PROSTATE CANCER SCREENING. Jun Li*, Zahava Berkowitz, Thomas Richards, Ingrid Hall (Center for Disease Control and Prevention, Atlanta, GA United States)

Background: In 2012, the US Preventive Services Task Force expanded its 2008 recommendation against prostate specific antigen (PSA) screening for prostate cancer among men aged = 75 years to include men of all ages. In this study, we aimed to describe the prevalence of PSA testing over time and assess associations between shared decision-making (SDM) on PSA testing. **Methods**: We estimated prevalence of PSA testing using data from the 2000, 2003, 2005, 2008, and 2010 National Health Interview Surveys. Changes in the prevalence by age group, race/ethnicity, and year were assessed with logistic regression models and general linear contrasts of the predicted margins. Bivariate analyses were conducted to assess associations between demographic and health-related characteristics and PSA testing. **Results**: Men aged = 75 years had a small but significant decrease in PSA testing from 2008 to 2010 (50.8% vs. 43.9%, P < 0.05). However, in 2010, they continued to have a significantly higher prevalence of PSA testing (43.9%) than men aged 50–74 (38.4%), and men aged 40–49 (9.7%). Men who had pre-screening discussions about the advantages and disadvantages of PSA testing (54.9%) and about disadvantages alone (44.1%) were more likely to receive PSA testing than men who had no discussion (17.7%), respectively (both P <0.05). **Conclusion**s: Men = 75 years continued to receive more PSA testing than younger men. Pre-screening discussions were positively associated with PSA testing. Additional research is needed on how SDM is being conducted in clinical practice and the role played by patient's values and preferences in decisions about PSA testing.

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CAUSAL EFFECTS OF AGE AT SMOKING INITIATION ON SUBSEQUENT LUNG CANCER RISK. Orestis A. Panagiotou*, Fangyi Gu, Carolyn Reyes-Guzman, Maria-Teresa Landi, Michele Bloch, Neil E. Caporaso, Sholom Wacholder (National Cancer Institute, Rockville, MD United States)

Background: Methods that describe the effect of age at smoking initiation and lung cancer adjust for variables unknown at the time of initiation (e.g. pack-years) and do not provide valid estimates of the causal effect of the initiation age. **Methods**: We applied a causal modeling approach to estimate the effect of age at initiation given variables fixed at that time and averaging over subsequent smoking behaviors using 1942 lung cancer cases and 2116 controls from the population-based case-control study "Environment And Genetics in Lung cancer Etiology". Risk factors fixed at smoking initiation were gender, childhood exposure to tobacco smoke [CETS], lung cancer family history, and birth cohort, while causally related to the initiation age were pack-years, cigarettes per day, quitting, and nicotine dependency. Using the sampling fractions for controls selection, we reconstructed the original study cohort and estimated absolute lung cancer risks overall and conditionally on fixed factors. We predicted lung cancer rates for different ages at smoking initiation as number of cases per 100,000 person-years (PY) using a binomial linear model and estimated corresponding risk differences (RD) and 95% confidence intervals (CI). **Results**: We found that delaying smoking initiation from age 16 to age 20 reduces estimated lung cancer rate in men from 149 to 78 cases per 100,000 PY with a RD=71 (95% CI 25 to 120), but there is apparently no corresponding effect in women (RD= -1 [95% CI -50 to 48] from 26 to 27 cases per 100,000 PY). The effect of delaying initiation is larger for those without CETS (RD=113 [95% CI 52 to 174] cases per 100,000 PY from 156 to 43) than those with CETS (RD=45 [95% CI -2 to 92] cases per 100,000 PY from 92 to 47). For those with family history, RD was 214 (95% CI -106 to 534) cases per 100,000 PY from 282 to 68, and for those without family history it was 44 (95% CI 3 to 85) cases per 100,000 PY (from 85 to 41). RDs were greater for early birth cohorts. **Conclusion**s: In summary, we estimated absolute lung cancer risk from a case-control study using information fixed at the initiation age and averaging over subsequent smoking behaviors. Our estimates show a substantial impact of delaying initiation in men, even if the person eventually smokes.

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A COMPREHENSIVE ASSESSMENT OF THE ROLE OF REGULATORY T CELLS IN OVARIAN CANCER ETIOLOGY. Shalaka Hampras, Lara Sucheston, Paul Wallace, Warren Davis, Grace Friel, Ellen Goode, Kunle Odunsi, Ovarian Cancer Association Consortium, Kirsten Moysich* (Roswell Park Cancer Institute, Buffalo, NY United States)

The etiology of ovarian cancer remains poorly understood, but recent interest has focused on the role of immune function in ovarian carcinogenesis. We conducted a comprehensive investigation to explore the significance of regulatory T (Treg) cells, an immunosuppressive subtype of T lymphocytes, in ovarian cancer. **Methods**: Blood Treg cell concentrations were measured via flow cytometry in patients with ovarian cancer (n=54) and benign lesions (n=144), as well as controls (n=101) from Roswell Park Cancer Institute. SNP associations were assessed utilizing a large-scale population study of 15,596 ovarian cancer cases and 23,236 controls from the Ovarian Cancer Association Consortium (OCAC), testing for associations with 1,625 SNPs in Treg cell pathway genes. In a subpopulation of this case-control study we measured associations between SNPs in the most significantly associated gene and whole genome mRNA expression profiles. **Results**: Treg cell concentrations were significantly higher among cancer patients compared to benign patients and controls (panova <0.03); the odds of developing ovarian cancer were significantly elevated among women in the highest tertile of the Treg cell distribution (OR=2.52, 95% CI=1.07-5.93). The most significant genetic association with overall ovarian cancer was with a SNP in IL12B (rs6894567) and the most significant association within histological subtype showed an association with a SNP in TGFBR2 (rs3773636) for clear cell tumors; the latter association was significant after correcting for multiple comparisons (p<0.0001). Within the TGFBR2 gene, variant alleles in rs1806802 were significantly associated with greater mRNA expression levels in FCGR2B, controlling for false discovery rate (adjusted r2=0.51, pFDR<0.03). **Conclusion**: Our results indicate that indicators of body burden, genetic variation and gene expression implicate Treg cells in ovarian cancer etiology.

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ASPIRIN AND ACETAMINOPHEN DECREASE THE RISK OF CERVICAL CANCER IN LONG-TERM USERS. Cici Liu, Grace Friel, Nonna Kolomeyevskaya, Shashi Lele, Kunle Odunsi, Kirsten Moysich* (Roswell Park Cancer Institute, Buffalo, NY United States)

Objectives: Recent evidence demonstrates the chemoprotective effect of nonsteroidal anti-inflammatory drugs (NSAIDs) on various cancers. Preclinical data point to overexpression of cyclooxygenase-2 (COX-2) in reproductive cancers, where it promotes cellular proliferation and angiogenesis and inhibits apoptosis. In addition to known oncogenic properties of human papillomavirus (HPV), chronic inflammation has been shown to play a role in cervical carcinogenesis. The objective of this study was to investigate whether regular use of aspirin and acetaminophen conferred cervical cancer risk reduction. **Methods**: We conducted a hospital-based case-control study that included 565 patients with cervical cancer and 2,257 matched controls treated at a single institution. All participants completed a comprehensive epidemiologic questionnaire between 1982 and 1998. Women who reported analgesic use at least once a week for ≥6 months were classified as regular users. Frequent long-term analgesic use was defined as ≥7 tablets a week for ≥5 years. Logistic regression analysis was performed to compute crude and adjusted odds ratios (OR) with corresponding 95% confidence intervals (CIs). **Results**: Compared to nonusers, frequent aspirin or acetaminophen use was associated with decreased risk of cervical cancer (OR 0.64, 95% CI 0.40-1.03,p for trend=0.06 and OR 0.40, 95% CI 0.18-0.91, p for trend =0.03, respectively). A marked chemoprotective effect was observed with frequent, long-term use of both aspirin (OR 0.48, 95% CI 0.24-0.95, p for trend=0.04) and acetaminophen (OR 0.19, 95% CI 0.05-0.82, p for trend=0.03). **Conclusion**s: Our findings indicate that use of aspirin and acetaminophen reduces the risk of cervical cancer, supporting their role in cancer prevention. Given the widespread use of NSAIDs and acetaminophen worldwide, further investigation in a larger sample size with better-defined dosing regimens is warranted.

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ASSOCIATION OF ALCOHOL INTAKE AND MAMMOGRAPHIC DENSITY IN TWO US BIRTH COHORTS. Jasmine McDonald*, Karin Michels, Barbara Cohn, Julie Flom, Mary Beth Terry (Columbia University, New York, NY United States)

Moderate alcohol consumption (≤7 servings/week) has been consistently associated with increased breast cancer risk. Using a prospective birth cohort of women (N=697), we examined the association between alcohol consumption in early adulthood (age at initiation and 20-29 years) and current alcohol consumption and breast density, an indicator of increased breast cancer risk. We measured both total dense area and percent breast density; the latter reflects the dense area divided by total breast area. Seventy-nine percent of women reported ever consuming alcohol and 64% reported current alcohol intake. There was no association between alcohol intake in early adulthood (age at initiation and ages 20-29) and dense area or percent density. Current moderate consumption of alcohol (≤7 servings/week), but not higher (> 7 servings a week), was associated with a 5 unit increase in dense area compared to non-drinkers after adjusting for age at mammogram, study site, prenatal smoke exposure, adult body mass index (BMI), and menopausal status (>0-<3 servings/week ß=1.0, 95% CI -3.0, 4.9; 3-7 servings/week ß=5.1, 95% CI 0.4, 9.8; and >7 servings/week ß=1.2, 95% CI -4.7, 7.1). There was no association between current alcohol consumption and percent breast density after adjusting for study site, maternal weight gain, prenatal smoke exposure, and BMI (>0-<3 servings/week ß=3.4, 95% CI 0.3, 6.6; 3-7 servings/week ß=1.6, 95% CI -1.7, 4.9; and >7 servings/week ß=0.3, 95% CI -3.7, 4.3). Overall, these findings do not support an association between alcohol consumption and mammographic breast density. Replication of our findings with dense area for moderate alcohol consumption is needed to evaluate whether our finding with dense area is spurious or if moderate alcohol consumption may increase breast cancer risk through a possible increase in dense area.

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BRA WEARING NOT ASSOCIATED WITH BREAST CANCER RISK: A POPULATION BASED CASE-CONTROL STUDY. Lu Chen*, Christopher Li (University of Washington, Department of Epidemiology, Seattle, WA United States)

Background: Despite the widespread use of bras among U.S. women and concerns in the lay media that bra wearing may increase breast cancer risk, there is a scarcity of credible scientific studies addressing this issue. Objective: To evaluate the relationship between various bra wearing habits and breast cancer risk among postmenopausal women. **Methods** and materials: We conducted a population-based case-control study of breast cancer in the Seattle-Puget Sound metropolitan area that compared 524 invasive ductal carcinoma (IDC) cases and 520 invasive lobular carcinoma (ILC) cases diagnosed between 2000 and 2004 to 469 control women between 55 to 74 years of age. Information on bra wearing habits and other breast cancer risk factors were collected from study participants through an in-person interview. Multivariate adjusted odds ratios (OR) and their associated 95% confidence intervals (CI) were estimated using polytomous logistic regression. **Results**: Neither duration of bra wearing (lifetime or daily), use of bras with an underwire, age women began wearing bras, nor changes in bra cup size were associated with risk of IDC or ILC breast cancer. However, with respect to cup size, women currently wearing an A cup had a 1.9-fold (95% CI: 1.0, 3.6) increased risk of IDC and ILC compared to women wearing a B cup. Also, compared to those who wore a B cup at age 18, those who wore a D cup had a 0.4 (95% CI: 0.2, 0.8) reduced risk of IDC and ILC. **Conclusion**s: Our results suggest that bra wearing is not associated with breast cancer risk among postmenopausal women.

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TIME TREND IN 5-YEAR SURVIVAL RATES AMONG BREAST CANCER PATIENTS BY HORMONE RECEPTOR STATUS AND STAGE: A NATIONAL POPULATION BASED STUDY. Lu Chen*, Hannah Linden, Benjamin Anderson, Christopher Li (University of Washington, Department of Epidemiology, Seattle, WA United States)

Background: Improvement in breast cancer survival has been observed in recent decades in the U.S., but it is unclear if similar survival gains are consistent across breast cancer subtypes, especially with regards to more advanced stages of the disease. **Methods**: We used data from 13 population-based cancer registries participating in the Surveillance, Epidemiology and End Results (SEER) program. Women between 20-79 years of age diagnosed with invasive breast cancer between 1992 and 2005 residing in the catchment areas of the 13 cancer registries were included in the analysis. 5-year breast cancer cause- specific survival rates were calculated and stratified by estrogen receptor (ER)/ progesterone receptor (PR) status, stage and age at diagnosis. The National Cancer Institute's Jointpoint program was used to assess annual percent changes in survival rates. **Results**: A total of 191,917 women were included in this analysis. Breast cancer 5-year cause-specific survival rates improved 0.7% (95% confidence interval (CI): 0.4%-0.9%) per year from 1998 to 2005 and then 0.2% (95% CI: 0.0%-0.3%) per year from 1998-2005. While the trend in improvement was consistent across ER+/PR+, ER+/PR-, and ER-/PR- cancers through 1999, subsequently through 2005 survival rates did not change for ER+/PR+ disease, worsened for ER+/PR- disease, and continued to improve for ER-/PR- disease. Among women with ER-/PR- breast cancer, survival rates improved continuously for stage I and II cancers from 1992 to 2005, improved only from 2000-2005 for stage III cancers, and did not change appreciably from 1992 to 2005 for stage IV cancers. **Conclusion** and relevance: Steady improvements in 5 year survival rates for breast cancer have been achieved in the U.S. over the past several decades, however certain subgroups of patients, notably those diagnosed with stage IV ER-/PR- cancer, have experienced little gains.

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IMPACT OF POSTMENOPAUSAL HORMONE USE ON BREAST CANCER INCIDENCE IN THE UNITED STATES. Ronald Gangnon*, Patricia Jewett, Brian Sprague, Natasha Stout, Oguzhan Alagoz, Amy Trentham-Dietz (University of Wisconsin, Madison, WI United States)

Recent declines in breast cancer incidence have been largely attributed to the decline in postmenopausal hormone (estrogen and progestin combined, E+P) use after the release of the Women's Health Initiative (WHI) trial results. We sought to quantify the impact of E+P use on breast cancer incidence while accounting for age, cohort, mammography and other period effects. We developed an age-period-cohort model of breast cancer incidence in U.S. females using cancer registry data from Connecticut (1935-2010) and the National Cancer Institute's SEER Program (1973-2010). Five functions were included in the model to estimate effects for age, pre- and post-menopausal birth cohort, period, and mammography (a second period effect for women age ≥40 years post-1982). Prevalence of E+P use by age and year among 40-84 year old women, 1970-2010, was estimated using data from NHANES, 1999-2010, and E+P prescription sales data, 1970-2003. Relative risks (RR) for current E+P use were taken from the literature: 1.25 from the WHI (Chlebowski JAMA 2010), 1.72 from a recent meta-analysis (Epidemiologic Reviews, in press) and 2.00 from the Million Women's Study (MWS; Beral Lancet 2003). Age-adjusted SEER breast cancer incidence declined from 264.8 (per 100,000 women) in 1999 to 242.0 in 2006. Using WHI and meta-analysis estimates, we found attenuated drops (256.2 to 242.7 and 246.2 to 241.6, respectively), after accounting for E+P use; using the MWS estimate, we found no drop (240.6 to 240.9). Using this model, we can attribute the decline in breast cancer incidence in the first part of the 2000's largely, if not entirely, to reductions in postmenopausal E+P use.

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LEUKOCYTE TELOMERE LENGTH AND MAMMOGRAPHIC DENSITY IN WOMEN UNDERGOING DIAGNOSTIC IMAGE-GUIDED BREAST BIOPSY. Clara Bodelon*, Mark Sherman, Alan Meeker, Christopher Heaphy, Berta Geller, Pamela Vacek, Donald Weaver, Rachael Chicoine, John Shepherd, Deesha Patel, Louise Brinton, Gretchen Gierach (Hormonal and Reproductive Epidemiology Branch, Division of Cancer Epidemiology and Genetics, National Cancer Institute, Bethesda, MD United States)

Background: Elevated mammographic density (MD) is one of the strongest breast cancer risk factors but the mechanisms underlying the association are poorly understood. Factors related to high MD and breast cancer risk (e.g., menopausal hormone therapy use, nulliparity, later age at first birth) may reflect cumulative exposures that promote epithelial cell division. A marker of cellular replicative history is telomere length, but its association with MD is unknown. We investigated the relationship between telomere length and MD. **Methods**: Peripheral blood leukocyte telomere length (LTL) was measured using quantitative polymerase chain reaction in 195 women, ages 39-65, clinically referred for image-guided breast biopsies at a facility of the Vermont Breast Cancer Surveillance System. Volumetric MD was assessed in craniocaudal views of the breast contralateral to the primary diagnosis in digital mammograms with single X-ray absorptiometry. Associations between log-transformed LTL and percent MD were evaluated using linear regression models adjusted for age and body mass index (BMI), which were associated with both MD and LTL in this population. Analyses were stratified by biopsy diagnosis: proliferative (i.e., hyperplasia, in situ or invasive carcinoma) or non-proliferative (i.e., benign or other discrete non-proliferative diagnosis). **Results**: Relative mean LTL in women with proliferative disease (n=141) was 1.6 vs. 1.2 in those with non-proliferative disease (n=54) (t-test on log-transformed LTL: P=0.005). Mean MD did not differ by diagnosis (proliferative=41.4% vs. non-proliferative=41.6%; t-test on square root-transformed MD: P=0.78). Finally, LTL was not associated with MD in women with proliferative (P=0.89) or non-proliferative (P=0.48) diagnoses. **Conclusion**s: Although LTL was related to lesion severity in this biopsied population, we did not find LTL to be associated with MD.

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METABOLIC SYNDROME IS ASSOCIATED WITH INCREASED BREAST CANCER RISK: A SYSTEMATIC REVIEW WITH META-ANALYSIS. Ruchi Bhandari*, George A. Kelley, Tara A. Hartley, Ian R. H. Rockett (None, Morgantown United States)

Background: While positive and statistically significant associations between individual metabolic risk factors and breast cancer risk have been reported, controversy surrounds risk of breast cancer from metabolic syndrome (MS). We report the first systematic review and meta-analysis of the association between MS and breast cancer risk in all adult females. **Methods**: Studies were retrieved by searching four electronic reference databases [PubMed, Cumulative Index to Nursing and Allied Health Literature (CINAHL), Web of Science, and PROQUEST - June 30, 2012], and cross-referencing from retrieved articles. Eligible for inclusion were longitudinal studies that reported associations between MS and breast cancer risk among females aged 18 years and older. Relative risks (RR) and associated 95% confidence intervals (95% CI) were calculated for each study, and then pooled using random -effects models. Publication bias was assessed both quantitatively (trim and fill) and qualitatively (funnel plots). Heterogeneity was examined using Q and I2 statistics. **Results**: Representing nine independent cohorts and 97,277 adult females, eight studies met the inclusion criteria. A modest, positive association was observed between MS and breast cancer risk (RR: 1.47, 95% CI, 1.15-1.87; z = 3.13; p = 0.002; Q = 26.28, p =.001; I2 = 69.55%). This finding is strengthened by the robustness of results from: (1) examination for publication bias; (2) influence analysis with each study deleted from the model once; and limiting analysis to (3) prospective designs and (4) postmenopausal women. No publication bias was observed. **Conclusion**s: MS is associated with an increased risk for breast cancer in adult women. Given the large global burden of MS, even a small association with breast cancer can have a substantial public health impact. Risk assessment tools can be developed that incorporate MS as a risk factor for breast cancer.

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REDUCED RISK OF BREAST CANCER ASSOCIATED WITH RECREATIONAL PHYSICAL ACTIVITY VARIES BY HER2 STATUS. Huiyan Ma*, Xinxin Xu, Giske Ursin, Kathleen Malone, Yani Lu, Michael Simon, Jill McDonald, Jane Sullivan-Halley, Michael Press, Leslie Bernstein (City of Hope, Duarte, CA United States)

Convincing epidemiologic evidence indicates that breast cancer risk is inversely associated with physical activity. However, mechanisms underlying this association are unknown and it is unclear whether the effects of physical activity vary by the tumor protein expression status of estrogen receptor (ER), progesterone receptor (PR), human epidermal growth factor receptor 2 (HER2), or p53. We evaluated the association of incident invasive breast cancer by these four biomarkers with lifetime and time-period-specific or age-specific recreational physical activity (measured as average annual metabolic equivalents of energy expenditure [MET]-hours per week) among 1195 population-based case and 2012 control participants in the Women's Contraceptive and Reproductive Experiences (CARE) Study. The inverse association between recreational physical activity and risk of invasive breast cancer varied according to HER2 expression status, but not ER, PR, or p53. Risk for HER2-negative (HER2-) breast cancer declined with increasing lifetime MET-hours of physical activity (P for trend = 0.04). In contrast, no such trend was observed for HER2-positive (HER2+) breast cancer (P for trend = 0.93). The decreased risk for HER2- breast cancer was also associated with increased MET hours of recreational physical activity in each specific life period examined (all P for trend $\leq$ 0.06), but not all homogeneity tests of trends (HER2- vs. HER2+) reached statistical significance (P for homogeneity of trends: 0.04, 0.07, 0.12, and 0.18 for the first 10 years after menarche, ages 10-19 years, ages 20-34 years, and most recent 10 year time period, respectively). Our data suggest HER2 may play an important role in biological mechanisms through which physical activity decreases the risk of developing breast cancer.

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RACIAL/ETHNIC DIFFERENCES IN OCCUPATIONAL PHYSICAL ACTIVITY AND OBESITY IN THE MASSACHUSETTS' WORKING POPULATION. MyDzung Chu*, Manuel Cifuentes, Letitia Davis (Occupational Health Surveillance Program, Massachusetts Department of Public Health, Boston, MA United States)

Current Physical Activity Guidelines for Americans recommend adults engage in weekly moderate- or vigorous-intensity physical activity and count physically active occupations toward meeting these recommendations. Existing studies show occupational physical activity (OPA) inversely associated with obesity and that their prevalence differ by race/ethnicity. We examined the association of OPA and obesity in the Massachusetts' (MA) working population and how it varied by race/ethnicity. We analyzed 30,568 currently employed adults in the MA Behavioral Risk Factor Surveillance System (BRFSS) data for odd years 2003-2009. Obesity was defined as body mass index $\geq$ 30.0kg/m2. Self-reported OPA was categorized as High/Low. Unadjusted prevalence and adjusted prevalence ratios (PRs) were estimated using SAS SURVEYMEANS and GLIMMIX binomial regression, respectively. Multivariable analysis adjusted for age, gender, leisure-time physical activity, fruit/vegetable consumption, and education, stratified by race/ethnicity. Average obesity prevalence among MA workers was 19.7% (95% Confidence interval (CI):19.0-20.3%). Obesity prevalence was higher among Black non-Hispanics (NH) (27.2%,CI:23.8-30.7%) and Hispanics (21.6%,CI:18.7-24.6%) than White NH (19.8%,CI:19.1-20.6%). Hispanics (48.1%,CI:44.2-51.9%) and Black NH (34.7%,CI:30.7-38.8%) were more likely to report high OPA than White NH (29.7%,CI:28.8-30.6%). Stratified by race/ethnicity, high OPA was significantly protective against obesity among White NH (PR:0.89,CI:0.81-0.97) but not among Black NH and Hispanics (PR:0.99,CI:0.81-1.21). Racial/ethnic differences in OPA and obesity prevail in the MA working population. The differential association of OPA and obesity across racial/ethnic groups suggests underlying differences in types of physical demands at work that can influence levels of health benefit gained.

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EXAMINING HEALTH DISPARITIES BY GEOGRAPHY USING THE 2013 NATIONAL CENTER FOR HEALTH STATISTICS URBAN-RURAL CLASSIFICATION SCHEME. Sheila Franco*, Deborah Ingram (National Center for Health Statistics/Centers for Disease Control and Prevention, Hyattsville, MD United States)

Background: Health researchers are often interested in the level of urbanization because it is associated with disparities in health status, utilization, and outcomes. NCHS developed a 6-level county-level urban-rural scheme which was recently updated with 2010 census data. An important feature of the NCHS scheme is its separation of large metro areas into central (inner cities) and fringe (suburban) counties, which often differ on health measures. 2010-2012 National Health Interview Survey and mortality data from the 2008-2010 National Vital Statistics System were used to examine health disparities. Findings: Substantial differences in health status, utilization, and outcomes by urbanization level were found. For most health indicators, residents of suburban counties fared best while the most rural counties fared worse. For example, reported fair or poor health status was lowest among adults aged 18–64 years residing in large fringe metro (suburban) counties and highest among those in the most rural counties. The percentage of uninsured adults aged 18-64 was lowest among those residing in large fringe metro (suburban) counties. The percentage of adults aged 18-64 with no health care visits in the past year was lowest among those residing in large fringe metro (suburban) counties compared to all other urbanization levels. Age-adjusted death rates from all causes for those aged 25-64 years were lowest for large fringe metro (suburban) and highest for the most rural counties. **Conclusion**s: Substantial urban-rural differences were observed for the health measures examined. Of special note are the findings that residents of suburban counties often fare better on health measures than residents of other urbanization levels. These findings demonstrate the usefulness and importance of the NCHS scheme in identifying differences in health measures across the 6 urbanization levels.

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IS HIGHER EDUCATION PROTECTIVE AGAINST DEPRESSIVE SYMPTOMS IN THE FACE OF DISCRIMINATION? Vicki Johnson-Lawrence*, Sherman James (University of Michigan-Flint, Flint, MI United States)

Depression is a major cause of disability in the United States, and is strongly patterned by socioeconomic position (SEP). African Americans experience a multitude of psychosocial stressors, including discrimination, that may determine the extent to which access to socioeconomic resources are protective of mental health. Using data from the 2001 follow-up of the Pitt County (NC) Study cohort, which included 1163 middle-aged African American adults (66% females), we examined whether cross-sectional associations between SEP and depressive symptoms are moderated by perceived experiences of discrimination. Depressive symptoms were measured using the Center for Epidemiologic Studies Depression (CES-D) scale (Cronbach's alpha = 0.72). Discrimination was measured using a 6-item subset the Everyday Discrimination Scale. Education was categorized as < high school, completed high school, some college, and completed college. Confounder-adjusted model results suggested college education was associated with lower CES-D scores (b=3.83, SE=0.40, p<0.01) than < high school education. Lower discrimination (b=-1.82, SE=0.17, p<0.01) was associated with lower CES-D scores. The interaction model suggested a protective effect of a college education (compared to having less than a high school education) on CES-D scores in the presence of discrimination. Future work should continue to investigate the variability in the protective effects of socioeconomic position in the face of other psychosocial stressors.

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THE PREVALENCE OF CHRONIC CONDITIONS AND CO-MORBIDITIES AMONG NEW YORK STATE PRISON INMATES. Montina Befus*, Carolyn T. A. Herzig, Kimberly J. Alvarez, Franklin D. Lowy, Elaine Larson (Columbia University Mailman School of Public Health, New York, NY United States)

The health of incarcerated individuals has implications for health systems in correctional facilities and in communities because there is constant movement of inmates between the two. Studies suggest higher rates of morbidity among the incarcerated as compared to the general population but empiric evidence is sparse and inconsistent, particularly for non-infectious diseases and co-morbidities. This study describes the prevalence of select chronic conditions and their co-occurrence among New York State (NYS) prisoners as compared to the general population. Data collected in 2009-2013 from medical records of inmates from one male and one female NYS maximum-security prison and from the 2009-2010 National Health and Nutrition Examination Survey were used. Data were age standardized using the 2010 census, and standardized morbidity ratios and 95% confidence intervals were calculated. Poisson regression was conducted to generate adjusted standardized prevalence estimates. Sixty three percent of NYS inmates had a chronic condition, and prevalence was higher for females than for males (71% vs. 55%). Asthma (SMR 2.3; 2.2-2.4), liver disease (SMR 4.3; 4.0-4.5), and kidney disease (SMR 1.3; 1.1-1.4) were significantly higher among inmates than in the general population. Inmates had significantly lower prevalence of cancer (SMR 0.2; 0.1-0.2), chronic obstructive pulmonary disease (SMR 0.24; 0.2-0.3), and heart disease (0.4; 0.4-0.5). After adjusting for age and race, female inmates had a higher prevalence of co-morbidities (SMR 1.8; 1.5-2.0) than male inmates. Many inmates are suffering from one or more chronic medical condition. Conditions detected primarily through screening were significantly lower among inmates, which may reflect health disparities in both correctional and underserved communities. Because most population surveys do not include inmates, an underestimate of required health resources may result.

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USING A MIXED METHODS APPROACH TO ELICIT ACTIONS FOR DECREASING RACIAL DISPARITIES IN INFANT MORTALITY. Lauryn Kasehagen*, Kathleen Brandert, Brenda Nickol, Maureen Gatere, Piia Hanson, Jane Bambace, Rita Beam, Shin Margaret Chao, Cheryl L. Clark, Carrie Y. Hepburn, Maria A. L. Jocson, Millie Jones, Patricia McManus (Centers for Disease Control and Prevention, Omaha, NE United States)

Background: The relationship between racism, discrimination and adverse health has been well-described. However, few communities have used mixed methods approaches to elicit actions which could decrease racial disparities in infant mortality (IM). This study applied the concept mapping technique to identify ways to decrease racial disparities in IM. **Methods**: 6 urban multidisciplinary teams generated specific ideas for community action around decreasing racial disparities in IM. Actions were rated as to necessity (N) and action potential (AP) and sorted into themes. Using multidimensional scaling (MDS) and cluster analysis, a series of visual representations were produced to show relationships between actions and thematic clustering. MDS was used to produce analyses describing the N of and AP for implementing actions. Maps were interpreted, broader themes suggested by the data discussed, and actions communities could take to decrease racial disparities in IM were identified. **Results**: 128 actions and 11 thematic clusters were identified during concept mapping. Correlation coefficients of the clusters ranged from 0.17-0.90. Average ratings ranged from 2.17-3.73 for N and 1.64-3.61 for AP. **Conclusion**s: Findings suggest that clusters with high AP usually represented on-going activities or actions that could be easily initiated. Community size, existing programs, partnerships, policies, and influential advocates were among the factors cited affecting feasibility of implementation. Clusters with lower AP require broader, longer-term, policy, institutional or system-wide changes and significant resources. High N clusters often contained actions perceived as essential for change, but sometimes outside of a community's control. A number of practical actions were identified that hold potential for individual, community and institutional changes which could decrease racial disparities in IM.

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A PROSPECTIVE INVESTIGATION OF SOCIOECONOMIC DEPRIVATION AND SELF-RATED HEALTH IN A LARGE US COHORTI. Qian Xiao*, Barry Graubard, David Berrigan, Charles Matthews (National Cancer Institute, Rockville, MD United States)

Background: Macro-environmental factors have been increasingly recognized as important determinants of health. People living in more deprived areas have higher disease risks and mortality. Self-rated health (SRH) is an important indicator of quality of life and a strong and independent predictor of premature death. There has been only one prospective study of area socioeconomic deprivation and SRH and it reported lower SRH among residents of disadvantaged neighborhoods. **Methods**: Our study included 249271 men and women (age 50-71) in the NIH-AARP Health and Diet Study, who reported SRH at both baseline (1995 -96) and follow-up (2004-06). Those reporting fair/poor SRH at baseline were excluded. Baseline home address was linked with the 2000 US Census. Demographic variables at census tract level were used to generate a socioeconomic deprivation index by principle component analysis. Multiple logistic regression with robust variance estimation was used to examine the relative risk of fair/poor SRH at follow up across quintiles of deprivation. **Results**: Greater socioeconomic deprivation was associated with higher risk of fair/poor SRH at follow up. In the base model adjusted for age, sex and baseline SRH, people in the highest quintile of deprivation had ~50% higher risk of fair/poor SRH comparing to those in the lowest (RR (95% CI): 1.51 (1.45, 1.58), p-trend<.001). After including individual-level factors of race, education, BMI, smoking, alcohol, physical activity and diet, the association was attenuated but remained significant (1.27 (1.19, 1.34), p- trend<.001). The results were similar among blacks only, and were not modified by sex or education. Excluding participants with diabetes, CVD, and cancer or adjusting for these conditions at baseline did not alter the results. **Conclusion**: Greater census track level socioeconomic deprivation is associated with greater risk of developing fair/poor SRH over 10 years.

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HEALTHCARE VISITS AND HYPERTENSION CONTROL AMONG U.S. ADULTS 20 YEARS OF AGE OR OLDER, BY DISABILITY STATUS – NHANES, 2001-2010. Alissa Stevens*, Elizabeth Courtney-Long, Brian Armour (Centers for Disease Control and Prevention, Atlanta, GA United States)

Background: One goal of the Million Hearts® initiative is to improve hypertension control in 10 million people. Understanding the relationship between healthcare visits and hypertension control among people with and without disability may inform hypertension control efforts, and is particularly important for the 56 million people in the United States with disability who are known to have health disparities in other areas. **Methods**: We used self-report and examination data from 23,800 participants in the 2001-2010 National Health and Nutrition Examination Survey to examine prevalence of hypertension (blood pressure =140/90 or taking medication), hypertension control, and frequency of healthcare visits among US adults by disability status (limitation in cognition, hearing, vision, or mobility). We used logistic regression stratified by disability to obtain prevalence ratios for the association between frequency of care and hypertension control adjusted for socio-demographic and behavioral risk factors. **Results**: Over one -third (38.2%) of adults reported a disability. Compared to adults without disability, adults with disability had higher prevalence of hypertension (45.9% vs. 21.2%, p<0.001), lower prevalence of hypertension control (63.3% vs. 67.0%, p<0.05), and higher prevalence of receiving care =4 times in the past year (54.0% vs. 26.8%, p<0.001). Adults without disability who received care =4 times in the past year were more likely to have hypertension control than those who received care 0 to 1 times (aPR: 1.21; 95% CI: 1.02, 1.43). This association was not significant among adults with disability (aPR: 1.11; 95% CI: 0.97, 1.27).**Conclusion**: Adults with disability experience disparity in hypertension control compared to adults without disability, even though they have more frequent healthcare visits. This suggests the need for a targeted approach to hypertension control among people with disability.

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LIFE COURSE SOCIOECONOMIC POSITION AND C-REACTIVE PROTEIN LEVELS IN ADULTS FROM THE BRAZILIAN LONGITUDINAL STUDY OF ADULT HEALTH(ELSA-BRASIL). Lidyane do Valle Camelo*, Luana Giatti, Paolo Andrade Lotufo, Pedro Guatimosim Vidigal, Isabela Bensenor, Dora Chor, Rosane Griep, Maria de Jesus Fonseca, Maria Ines Schmidt, Sandhi Maria Barreto (Universidade Federal de Minas Gerais, Belo Horizonte, Brazil)

We investigated the association between three life course socioeconomic position (SEP)approaches (sensitive periods, accumulation of risk, and social mobility) and C-reactive protein (CRP) levels, as well as the possible modifying effect of gender. All ELSA-Brasil cohort members participated, except those with prevalent cardiovascular disease (CVD) and women using hormonal therapy (N=12,855). Childhood SEP was determined by maternal education and leg length. Early adulthood and adulthood SEP were assessed by own education and per capita household income, respectively. A cumulative SEP score was calculated based on these variables and ranged from 0 (lowest risk) to 7 (highest risk). Socioeconomic trajectories from childhood to early adulthood were calculated by using maternal education and participants' education. Lower childhood SEP was associated with higher levels of CRP in adult life, independently of adulthood SEP. Compared with participants with ≥11 years of maternal education, men and women whose mothers had 8-10 years of education presented higher CRP (β = 0.1209;95% CI:0.0444-0.1974 and β = 0.1032;95%CI:0.0267-0.1796, respectively). The higher the cumulative SEP, the higher the CRP levels in men (β = 0.0571;95%CI:0.0415-0.0726) and women (β = 0.0355;95%CI:0.0191-0.0519). Higher CRP levels was also found in those with "decreasing" social trajectories in men (β = 0.1479;95%CI:0.0634-0.2325) and women (β = 0.1237;95%CI:0.0391-0.2083) compared with participants with "high stable" social trajectories. The magnitudes of all associations were higher among women in the minimally adjusting models. However, after adjusting for health-related behaviors and proximal CVD risk factors the magnitude of the associations became higher among men. Obesity substantially lowered most of the association between SEP and CRP among women, whereas it made the magnitude of these associations increase among men.

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SOCIAL DISPARITIES IN ADIPOSITY IN ADOLESCENCE: PROSPECTIVE OBSERVATIONS FROM HONG KONG'S ''CHILDREN OF 1997'' BIRTH COHORT. L.L. Hui*, C. Mary Schooling (School of Public Health, The University of Hong Kong, Pokfulam Hong Kong)

Background: It is unclear why low early life socio-economic position (SEP) is more strongly associated with adiposity among women than men and when this sex difference emerges. Given puberty is a key period when differences between the sexes become more pronounced we examined whether differences by sex in the association of SEP with adiposity emerged at puberty. **Objectives**: We examined the associations of early life SEP, proxied by highest parental education, with general and central adiposity in adolescence and whether any associations were varied by sex or timing of puberty. Method: We used multivariable regression to assess the association of highest parental education with body mass index (BMI) at 7, 11 and 14 years (n= 6436, 82% follow-up) and waist circumference, waist-hip ratio (WHR) and waist-height ratio (WHtR) (n=5374, 65% follow-up) at 14 years in term births from Hong Kong's Chinese birth cohort "Children of 1997". Findings: The associations of parental education with waist circumference and WHtR, but not WHR or BMI, varied with sex. ($p<0.05$). Parental education of =grade 9, compared to =grade 12, was associated with greater waist circumference (1.99cm, 95% confidence interval (CI) 1.09cm to 2.89cm) and WHtR z-score (0.32 95% CI 0.20 to 0.44) among girls, but not boys (waist circumference 0.25cm, 95% CI -0.82 to 1.31, WHtR z-score: 0.05, 95% CI -0.07 to 0.16). In girls, the social gradient in WHtR z-score at 14 years appeared stronger in those with earlier puberty although a 3-way interaction was not significant. **Conclusion**s: Early life SEP was inversely associated with central adiposity at 14 years among girls but not boys, with no sex difference for BMI. Early life exposures, such as infections or nutrition, associated with SEP may have sex-specific effects on the hormonal changes at puberty which determine body shape.

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CENTRAL ADIPOSITY IN ADOLESCENCE AMONG SECOND GENERATION MIGRANTS IN THE HONG KONG'S ''CHILDREN OF 1997'' BIRTH COHORT. L.L. Hui*, C. Mary Schooling (School of Public Health, The University of Hong Kong, Pokfulam Hong Kong)

Background: A higher risk of central adiposity and diabetes is seen among migrants from developing to developed countries. Whether these associations persist across generations for both sexes regardless of social economic position (SEP) is unknown. We examined the association of maternal migrant status (migrant from limited living conditions in China or born in economically developed Hong Kong) with central and general adiposity in adolescence and whether the associations differed by sex or early life SEP, proxied by highest parental education. **Method**: In the Hong Kong's Chinese birth cohort "Children of 1997", we used multivariable linear regression to assess the association of maternal migrant status with waist circumference, hip circumference, waist-hip ratio (WHR, n=5010 64% follow-up), height and body mass index (BMI) (n=6436, 82% follow-up) at about 14 years, adjusted for sex and age at measurement. Findings: Adolescents of migrant mothers, compared to Hong Kong born mothers, were taller, height z-score (0.15, 95% confidence interval (CI) 0.11 to 0.20), had greater waist circumference (0.91cm, 95% CI 0.42cm to 1.39cm) and higher WHR z-score (0.14, 95% CI 0.09 to 0.20), with no difference by sex or early life SEP. The associations with BMI and hip circumference differed by early life SEP (p=0.03) such that adolescents with migrant mothers and lower early life SEP did not have greater BMI or hip circumference than adolescents with Hong Kong born mothers, despite their high WHR z-score (0.26 95% CI 0.19, 0.33). Further adjusting for parental education attenuated but did not change the associations. **Conclusion**s: Poor living conditions in previous maternal generations may be associated with specifically greater central adiposity in adolescents. Mechanisms driving these associations and the extent to which these persist across generations should be investigated, so that prevention can be targeted.

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PROJECTIONS OF SOCIOECONOMIC TRENDS IN OBESITY AND DIABETES IN CANADA FROM 2001 TO 2021: THE POPULATION HEALTH MICROSIMULATION MODEL FOR CARDIOVASCULAR DISEASE (POHEM:CVD). Brendan Smith*, Sam Harper, Douglas Manuel, Peter Smith, Deirdre Hennessy, Meltem Tuna, Cameron Mustard (University of Toronto, Toronto Canada)

Reducing health inequalities is a major public health priority. Social inequalities in obesity and diabetes have been previously reported in Canada. However, it is unclear how these trends will change over time. The objective was to project future trends in obesity and diabetes by socioeconomic position (SEP) from 2001-2021. Projections were conducted using the Population Health Model. This continuous-time microsimulation model uses data from the cross-sectional 2001 Canadian Community Health Survey (CCHS) to simulate a baseline population of 22.5 million actors representative of the Canadian population over 20 years. Independent life trajectories are created for each actor, including full risk factor profiles updated each year using predictive algorithms to determine transitions in risk states. Obesity (body mass index≥30kg/m2) and diabetes (physician diagnosed) prevalence were estimated by SEP (4 levels of educational attainment). The model was validated comparing predicted obesity and diabetes by SEP to observed prevalence in the 2001-2011 cycles of the CCHS. Both obesity and diabetes are projected to increase from 2001-2021. Comparing lowest to highest education groups social inequalities in obesity in 2001 (19% vs. 13%, risk difference (RD): 6%, prevalence ratio (PR): 1.5) were significantly reduced in 2021 (25% vs. 23%,RD: 2%,PR: 1.1) where as social inequalities in diabetes in 2001 (9% vs. 3%,RD: 6%,PR: 3.0) increased on the absolute scale and remained on the ratio scale through 2021 (14% vs. 5%,RD: 9%,PR: 2.8). Overall, this study suggests the prevalence of obesity and diabetes will increase across all education groups in Canada through 2021. Social inequalities in diabetes will increase, despite an elimination of social inequalities in obesity. Population health interventions that aim to reduce obesity and diabetes at a population level, and also across education levels are needed in Canada.

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RACIAL/ETHNIC DISPARITIES IN ADHERENCE TO CARDIOVASCULAR MEDICATIONS AMONG MEDICARE SENIORS: LOOKING BEYOND THE MEAN. Mustafa Hussein*, Teresa Waters (University of Tennessee Health Science Center, Memphis, TN United States)

Racial/ethnic disparities in medication adherence are a primary contributor to disparities in attaining therapeutic goals, placing minorities, especially the elderly, at greater risk for a worse cardiovascular (CV) prognosis. Adherence disparities are relatively understudied, and have been reported only at the mean. This study aims to identify the subpopulations where these disparities may be particularly amplified, by investigating the magnitude of adherence disparities across the distribution of adherence behavior. Unconditional quantile regression (Econometrica 2009;77 (3):953-73) was applied to pooled data from the Medical Expenditure Panel Survey (MEPS), 2006-2010, on white, black, and Hispanic elderly Medicare enrollees using at least one of five major CV drug classes. Prevalent adherence was measured as the proportion of days covered (PDC) using drug refill data over survey year in MEPS. Quantiles based on clinical PDC values as well as the 5th, 10th, 25th, 50th, 75th, and 90th quantiles of the PDC distribution were modeled. Following the Institute of Medicine's (IOM) definition of disparities, the association between race/ethnicity and adherence was adjusted for only demographics, health status, and beliefs, with no adjustment for socioeconomic status or its correlates (e.g. insurance). For comparison, disparities were also measured in fully-adjusted models. A disparity corresponded empirically to the marginal effect (ME) of race/ethnicity on PDC. The sample included 8,154 MEPS respondents, nationally representing 23 million seniors. Black-white IOM disparities in adherence were statistically significant across the PDC distribution, and especially widening between the 25th and 58th quantiles (PDC 50%, 80%, respectively). Largest disparities were found at the 53rd quantile (PDC 75%) (ME: -13.25; 95%CI -18.22,-8.28). Hispanic-white IOM disparities were significant at only the 5th (ME: -6.40; 95%CI -10.13,-2.66) and 25th (ME: -5.20; 95%CI -9.94,-0.45) quantiles.

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SOCIOECONOMIC INEQUALITIES IN MOTOR VEHICLE ACCIDENT DEATHS, USA 1995-2010. Thomas J Charters*, Sam Harper, Erin C Strumpf (McGill University, Montreal Canada)

Deaths from motor vehicle crashes in the United States have continued their secular decline in recent years, but little is known about socioeconomic trends. We examined education-related inequalities in traffic accident death rates and trends from 1995-2010. We obtained data on motor vehicle accident deaths from the US National Center for Health Statistics Detailed Mortality Files and population estimates from the Current Population Survey. We calculated vehicle and person miles travelled estimates (restricted to road vehicles) using the National Household Travel Survey. We used negative binomial regression to estimate crude and age-sex-race-adjusted mortality rates for those ages 25 and over. Overall motor vehicle accident death rates decreased from 15.0 to 11.8 deaths per 100,000 population from 1995 to 2010, but decreases were stronger among the higher educated. Adjusted death rates among college graduates declined from 10.1 to 5.7 (difference=4.4, 95%CI 3.2, 5.7), but from 18.9 to 16.9 (diff=2.0, 95%CI -0.5, 4.5) among those with less than high school. Accounting for educational differences in vehicle miles travelled suggested widening inequalities. Death rates per 100 million vehicle miles traveled actually increased in those with less than a high school education from 4.0 to 6.4 (diff=2.4, 95%CI 1.2, 3.6), but decreased from 1.0 to 0.6 (diff=-0.4, 95%CI -0.6, -0.2) among college graduates, doubling the inequality. Similar differences in mortality trends were observed using measures of person miles travelled. Education-based inequalities were similar by race and sex, although inconsistent at older ages. Although rates of mortality from motor vehicle accidents have declined in the US, we provide evidence that differences by socioeconomic position have persisted or worsened over time. Further work on the source of such inequalities is warranted.

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BMI, WEIGHT AND HEIGHT FROM MENARCHE TO THREE YEARS POST-MENARCHE IN INDIGENOUS AND NON-INDIGENOUS GIRLS IN CHILE. Macarena Lara*, Jay S. Kaufman, Patricia Bustos, Hugo Amigo (Doctoral Program in Public Health, University of Chile, Santiago Chile)

INTRODUCTION: Chilean indigenous women have higher obesity prevalence than non-indigenous women. During adolescence anthropometric changes occur, but it is not known how ethnic differences in Body Mass Index (BMI), weight and height change from menarche to three years post-menarche. OBJECTIVE: To compare BMI, weight and height from menarche to three years post-menarche, in indigenous and non-indigenous girls from the Araucania region of Chile. **METHOD**: A population of 8,504 girls between 10 and 16 years were screened and selected into the study cohort if they recently experienced menarche (less than 3 months prior). The final cohort size was 237 girls (114 indigenous and 123 non-indigenous). Weight and height were measured and BMI was calculated at menarche and at 6, 12, 18, 24, 30 and 36 months post-menarche. Linear Generalized Estimating Equations (GEE) models were used to obtain disparities unadjusted and adjusted for baseline anthropometric values, age at menarche and socioeconomic level. **RESULTS**: Indigenous girls had menarche 4 month after non-indigenous girls (151±11 versus 147±11 months, p=0.005). Their BMI and weight were higher and height was lower than non-indigenous girls at menarche and this trend continued after menarche. Unadjusted GEE models showed that indigenous identity increased post-menarche BMI by 1.8 kg/m2 (95% CI=0.9,2.7), increased weight (2.4 kg, 95%CI=-0.1,4.9) and decreased height (2.6 cm, 95%CI=-3.9,-1.3). However, when adjusted for age, socioeconomic and anthropometric values at menarche, there was no additional change in the ethnic disparity in post-menarche BMI (0.3 kg/m2, 95%CI=-0.1,0.7), weight (0.7 kg, 95%CI=-0.7,2.1) and height (-0.3 cm, 95%CI=-0.7,0.1). **CONCLUSION**: Indigenous girls had higher BMI and weight and lower height than non-indigenous girls at menarche and this trend remained after menarche, with no further change in ethnic disparity over the subsequent three years.

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A DATA-DRIVEN APPROACH TO MECHANISMS OF PREMATURE BIRTH IN US URBAN COUNTIES: THE INFLUENCE OF OBESITY IN COMBINATION WITH OTHER WELL-KNOWN FACTORS. Anne Kershenbaum*, Michael Langston, Gary Rogers, Barbara Kilbourne, Suzanne Backtash, Mohammed Alhamdan, Paul Juarez, Robert Levine (University Tennessee, Knoxville, Knoxville, TN United States)

Background: Premature birth rates are high in the US. The recent increase in the number and variety of population measures available for analysis, offers insight into mechanisms. Objective: Generate new hypotheses to explain the occurrence of urban prematurity in the US. Data: CDC Wonder – natality, obesity, environmental pollution and sexually transmitted diseases (STDs); US Census (Geolytics); Environmental Protection Agency and Area Resource File. **Methods**: Graph theoretical analysis was used to generate groupings of highly inter-correlated variables(paracliques). The correlation matrix included prematurity (proportion of births between 24 and 33 weeks gestation), along with another 578 county-level variables. 524 US counties with population > 100,000 were included. Paracliques whose average correlation with prematurity was r >0.4 were selected for further analysis. Connections between paraclique summary variables were drawn where r >0.5, enabling visualization of the associations between paracliques. A regression model of logit prematurity against paraclique summary variables tested the percentage of variance explained. **Results**: Some paracliques combined variables of different concepts: prematurity + STD + black proportion + low birth weight; poverty + unmarried in another, and diabetes + obesity + lack of exercise in another. The diabetes/obesity and the poverty/unmarried paracliques were the most interconnected to others, each with 5 connections of r >0.5. When black proportion, diabetes/obesity and unmarried summary variables were entered individually to a regression model, the variance explained by each was 51.9%, 44.2% and 56.0% respectively; when entered together, each was significant and the degree of variance explained, 72.9%. **Conclusion**s: These results are consistent with the hypothesis that complex relationships linked to obesity are key components of prematurity rates in urban US communities.

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DIRECT EFFECTS OF WOMEN'S EARLY LIFE SOCIOECONOMIC STATUS ON THE BIRTH WEIGHTS OF THEIR CHILDREN. Jonathan Huang*, Amelia Gavin, Ali Ali Rowhani-Rahbar, Daniel Enquobahrie (University of Washington Department of Epidemiology, Seattle, WA United States)

Background: Inequities in birth weight may be caused by differences in socioeconomic and biological stressors across a mother's life course. Distinguishing maternal early life effects from more proximal determinants of birth weight has been challenging. We tested the effect of a mother's own in utero socioeconomic status (SES) on the birth weight of her child using two structural methods. **Methods**: Using all four waves of the National Longitudinal Study of Adolescent Health, we identified women who delivered at least one live singleton infant (N = 1,680 pairs). Maternal in utero SES was defined by self-reported educational attainment (≤ 8th grade, trade, < high school (HS), HS, GED, post-HS trade, < college, college, > college) of the biological grandmother (GM). Using structural equation models (SEM), we explored relationships between maternal life course factors. Using marginal structural models (MSM), we tested the controlled direct effect of GM education on the birth weights of children born to a marginal population of women at low risk of maltreatment, pre-pregnancy overweight, smoking during pregnancy, and low early adult SES. **Results**: Average birth weight was higher among GM with greater education (*e.g.* 3,309 grams (g) and 3,224 g amongst college graduates versus < high school, respectively). SEM analyses suggested a 16 g increased birth weight (β = 15.9, [95% confidence interval: -0.837, 32.6]) directly associated with each level increase in GM education. Confirmatory Fit Index was > 0.98 in all models. MSM and naïve adjustment produced similar results: The controlled direct effect estimated by inverse probability weighting suggests each level increase in GM education results in a 21 g increased birth weight (β = 20.9, [95% CI: 3.02, 38.9]) in a marginal population of healthy women. **Conclusion**s: Various models suggest a small but direct effect of GM education on birth weight.

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LEAVING THE EMERGENCY DEPARTMENT WITHOUT COMPLETE CARE IN AMERICAN INDIAN CHILDREN. Susan Puumala*, Katherine Burgess, Anupam Kharbanda, Nathaniel R. Payne (Sanford Research, Sioux Falls, IA United States)

Assessing high quality pediatric emergency department (ED) care includes measuring the rate at which children leave prior to being seen or prior to complete evaluation and treatment (LWCET). Previous research has suggested a higher rate of LWCET in a subset of American Indian (AI) children. This study examines LWCET in AI children by exploring possible differences by ED location and utilization patterns in a multi-center cohort of EDs in the upper Midwest. The data included all visits by children aged 0-17 years to one of five EDs in the upper Midwest between June 2011 and May 2012. Analysis was limited to three racial groups (African American (AA), AI, and White). Logistic regression was used to determine differences in LWCET by race and ED location controlling for other possible confounding factors including age, insurance type, triage level, sex, timing of visit, and distance from the ED. A total of 79,231 visits by 53,700 children were included in the analysis. Overall 1.5% of visits ended in LWCET. In the multivariate model, there was no significant interaction between ED location and race, but there was an association between race and LWCET with AI children being more likely to LWCET than White children (Odds Ratio (OR) = 1.56, 95% Confidence Interval (CI) = 1.25-1.96). There was no significant difference in LWCET between AA children and White children. Other factors significantly associated with LWCET included ED location, triage level, sex, timing of visit, and distance from the ED. We report a significant relationship between LWCET and race. Our results suggest that, regardless of location, AI children have a higher rate of LWCET compared to White children and that this association is different from other racial minority groups. Thus, it is likely that there are broad factors affecting LWCET in AI children throughout the upper Midwest. These factors require further exploration.

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THE IMPACT OF MATERNAL RACE/ETHNICITY ON PERINATAL OUTCOMES ASSOCIATED WITH MATERNAL ASTHMA. Katrina F. Flores*, Candace Robledo, Kira Leishear, S. Katherine Laughon, Michele Kiely, Beom S. Hwang, Uma M. Reddy, Pauline Mendola (Eunice Kennedy Shriver National Institute of Child Health and Human Development, Rockville, MD United States)

Maternal asthma is one of the most common chronic diseases in pregnancy, complicating 4-8% of pregnancies. Obstetric and perinatal complications are increased among women with asthma and also differ by maternal race/ethnicity. Given that asthma prevalence differs by race/ethnicity, we sought to examine the risk of obstetric and perinatal complications by race/ethnicity among women with asthma. Data were obtained from the Consortium on Safe Labor, a retrospective cohort of 223,512 singleton deliveries from 12 clinical centers across the US between 2002 and 2008. We restricted our analyses to 208,899 singleton deliveries where mothers race/ethnicity was reported as White (n=110,603), Black (n=50,284), Hispanic (n=38,931) or Asian/Pacific Islander (n=9,181). Generalized linear models including an interaction between asthma and race/ethnicity were used to determine odds ratios for maternal and neonatal complications associated with race/ethnicity after controlling for demographic, clinical factors and pre-existing conditions. White women with/without asthma were the reference group. Significant interactions were observed for preeclampsia, neonatal apnea and intensive care unit (NICU) admission but not for other complications studied. Black women with asthma and their infants had a lower odds of preeclampsia (OR=0.98, 95% CI: 0.84,1.15) and NICU admission (OR=1.10, 95% CI: 0.99,1.21) than those without asthma (OR=1.40, 95% CI: 1.31, 1.49; OR=1.28, 95% CI: 1.22,1.33, respectively). Apnea was lower for the infants of Black women with asthma (OR=0.79, 95% CI: 0.63, 0.99) and without asthma, and similar to Whites (OR=0.99, 95% CI: 0.90,1.08). In general, there were no additional risks for obstetric and neonatal complications for minority women with asthma.

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DO INEQUALITIES IN OBESITY REFLECT UNDERLYING INEQUALITIES IN DISTRIBUTIONS OF BMI? Arjumand Siddiqi*, Anthony Hong, Vincent Hildebrand (University of Toronto, Toronto Canada)

Despite vast evidence of the continuous nature of risk distributions, epidemiological investigation of inequalities in risk has largely focused on thresholds of an outcome: e.g., rather than understanding inequalities in distributions of body mass (BMI), the literature has focused on inequalities in obesity. By examining socioeconomic inequalities in BMI distributions – and decomposing determinants of these distributional inequalities – we present novel distributional conceptualizations of inequalities and provide companion methodological approaches for studying distributional inequalities. We use the largest sources of nationally representative data in the US (National Health Interview Survey) and Canada (Canadian Community Health Survey) to show how inequalities in BMI distributions vary across social and economic groups (income and race/ethnicity), time (2000-2011), and society (US vs. Canada). We use a distributional adaptation of Oaxaca-Blinder's decomposition technique to (a) quantitatively assess inequalities in BMI distributions (where prior studies have used only visual inspection to do so) and (b) test whether various observable characteristics (e.g., age, sex, socioeconomic status) account for observed inequalities in distributions of BMI by creating and comparing counterfactual (marginal) distributions which indicate the BMI distribution when the characteristics of the referent group are applied to the comparator group. The resultant analyses provide an assessment of the extent to which inequalities can be explained by (i) differences between groups in observable characteristics (composition effect) or (ii) differences between groups in returns to observable characteristics (price effect/coefficient), or (iii) whether they remain unexplained by observable characteristics in the model (residual). **Results** have widespread implications for tailoring population health interventions.

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THE POPULATION HEALTH IMPACT OF FAILING TO BREASTFEED ON INFANT ILLNESS IN CANADIAN ABORIGINAL COMMUNITIES. Kathryn McIsaac* (Dalla Lana School of Public Health, University of Toronto, Canada)

Background and **Objectives**: Aboriginal children in Canada face marked heath disparities compared to their non-Aboriginal peers. Breastfeeding an infant can substantially reduce risk of many conditions that Aboriginal Canadians are disproportionately affected by. The aim of this study was to determine what fraction of infant illnesses could be prevented if Aboriginal infants received any breastfeeding to at least four months, as opposed to no breastfeeding. **Methods**: Population attributable fractions were estimated using an extension of Levin's formula for multiple exposure categories. Rate ratios comparing risk of gastrointestinal, upper respiratory tract, otitis media, and sudden infant death syndrome in those receiving no breastfeeding to those receiving any breastfeeding at four months were obtained from recent meta-analyses. Prevalence estimates of breastfeeding in each of Canada's three Aboriginal groups (First Nations, Metis, Inuit) were obtained from the Aboriginal Children's Survey (2006). **Results**: Among First Nations, Inuit and Metis infants, we estimate that 46%, 40%, and 39% of lower respiratory tract infections; 39%, 34% and 33% of gastrointestinal infections;11%, 10%, 10% of otitis media infections; and 40%, 37%, and 36% of sudden infant death syndrome, respectively, could be prevented in these populations had all infants received any breastfeeding to four months. Interpretation: Aboriginal infant at an increased risk for many conditions that breastfeeding is protective against ; protecting, promoting and supporting breastfeeding in Aboriginal communities may go some ways to improving the health of this marginalized population.

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JOINT ANALYSES OF RACIAL AND URBAN-RURAL DISPARITIES IN CANCER SCREENING. David Strogatz*, Oleg Ivashchenko, Pinka Chatterji, Kajal Lahiri (Bassett Research Institute, Cooperstown United States)

Analyses of data on screening for cervical, breast and colorectal cancer have examined Black-White disparities as well as disparities when contrasting urban and rural populations, but there is limited information on the simultaneous assessment of race and cancer screening in rural compared to urban environments. Data collected in 2008 and 2010 by the Behavioral Risk Factor Surveillance System were linked to Rural/Urban Continuum Codes (RUCC) from the Area Resource File to evaluate whether racial disparities in meeting U.S. Preventive Services Task Force screening recommendations varied by degree of urbanicity. Age-adjusted analyses of main effects for race revealed that African Americans were slightly more likely than whites to have met screening guidelines for cervical cancer [Odds Ratios (OR), 95%CI: 1.13 (1.06,1.21)] and breast cancer [OR, 95%CI: 1.14 (1.06,1.24)] but less likely for colorectal cancer [OR, 95%CI: 0.91 (0.87,0.96)]. Significant interaction ($p<0.01$) between race and RUCC categories showed that screening for colorectal cancer was especially low for African American residents of non-metropolitan counties that are not adjacent to metropolitan areas (OR=0.45 and 0.41 for residents of the two RUCC non-metropolitan/ non-adjacent categories of counties). A similar but less pronounced pattern of findings was observed for mammography but not for Pap tests in African American women, suggesting that disparities may persist when considering the more resource-intensive screening modalities in relatively isolated geographic areas. Ongoing analyses will examine additional individual and county-level characteristics which may account for the variation in frequency of recommended screening.

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RISING INEQUALITY IN MORTALITY AMONG WORKING-AGE MEN AND WOMEN DURING AND AFTER THE ECONOMIC RECESSION IN THE EARLY 1990S IN SWEDEN: A NATIONAL REGISTRY-BASED REPEATED COHORT STUDY. Naoki Kondo*, Mikael Rostila, Monica Åberg-Yngwe (The University of Tokyo School of Public Health, Bunkyo-ku Japan)

Background To evaluate the trends in income-based inequality in mortality rates in the early 1990s in Sweden, when the country experienced a severe economic recession. After the recession, major macroeconomic structural reforms and cuts in the social welfare budget took place, which may have had longer-term consequences. **Methods** We conducted a national registry-based repeated cohort study with three years of follow-ups, 1990–2007, gathering information on mortality from all causes for all working-age Swedish men and women aged between 30 and 64 years. Then we conducted temporal trend analysis using Poisson regression with generalized estimating equations to statistically confirm the trajectories observed. **Results** Among men, we found that the rate reduced by 29.5% in the highest income quintile but the reduction was only 6.6% among the poorest. Among women, the mortality reduced by 34.8% in the richest, but increased by 22.6% among the poorest. The slope index of inequality (SII, interpreted as the mortality rate difference (per 100 000 population) of the poorest quintile against the richest, adjusted for age and marital status) slightly decreased among men between 1990 and 1994, from 615.6 to 558.3. However, it then increased, reaching 615.9 in 2003. Among women, it continuously increased from 131.4 to 266.1 during the observation period, a steeper increase than for men. **Conclusion** We found the rise in income-based disparities in mortality not during but after the recession. Further studies exploring the political and other factors explaining this finding would be needed.

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MEASURING THE STORM: METHODS OF QUANTIFYING HURRICANE EXPOSURE IN THE PUBLIC HEALTH LITERATURE. Shannon Grabich*, Jennifer Horney, Charles Konrad (University of North Carolina at Chapel Hill, Chapel Hill, NC United States)

The health effects of natural disasters are increasing as coastal populations grow and disaster events increase severity. The United Nations defines disaster as "a serious disruption of the functioning of the community causing widespread loss". Generalized definitions make it difficult to objectively identify exposure. The current disaster literature employs two methods of assigning hurricane exposure: 1) the area within Federal Emergency Management Agency presidential disaster declaration and 2) the area within given distance of a specific storm track. Both methods may induce exposure misclassification when used to determine exposure to the impacts of a disaster such as hurricanes. We used an integrative GIS mapping of meteorological indicators of weather severity based on maximum wind speeds. To compare exposure methods, we conducted a retrospective ecological study investigating the association between hurricane exposure and fetal death rates in all 67 Florida counties. Fetal death rates across all Florida counties were examined during and after the time periods when four hurricanes made landfall during 2004. We used ArcMap 10.1 to generate exposure maps for each of the 4 hurricanes and conducted analysis in SAS 9.2. Exposure maps of the three methods show different spatial patterns. Preliminary analysis of exposure and fetal death were non-significant across all exposure methods and hurricanes. However, estimates were inconsistent across method, varying from positive to negative rates. For example, in preliminary analysis, rate differences for Hurricane Charlie ranged from -0.90 to 1.30 across exposure methods. The use of meteorological indicators of hurricane exposure may create a more specific, objective, and replicable measure of hurricane exposure. While the methods varied significantly by exposure, our preliminary analysis was inconsistent in estimating estimates of fetal death rates.

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POPULATION ATTRIBUTABLE FRACTION FOR HEALTH RISK DUE TO AMBIENT PARTICULATE MATTER IN REPUBLIC OF KOREA. Hye Ah Lee, Won Kyung Lee*, Dohee Lim, Sun Jung Baik, Kyoung Ae Kong, Kyunghee Jung-Choi, Hyesook Park (Inha University School of Medicine, Incheon Korea)

Growing body of evidence shows that possible unfavorable effect of particulate matters (PM) on health outcomes. Here, we estimate the population attributable fraction (PAF) for all-cause mortality, respiratory disease, cardiopulmonary disease, and lung cancer due to PM based on latest exposure data. For the exposure indicator, PM10 (smaller than 10μm in diameter) was used. It was measured 251 monitoring stations and presented in the Annual Report of Ambient Air Quality in Korea. Using regionally stratified PM10 data, the PAF was calculated as the World Health Organization (WHO) concept. The annual average outdoor PM10 concentration is 50 μg/m³ (range: 26-89 μg/m³). PAF was 2.7% for all-cause mortality, 5.7% for respiratory disease, 15.7% for cardiopulmonary disease, and 22.5% for lung cancer, respectively. It was approximately two times higher than 2004 WHO global burden of disease report. Although the concentration of PM10 has been decreased recently, it was still higher than WHO air quality guideline recommended maximum value of 20 μg/m³. Therefore, the efforts are needed to reduce burden of health problem caused environmental risk with air pollution reduction. Acknowledgements: "This study was supported by a grant of the Korean Health Technology R&D Project, Ministry of Health & Welfare, Republic of Korea (HI13C0729)."

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SEASONAL VARIATION OF PERIPHERAL BLOOD LEUKOCYTE TELOMERE LENGTH IN COSTA RICA: A POPULATION BASED OBSERVATIONAL STUDY. David Rehkopf*, William Dow, Luis Rosero-Bixby, Jue Lin, Elissa Epel, Elizabeth Blackburn (Stanford University, Stanford, CA United States)

Objectives: Peripheral blood leukocyte telomere length is increasingly being used as a biomarker of aging, but its natural variation in human populations is not well understood. Several other biomarkers show seasonal variation, as do several determinants of leukocyte telomere length. We examined whether there was monthly variation in leukocyte telomere length in Costa Rica, a country with strong seasonal differences in precipitation and infection. **Methods**: We examined a longitudinal population based cohort of 581 Costa Rican adults age 60 and above, from which blood samples were drawn between October 2006 and July 2008. Leukocyte telomere length was assayed from these samples using the quantitative PCR method. Multivariate regression models were used to examine correlations between month of blood draw and leukocyte telomere length. **Results**: Telomere length from peripheral blood leukocytes varied by as much as 200 base pairs depending on month of blood draw, and this difference is not likely to be due to random variation. A moderate proportion of this association is statistically accounted for by month and region specific average rainfall. We found shorter telomere length associated with greater rainfall. **Conclusion**s: There are two possible explanations of our findings. First, there could be relatively rapid month-to-month changes in leukocyte telomere length. This conclusion would have implications for understanding the natural population dynamics of telomere length. Second, there could be seasonal differences in constituent cell populations. This conclusion would suggest that future studies of leukocyte telomere length use methods to account for the potential impact of constituent cell type.

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ASSOCIATION OF URINARY BISPHENOL A CONCENTRATION WITH OXIDATIVE STRESS AND INFLAMMATORY MARKERS: NHANES 2003-2010. Juhua Luo*, Michael Hendryx (Indiana University, Bloomington, IN United States)

Background: Human exposure to Bisphenol A (BPA) has recently received special attention, because of widespread exposure among humans and its reported endocrine-disruptor activity. There are significant concerns that exposure to BPA could increase risk of a variety of poor health outcomes, including miscarriage, polycystic ovarian syndrome, diabetes, and cancer. However, the mechanisms by which BPA is associated with these health effects is not clear. Experimental studies have shown that oxidative stress and inflammation may be involved. However, few studies have examined these relationships in humans. **Methods**: We analyzed 6353 participants aged 18 and older with measurements from 2003-2010 of the National Health and Nutrition Examination Survey (NHANES) to investigate the relationships between urinary creatinine-adjusted BPA concentration and potential blood markers of oxidative stress (bilirubin – a potent antioxidant, gamma glutamyltransferase (GGT) – a marker of oxidative stress), inflammation (C-reactive protein (CRP), alkaline phosphatase (ALP)), and a biomarker of tissue damage (lactate dehydrogenase, LDH). BPA and all blood biomarker measures were ln-transformed for analysis. Multivariable linear regression models were conducted and adjusted for age, sex, race/ethnicity, BMI and smoking. The complex and multistage study design of NHANES data were accounted for using methods described in detail on the NHANES website. **Results**: Compared with the lowest quartile of urinary BPA, the highest quartile of urinary BPA concentration had significantly lower bilirubin (p for linear trend =0.07); had significantly higher ALP (p for linear trend=0.04) and significantly higher LDH (p for linear trend=0.008). No significant associations were noted between BPA and CRP and GGT. Further analyses stratified by sex revealed that findings in males were similar to the overall samples. In females, we observed that BPA was positively associated only with ALP. **Conclusion**: Exposure to a low dose of BPA in the general population may be associated with increased oxidative stress and increased inflammation, especially among males.

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AIR POLLUTION AND HIGH DENSITY LIPOPROTEINS IN THE MULTI ETHNIC STUDY OF ATHEROSCLEROSIS (MESA). Griffith Bell*, Samia Mora, Edward Gill, Phillip Greenland, Michael Ysai, Andrea Vitello, Joel Kaufman (University of Washington, Seattle, WA United States)

High-density Lipoprotein Cholesterol (HDL-C), a fraction of total cholesterol, is typically considered anti-atherogenic and anti-inflammatory. HDL is a heterogeneous lipoprotein, and exists in varying subfractions; HDL particle concentration (HDL-P) may explain its protective affects better. Studies suggest air pollution may reduce the atheroprotective functions of HDL-C. We examined whether measures of traffic-related air pollution were associated with decreased serum levels of HDL-C and HDL-P in the Multi-Ethnic Study of Atherosclerosis in a cross-sectional analysis. Study participants were 6,667 white, African-American, Hispanic, and Chinese men and women, 45–84 years of age, recruited from six communities (Baltimore; Chicago; Forsyth County, NC; Los Angeles; New York; and St. Paul). We estimated individual residential ambient fine particulate pollution exposure (PM2.5) concentrations using a fine-scale likelihood-based spatiotemporal model and cohort-specific monitoring. Exposure periods were averaged to 12 months, 3 months, and one month prior to exam. HDL-C and HDL-P were measured with the cholesterol oxidase method and nuclear magnetic resonance spectroscopy, respectively. We used linear regression to examine the cross-sectional relationship between air pollution exposure and HDL. In the three month averaging time period, a 5 μg/m3 higher PM2.5 was associated with lower HDL-P (-0.60 μmol/L (95% CI: -1.00, -0.20), but not HDL-C (-0.48 mg/dL (95% CI: -1.29, 0.33) in models fully adjusted for cardiovascular risk factors, site, and season. Neither diabetes nor use of lipid-lowering drugs modified the association between air pollution and HDL-P. Exposure to higher levels of PM2.5 over a three-month period was associated with reduced HDL-P in a multi-ethnic cohort.

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PAST USE OF COAL FOR COOKING IS ASSOCIATED WITH ALL-CAUSE MORTALITY IN THE PROSPECTIVE SHANGHAI WOMEN'S HEALTH STUDY. Christopher Kim*, Xiao-ou Shu, H Dean Hosgood, Bryan Bassig, Wei Jie Seow, Wei Hu, Yongbin Xiang, Bu-Tian Ji, Wei Zheng, Wong-Ho Chow, Yutang Gao, Nathaniel Rothman, Qing Lan (National Cancer Institute, Bethesda, MD United States)

Introduction: Indoor air pollution (IAP), mostly from coal burning, was responsible for approximately 3.5 million deaths from all-causes and over 100,000 disability-adjusted life years in 2010. The majority of studies conducted in the past have been retrospective, in rural and under developed populations with recent and high levels of exposure. We assessed the association between historic kitchen coal use and various causes of mortality in the prospective Shanghai Women's Health Study cohort. **Methods**: A cohort of 73,363 women was followed through December 2009 with a combination of in-person surveys every 2-3 years and annual linkage to a vital statistics registry database where all causes of mortality was recorded. A total of 3808 deaths were identified during the follow-up period. Cox proportional hazards models were used to estimate risk of mortality associated with in-home coal use. Models were adjusted for smoking status, family income, environmental tobacco smoke, occupational history, shift work, BMI, hormone therapy, and parity. **Results**: All-cause mortality was elevated 13% among ever coal users (Hazard Ratio (HR): 1.13; 95% CI: 1.04-1.23) compared to never-coal users. Coal use was most strongly associated with all-cause mortality among women who had more than 15 years of coal use (15-30 years: HR: 1.14; 95% CI: 1.02-1.26; >30 years: HR: 1.15; 95% CI: 1.04-1.26). Women with 15-30 years of coal use had a 21% elevation of cancer mortality (95% CI: 1.04-1.42), but no elevation was observed in women with >30 years of coal use (HR: 1.06; 95% CI: 0.91-1.24) compared to never-coal users. More than 30 years of coal use was associated with a 32% elevated risk of cardiovascular mortality (HR: 1.32; 95% CI: 1.11-1.57), and 62% elevated risk of myocardial infarction mortality (HR: 1.62; 95% CI: 1.01-2.63) compared to never-coal users. All-cause mortality was elevated in women who last lived in a coal burning home up to 20 years ago (>0-10 years: HR: 1.16; 95% CI: 1.04-1.28; >10-20 years: HR: 1.21; 95% CI: 1.09-1.35). **Discussion**: This is the first study of mortality and in-home coal use in a prospective study after much of Shanghai transitioned into a developed and urban city. Evidence from this study suggests that previous coal use could be related to excess cardiovascular and cancer deaths among women in Shanghai.

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THE INFLUENCE OF METEOROLOGICAL VARIABLES ON THE PRESENTATION OF VENOUS THROMBOEMBOLISM: A CASE CROSS-OVER STUDY. Nira Hadar*, Robert Goldberg, Frederick Spencer, David Kent, Issa Dahabreh, Doug Brugge (Tufts University/Brown University, Boston, MA United States)

Objectives: Venous thromboembolism (VTE), consisting of deep vein thrombosis (DVT) and pulmonary embolism (PE), is the third most common acute vascular disorder in the United States (US). Evidence about the influence of non-traditional risk factors, such as meteorological variables, on the risk of VTE presentation (provoked or unprovoked) remains inconclusive. **Methods**: Data from the Worcester Venous Thromboembolism Study was analyzed. A time-stratified case-crossover design approach was employed, to examine the association between several climatic variables and VTE events in a central New England population using the case-crossover design. We also examined possible effect modification of the weather-VTE association by traditional VTE risk factors and patient co-morbidities. **Results**: A decrease in daily mean temperature at 14 day moving average was associated with a 1% increase risk of VTE presentation (OR 0.986, 95% CI 0.974 – 0.997). When stratifying patients by various risk factors those with PE have experienced increased risk for decreased temperature compared with patients with DVT. Decreased temperature increased VTE presentation for people with no known risk factors (unprovoked) versus provoked VTE. **Conclusion**s: In summary, decreased in mean daily temperature over 14 days before the event occurred increase the risk for VTE presentation with confirmed diagnosis shortly after admission. Effect modification by event type and provoked status was also observed with in the same time period of 2 weeks. Our findings need independent confirmation or refutation, but, if confirmed, there may be a role for meteorological variables and especially temperature in some patients with these diseases.

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ASSOCIATION BETWEEN POPS (PERSISTENT ORGANIC POLLUTANTS) EXPOSURE IN CHILDREN AND RISKS OF DIABETES. Su Hyun Park, Hye Ah Lee, Young Sun Hong, Sun Ha Ji, Hye Sook Park* (Ewha Womans University, Seoul Korea)

Diabetes Mellitus is a disease that causes concern all over the world; it is considered to be one of the main diseases that is associated with preventable death. According to Statistics Korea, Diabetes became the fifth-leading cause of death in Korea. Many studies have shown a relationship between child obesity and increased health risks including the risk of developing type II diabetes. Also, recent studies presented that even low level of POPs exposure may increase the risk of diabetes in adults. However, there is little evidence about the relationship between children's exposure to POPs and its effect. This study aims to provide the relationship of serum concentration of POPs and predictors for identifying T2D and obesity in children. We analyzed a total number of 52 persistent organic pollutants among 130 children aged 7 to 8, using the Ewha Birth & Growth Cohort Study. As the predictors for both obesity and T2D, BMI, WHR, WC, HOMA-IR, insulin and fasting glucose level were collected. We included a total of 26 POPs: 6 organochlorine pesticides (OCPs) and 20 polychlorinated biphenyl (PCBs) to analyze, and if the serum concentration from laboratory results was below the limit of detection (LOD), we used half of the LODs (LOD/2) instead. Spearman's rank correlation coefficient was used to examine the relationships between the predictors for obesity and T2D. Analysis of variance (ANOVA) was also performed to compare the mean values. Exposure to POPs was higher in girls than in boys. The results presented that most OCPs and PCBs presented an inverted U-shaped association with predictors for obesity and T2D. The mean values of WHR in the second tertile of the sum of PCBs in male children and female children; 0.86 and 0.83 were higher than the mean values of the first and third tertile in male; 0.82, 0.81, and female; 0.79, 0.80. The key limitation of this study was that the sample size was too small, so it was difficult to find a significant relationship POPs exposure and T2D from the data. Even though this finding is not fully able to explain the relationship between POPs exposure and the risk of diabetes in children, this study provides some evidence that children are exposed to POPs, and the certain levels of early exposure may relate to developing the risk of diabetes in the future. This research was supported by a grant (13162KFDA891) from Korea Food & Drug Administration in 2013.

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ASSOCIATION OF POLYCYCLIC AROMATIC HYDROCARBONS WITH GLUCOSE HOMEOSTASIS, METABOLIC SYNDROME, AND DIABETES IN USA ADULTS. Hui Hu*, Haidong Kan, Gregory Kearney, Xiaohui Xu* (Department of Epidemiology, College of Public Health and Health Professional and College of Medicine, University of Florida, Gainesville, FL United States)

Background: Increased risks of diabetes mellitus (DM) have been consistently linked to cigarette smoking, red meat consumption, and air pollution, which are also the main exposure sources of polycyclic aromatic hydrocarbons (PAHs). However, the nongenotoxic effects of PAHs such as their effects on blood glucose, metabolic homeostasis, and DM have not been well studied. **Methods**: We used the National Health and Nutritional Examination Survey (NHANES) 2001-2008 to investigate the associations among eight monohydroxy urinary metabolites of four PAHs, glucose homeostasis, and metabolic syndrome in 1878 non-diabetic participants aged 18 years or older, and the NHANSE 2005-2008 to examine the associations between PAHs and prevalence of DM in 1,188 participants aged 18 years or older. **Results**: In linear regression models, increased level of 2-PHEN was significantly associated with increased insulin resistance (β coefficient 0.05±0.02), and increased concentrations of 3-FLUO (β coefficient -0.02±0.01) were significantly associated with decreased β-cell function (all $p<0.05$). In logistic models, increased concentrations of 2-FLUO [Odds Ratio (OR)=1.25, 95% Confidence Interval (CI): 1.04-1.51], 1-PHEN (OR=1.36, 95%CI: 1.09-1.70), and 2-PHEN (OR: 1.49, 95%CI: 1.22-1.83) were significantly associated with a higher prevalence of the metabolic syndrome. In the analyses of DM, elevated concentrations of 2-NAP (OR: 1.46, 95%CI: 1.12-1.91), 2-FLUO (OR: 1.26, 95%CI: 1.01-1.58), 1-PHEN (OR: 1.47, 95%CI: 1.04-2.09), and 2-PHEN (OR: 1.55, 95%CI: 1.13-2.11) were significantly associated with the increased prevalence of DM. Consistent results were observed in a subgroup analysis among nonsmokers. **Conclusion**: Our findings suggest that environmental exposure to PAHs independent of cigarette smoking may contribute to insulin resistance and β-cell dysfunction, and subsequently increase the risk of DM and metabolic syndrome.

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DEVELOPMENTAL TRAJECTORIES OF AMBIENT OZONE CONCENTRATION AND LIFE EXPECTANCY IN CONTIGUOUS U.S. COUNTIES, 2002-2008. Chaoyang Li*, Lina Balluz, Ambarish Vaidyanathan, Xiao-Jun Wen, Yongping Hao, Judith Qualters (Centers for Disease Control and Prevention, Atlanta, GA United States)

Long-term exposure to ambient ozone is associated with increased risk of morbidity and mortality in children and adults. The association between long-term exposure to ozone and life expectancy remains uncertain. We assessed the direct association between warm season average of daily 8-hour maximum (8-h max) ozone concentration and life expectancy at birth in 3,109 contiguous U.S. counties between 2002 and 2008. County level population-weighted warm season average of daily 8-h max ozone concentrations and annual average of 24-hour mean fine particulate matter (PM2.5) concentrations were generated from the Downscaler space-time Bayesian model. Life expectancy data at county level were obtained based on the mixed effects Poisson regression models. We used latent class growth analysis to identify classes of counties with distinct developmental trajectories in ozone concentration over the seven-year period. Three classes of county units with distinct warm season average of daily 8-h max ozone concentration and rate of change over time were identified. The class of counties with the persistently highest ozone concentration had about 1.7-year and 1.4-year lower average life expectancy in males and females, respectively, when compared with the class of counties with the lowest ozone concentration (both P <0.0001). The associations remain statistically significant after controlling for potential confounding effects of annual average PM2.5 concentrations and other 15 selected demographic characteristics, economic indicators, and health risk factors (both P <0.0001). Increase in every 5 ppb of average ambient level ozone concentrations was associated with a reduction about 0.2 year of life expectancy among both males and females (both P <0.0001). In sum, persistently elevated ambient-level ozone concentrations were associated with reduced life expectancy in both males and females in contiguous U.S. counties.

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PERSISTENT ORGANOCHLORINE POLLUTANTS (POPS) AND THYROID DISEASE (TD) IN ANNISTON, ALABAMA. Christina Lupone*, Allen Silverstone, PhD, Roberto Izquierdo, MD, Nina Dutton, Marian Pavuk, MD PhD, Paula Rosenbaum, PhD (State University of New York Upstate Medical University, Syracuse, NY United States)

Recent literature has suggested that POPs alter thyroid function. A cross-sectional study was conducted in 2005-2007 to study the health effects of POP exposure in a stratified random sample of Anniston, AL residents. Data was collected using the Anniston Community Health Survey (n=1110); serum PCBs, 9 herbicide and pesticides, and thyroid hormone levels were obtained for 774 respondents who also attended a clinic visit. Frequencies, arithmetic and geometric means and OR (95% CI) from logistic regression were used to assess associations between POPs and TD. Respondents were 70% female, 54% white with a mean (SD) age of 54.8 (15.9) years. Excluding unconfirmed self reports (n=24), 16% (n=172) of participants had hypothyroid disease (HTD) and <1% (n=4) had hyperthyroidism; TD definitions were based on thyroid medication usage and lab values of hormones in those not taking medication. The majority of participants with HTD were older, white females. Serum PCB levels were not associated with TD in this study but participants who reported PCB exposure at work were less likely to have HTD (Unadjusted (U) OR=0.6, 95% CI 0.4-0.9). Higher mean levels of beta-hexachlorocyclohexane, oxychlordane, and trans-nonachlor were observed in farmers and in those with HTD. Participants reporting employment in farming had a higher risk of HTD compared to those not in farming (UOR = 1.4 95% CI 1.0-2.0). Unadjusted logistic regression modeling revealed an increasing risk of HTD with increasing POP quintile, however all associations diminished after adjustment for race, age, and sex. PF Rosenbaum for the Anniston Environmental Health Research Consortium. Funded by ATSDR U50/ ATU473215.

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INTERACTION BETWEEN CYP2E1 GENE POLYMORPHISMS AND EXPOSURE TO DRINKING WATER CHLORINATION BY-PRODUCTS: EFFECT ON SMALL-FOR-GESTATIONAL-AGE OCCURRENCE. Patrick Levallois*, Molière Nguilé-Makao, Nathalie Bernard, Céline Campagna, Manuel Rodriguez, Robert Tardif, Yves Giguère, Alexandre Bureau (Université Laval, Québec Canada)

Background: CYP2E1 gene encodes major cytochrome P-450 isoenzymes that catalyze reactions involved in metabolism of xenobiotics. CYP2E1 polymorphisms could modify disinfection by-products toxicity. We evaluated whether 12 selected single nucleotide polymorphisms (SNPs) of the CYP2E1 gene modify the relationship between Small-for-Gestational age (SGA) and trihalomethanes (THMs) exposure during pregnancy. **Methods**: 292 cases were compared to 1150 controls from the same geographical area: Cases were term single Caucasian neonates with birth weight <10th percentile of the age- and sex-specific Canadian birth weight distribution, while controls (birth weight ≥10th percentile) were Caucasian births from the same calendar week. Exposure of mothers during the last trimester of pregnancy was based on intensive monitoring of THMs in the drinking water distribution systems serving residences and a phone questionnaire delivered to mothers two months after birth. DNA samples of infants and mothers were extracted from either blood or saliva samples. SNPs were genotyped with a multiplexed PCR reaction (MassARRAY SNP Multiplex Sequenom). Odds Ratio (OR) was estimated by a non-conditional multiple logistic regression on infant and mother genotype. **Results**: For total THMs (the sum of 4 trihalomethanes) >58µg/L, the adjusted OR compared to lower exposure was estimated at 4.1 (95%CI: 1.2-13.7) for children with 1 or 2 variant alleles of CYP2E1 rs117618383 polymorphism and 1.1 (95%CI:0.8-1.5) for the wild type group (p value for interaction=0.04). Significant interactions were also found for other CYP2E1 SNPs uncorrelated to rs117618383 but with lower ORs. No improvement of the association was found when considering multiroute exposure assessment. **Conclusion**: Neonates with CYP2E1 variant alleles, and in particular for rs117618383, seem more susceptible to THMs effect on SGA phenotype.

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HAIR MERCURY AND SEMEN PARAMETERS AMONG MEN ATTENDING A FERTILITY CLINIC. Myriam Afeiche*, Audrey Gaskins, Paige Williams, John Petrozza, Diane Wright, Cigdem Tanrikut, Russ Hauser, Jorge Chavarro (Department of Nutrition, Harvard School of Public Health, Boston, MA United States)

Introduction We have previously reported that fish intake is related to higher total sperm count and sperm morphology. However, fish is a source of methyl-mercury, a reproductive toxicant. In this study, we examined whether hair mercury was associated with semen parameters. **Methods** A total of 126 men (227 semen samples) participating in a cohort study at the Massachusetts General Hospital Fertility Center were included in this analysis. Total hair mercury was measured in the proximal 3 cm of hair using a Direct Mercury Analyzer 80 (Milestone Inc, Monroe, CT). Median (interquartile range (IQR)) time between hair sample and semen sample was -13days (-44,4).We used linear mixed regression models to examine the relation between hair mercury and semen parameters (total sperm count, sperm concentration, progressive motility, morphology, and semen volume) while adjusting for age, body mass index, smoking status, abstinence interval, race, calorie, and alcohol intake. **Results**: Men had a median (IQR) hair mercury of 0.70 ppm (0.37, 1.26) and age of 36.4 years (33.0, 39.2). The adjusted (95%CI) sperm concentration was 42.0 $x10^6$ sperm/mL (30.0, 59.0) among men in the lowest quartile of hair mercury (0.03-0.34ppm), and 56.9 $x10^6$ sperm/mL (42.7, 75.9) among men in the highest quartile of hair mercury (1.26-8.00ppm) (p,trend=0.23). Men whose hair mercury was above the Environmental Protection Agency safety limit of 1ppm (36%) had 27.3% (1.5, 46.3%) higher total sperm count than men below the safety limit. **Conclusion**s: Higher hair mercury was associated with higher total sperm count among men presenting to a fertility clinic.

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ROLE OF METABOLIC GENES IN BLOOD CONCENTRATIONS OF ARSENIC IN JAMAICAN CHILDREN WITH AND WITHOUT AUTISM SPECTRUM DISORDERS. Mohammad Rahbar*, Maureen Samms-Vaughan, Jianzhong Ma, Jan Bressler, Katherine A. Loveland, Manouchehr Ardjomand-Hessabi, Aisha S. Dickerson, Megan L. Grove, Sydonnie Shakespeare-Pellington, Compton Beecher, Wayne McLaughlin, Eric Boerwinkle (The University of Texas Health Science Center at Houston, Houston, TX United States)

Arsenic is a toxic metal with known adverse effects on cognitive function. Glutathione-S-transferase (GST) genes play a major role in detoxification and metabolism of arsenic, and polymorphisms in several members of this gene family including GSTT1, GSTP1, and GSTM1 have been associated with variation in the capacity of the encoded enzymes to catalyze chemical reactions involved in this process. In this study we investigate whether Autism Spectrum Disorders (ASD) status serves as an effect modifier of the association between sequence variation in the aforementioned GST genes and blood arsenic concentrations. We used data from 100 ASD cases and 100 age- and sex-matched typically developing (TD) children 2-8 years of age from Jamaica. Using log-transformed blood arsenic concentrations as the dependent variable in a General Linear Model, we observed a significant interaction between GSTP1 and ASD case status after controlling for several confounding variables including source of drinking water, the age of the mother at the child's birth, parental education level, socioeconomic status, and consumption of fruits and vegetables. Our findings from multivariable analysis indicate that the TD children who had either the Ile/Ile or Ile/Val genotype for the GSTP1 Ile105Val polymorphism had significantly higher blood arsenic concentrations than those with the Val/Val genotype ($p<0.006$). However, this difference was not statistically significant among the ASD cases ($p>0.3$). Specifically, for the TD group we observed an adjusted geometric mean difference of 1.36µg/L between children with the GSTP1 Val/Val genotype and those with other genotypes. Our findings indicate a significant effect modification by ASD status when assessing the association between GSTP1 and blood arsenic concentrations among Jamaican children. The lack of a similar association for the ASD group requires further investigation.

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A DESCRIPTION OF THE HEPATITIS B VIRUS GENOMIC BACKGROUND IN A HIGH-PREVALENCE AREA IN CHINA. ZJ Shao* (Fourth Military Medical University, Xi'an China)

In this study, 320 complete hepatitis B virus (HBV) genome sequences were isolated from HBV asymptomatic carriers in major cities of Northwest China, including Lanzhou, Wuwei, Xian, Xining, Urumqi and Yinchuan. All the sequences were aligned with ClustalW, and a phylogenetic tree was constructed for genotypes. In addition, genotype consensus sequences were determined using the Mutation Master Server online and compared. Furthermore, all the sequences were screened for clinically relevant mutations reported in previous studies. The 320 HBV sequences clustered into genotypes B, C and D. Through the comparison of genotype consensus sequences, 158 genotype-dependent positions were observed in P, S and X ORFs. In clinically relevant mutation screening, no HBV antiviral drug resistance mutations were observed. The vaccine escape mutation G145R was heavily underrepresented in prevalence. The ntG1896A mutation in the preC region was common, but its prevalence was lower than previously reported in chronic hepatitis B patients. The V5M/L mutation in the x region and K130M/V131I in the basal core promoter region were related to HCC, and aggressive liver diseases were frequently observed.

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TOXOPLASMA GONDII AND ANXIETY DISORDERS IN A POPULATION-BASED SAMPLE. Adam Markovitz*, Amanda Simanek, Robert Yolken, Sandro Galea, Karestan Koenen, Shu Chen, Allison Aiello (Department of Epidemiology, School of Public Health, University of Michigan, Ann Arbor, MI United States)

A growing body of literature suggests that exposure to the neurotropic parasite *Toxoplasma gondii* (*T. gondii*) is associated with increased risk of mental disorders. While *T. gondii* infection has been linked to schizophrenia, a potential association between this exposure and anxiety and mood disorders has not been rigorously explored. Here, we examine the association of *T. gondii* infection with both anxiety and mood disorders. Participants (n=484) were drawn from wave 1 (2008-2009) of the Detroit Neighborhood Health Study, a population-representative probability sample of adult residents in Detroit, and included those who had completed a baseline telephone survey and provided biospecimens. We assessed *T. gondii* exposure by seropositivity, serointensity, and categorical antibody level measures. We concurrently measured past-year generalized anxiety disorder (GAD), posttraumatic stress disorder (PTSD), and depression with the seven-item generalized anxiety disorder scale, PTSD checklist, and Patient Health Questionnaire, respectively. We found that *T. gondii* seropositivity and, to a greater extent, high *T. gondii* antibody level, were significantly associated with GAD but not PTSD or depression. After fully adjusting for age, gender, race, income, marital status, and medication use, *T. gondii* seropositivity was associated with a 2 times higher odds of GAD (OR, 2.17; 95% CI, 1.10 - 4.28), while individuals in the highest antibody level category had more than 3 times higher odds of GAD (OR, 3.35; 95% CI, 1.41 - 7.97) as compared to seronegative subjects. In contrast, neither *T. gondii* seropositivity nor serointensity was significantly associated with PTSD or depression. Our findings indicate that *T. gondii* infection is strongly and specifically associated with GAD. While prospective confirmation is needed, *T. gondii* infection may play a role in the development of GAD in the population.

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COMPLEX SYSTEMS MODELING OF HEALTHCARE-ASSOCIATED INFECTIONS. Eric Lofgren*, Jose Jimenez, Bryan Lewis, Stephen Eubank (Virginia Bioinformatics Institute, Blacksburg, VA United States)

Healthcare-associated infections (HAIs) are an important source of morbidity and mortality, and represent a financial burden on the healthcare system. Many of these infections are avoidable and difficult to treat, fostering interest in interventions focused on prevention. Observational studies of HAIs are complicated by the setting in which they take place – healthcare facilities. The primary purpose of these facilities is patient care, rather than research. Additionally, a patient's risk of infection is a complex blend of their contact with other patients, staff, visitors and the environment. Further complicating the evaluation of interventions is that they are rarely implemented single, but rather introduced as a combined bundle. Computational simulation models can alleviate some of these problems, allowing for empirical, repeatable research to be conducted in a simulated environment. We have developed an agent-based model of a hospital, modeling interactions between patients, staff and the environment to study the transmission of Clostridium difficile. Contacts between individuals in the model are built from empirically obtained activity schedules. Using this model, we explore the potential of a number of interventions targeting hospital environmental contamination to reduce the burden of disease, including novel disinfection techniques such as the use of UV light or contamination-resistant surfaces. The results of this research are analyzed as a virtual cohort study, providing estimates that can be put into context with the existing empirical literature. We find that intensive surface decontamination can positively impact in-hospital transmission rates, especially in settings where hand hygiene compliance and other basic infection control measures have not reduced transmission to acceptable levels.

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UNDERSTANDING THE TEST-NEGATIVE STUDY DESIGN USING CAUSAL DIAGRAMS. Sheena Sullivan*, Guy Freeman, Ben Cowling (WHO Collaborating Centre for Reference and Research on Influenza, North Melbourne Australia)

Influenza viruses undergo frequent antigenic changes. As a result, the viruses circulating change within and between seasons and the composition of the influenza vaccine is updated annually. Thus, the vaccine's effectiveness is not constant across seasons. In order to provide annual estimates of the influenza vaccine's effectiveness, health departments have increasingly adopted the 'case test-negative' design using enhanced surveillance systems data. In this design, patients presenting to participating general practitioners with influenza-like illness are swabbed for influenza testing: those who test positive are the cases and those who test negative are the noncases. Patients' vaccination history, age, gender and influenza risk profile are also collected. Vaccine effectiveness is estimated from the odds ratio comparing the odds of influenza among vaccinated versus unvaccinated patients. The test-negative design is purported to reduce bias associated with confounding by indication and misclassification of noncases. In this paper, we will use causal graphs to represent studies using the test-negative design. We will show how they avoid bias and where bias may be introduced with common study design variations.

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UTILITY OF SOCIAL MEDIA SURVEILLANCE FOR DRUG SAFETY AND SIGNAL DETECTION PURPOSES. Brian Dreyfus*, Jaidev Dasgupta, Andres Gomez-Caminero (Bristol-Myers Squibb, Wallingford United States)

Access to safety data in the real world is accompanied by delays of months to years. The availability of real time data from social media may be able to provide more timely safety information. Review and communication of these data would allow for an informed public with regards to the benefit risk profile of the medications they receive. This study was conducted to evaluate the usefulness of social media for signal detection purposes. The drug-event pairs, telaprevir (TLP) with fatal skin reactions and boceprevir (BCP) with hypersensitivity were selected. The labels (USPI) of TLP and BCP were updated for these events in December and November of 2012, respectively. Posts were captured from Facebook (FB), Twitter (TW), chat forums and blogs (CF) from May 2012 through July 2013. Posts were filtered by the Medical Dictionary for Regulatory authorities (MedDRA) ontology or a custom algorithm. The data were analyzed based on the number of posts per time period, proportional reporting ratio (PRR), and content. 2775 CF, 1192 TW, and 43 FB posts for TLP were included. BCP had 968, 724 and 30 posts respectively. In the quarters (Qtr) before the USPI change for TLP there were 58 and 60 posts for skin type events. 188 were in the Qtr of the change with 76% occurring concurrently or following the USPI update. For BCP, there were 29, 34, 41, 34 and 22 posts per Qtr for hypersensitivity with no increase preceding the USPI update. Most posts were not medically meaningful; primarily with TW and FB. The PRR demonstrated the ability to differentiate between products with regards to specific events. The two drugs evaluated with a short observation time did not predict USPI changes but did provide useful insight on a patient's experience with treatment. However many of the social media posts were not relevant for drug safety purposes. A larger study is in progress to establish if social media can identify safety signals.

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ROLE OF CASUAL CONTACTS IN THE RECENT TRANSMISSION OF TUBERCULOSIS. Weibing Wang*, Biao Xu, Yi Hu, Qi Zhao (Fudan University, Shanghai China)

Background: Tuberculosis (TB) remains a major cause of morbidity and mortality worldwide. In various settings, a substantial proportion of household contacts were infected with a different strain than the index case. **Objectives**: To understand the transmission of TB in rural China by examining circulating M. tuberculosis strains and to determine risk factors associated with recent transmission. **Methods**: We performed a population-based molecular epidemiologic study in 6 sites in China between 1 June 2009 and 31 December 2010. Subjects were interviewed at the time of TB diagnosis at the county TB dispensaries (CTDs) by physicians. M. tuberculosis genomic DNA was genotyped using a high-resolution 7-loci variable number of tandem repeat (7-VNTR) method. The isolates with identical 7-VNTR genotypes were further performed with IS6110-based restriction fragment length polymorphisms (RFLP) analysis. In order to estimate the extent of recent transmission of tuberculosis, we calculated the widely used index RTIn-1. **Results**: After bacterial culture and strain identification, a total of 1,222 DNA fingerprints were successfully obtained and included in analysis. The molecular clustering analysis combined 7 VNTR-based genotyping and IS6110-based RFLP revealed that 187 isolates (15.3%) shared the VNTR -IS6110 pattern were referred to the "cluster" category; the remaining 1,035 isolates (84.7%) exhibited the unique pattern and referred to the unique category/ isolates. Of the 258 drug-resistant Mtb isolates, a total of 233 VNTR-IS6110 RFLP genotype patterns were observed, with 21 clusters composed of 46 drug-resistant isolates (16.7%). The total RTIn-1 was estimated at 8.9%. After adjustment for age and sex, MDR remained significantly associated with clustering (OR: 2.16; 95%CI:1.18-3.95). Through face-to-face interview of epidemiological link for the rest 117 patients, none reported other members within the same cluster. Nineteen of 126 reported having a history of contact to a TB case within 2 years before the current TB diagnosis. An only possible epidemiological link was established in a deceased patient whose wife reported that the patient had worked in the same factory same as other patients within the cluster. **Conclusion**: The relatively low clustering proportion in this study indicate that remote reactivate of TB is the main concern in rural China after the DOTS strategy has been implemented in China. Our findings underscores the role of cause contact as a driving factor maintaining the current endemicity in China, and suggest the need of prevention strategies (i.e., isoniazid preventive therapy) to reduce the development of active TB in people with latent TB infection.

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COMMUNITY-BASED RESEARCH ON H.PYLORI INFECTION IN THE CANADIAN ARCTIC: FINDINGS SHOW A HIGH PREVALENCE OF SEVERE GASTRITIS. Emily V Hastings*, Safwat Girgis, Karen J Goodman (University of Alberta, Edmonton, AB Canada, Canada)

Residents of Arctic Aboriginal communities have a high prevalence of H.pylori infection. In response to community concerns about cancer risk from this infection, the CANHelp Working Group established community projects to investigate the disease burden and improve disease control strategies. We present preliminary analysis of the distribution and determinants of severe gastritis in Aklavik Northwest Territories and Old Crow Yukon, where community screening estimated H.pylori prevalence at 58% (n=332) and 68% (n=186) respectively. Participants underwent upper endoscopy with gastric biopsy in 2008 in Aklavik and 2011 in Old Crow. 5 biopsies per person were assessed for gastritis severity by a single pathologist using the Sydney classification. Data on potential risk factors came from structured interviews. ORs and 95% CIs for the effect of exposures of interest on severe gastritis among H.pylori-positive (HP+) participants were estimated by logistic regression. Of HP+ persons, <5% had mild gastritis, so gastritis severity was dichotomized as severe v. mild/moderate. The prevalence of severe gastritis was high (48% CI:41%,56%). As a potential risk factor of community interest, initial analysis focused on the effect of untreated river water consumption on severe gastritis prevalence. Among 160 HP+ persons with complete data the estimated OR for this effect was 1.8 (CI:0.86, 3.8) adjusting for age, ethnicity, education, alcohol, smoking, NSAID use and community. Given the potential for variation in water quality by community, this effect was also estimated by community (Aklavik 2.8,CI:1.1,7.2; Old Crow 0.85,CI:0.19,3.9). Our results show high frequencies of severe gastritis among HP+ individuals and a higher revalence of severe gastritis among participants who consume untreated river water in Aklavik. Further analysis will include data from other communities to estimate effects of additional dietary factors.

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USING ADMINISTRATIVE DATA TO AUGMENT AN ADVERSE EVENTS FOLLOWING IMMUNIZATION (AEFI) SURVEILLANCE SYSTEM FOLLOWING INTRODUCTION OF A NEW VACCINE. Shannon MacDonald*, Douglas Dover, Lawrence Svenson (University of Calgary Department of Pediatrics, Calgary Canada)

Detecting uncommon adverse events following immunization requires post-licensure surveillance at the population level. Typically, the public health system relies on passive surveillance to produce 'signals' indicating an increase in adverse events. Under-reporting is a concern for this passive system. To explore this issue, we compared (1) passive reporting of adverse events to the public health department to (2) events identified through linkage of multiple administrative health databases. We used the two systems to determine (1) the incidence of seizures following administration of Measles-Mumps-Rubella (MMR) and MMR-Varicella (MMRV) vaccines and (2) any increased risk resulting from replacement of MMR with MMRV in a regional immunization program. We identified seizures in a cohort of 12-23 month old children receiving their first dose of MMR or MMRV between 2006 and 2012. We determined seizure incidence in the 7-10 day peak post-vaccine period for MMR and MMRV and calculated the relative risk for MMRV versus MMR. For every 100,000 doses of MMR administered, 12.7 seizures were identified by public health as compared to 53.3 with administrative data. For MMRV, public health identified 27.9 seizures per 100,000 doses versus 129.3 with administrative data. The introduction of MMRV increased seizure incidence, resulting in relative risks of 2.2 (95% CI 1.27-3.82) and 2.4 (95% CI 1.87-3.15) from public health and administrative data, respectively. Thus, public health data underestimated seizure incidence compared to administrative data, but the relative risk when comparing the two vaccines was similar. Administrative data linkage had the ability to detect the increase much earlier (2 months of data) than public health data (>9 months). Our findings suggest that augmentation of public health surveillance with administrative health data would contribute to timely and accurate vaccine safety surveillance.

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IMPROVING RESPIRATORY SYNCYTIAL VIRUS SURVEILLANCE IN MONTANA. Joel Merriman*, Neil Squires, Stacey Anderson, Karl Milhon, Jim Murphy, Susanne Zanto (Montana Department of Public Health and Human Services, Helena, MT United States)

BACKGROUND: Respiratory syncytial virus (RSV) is the leading cause of bronchiolitis and pneumonia in U.S. infants aged less than one year. Annually, about 75,000–125,000 RSV-related hospitalizations occur among children aged <5 years. Palivizumab (Synagis®) is a monoclonal antibody administered monthly as chemoprophylaxis to high-risk infants and children during RSV season and recommended for use only during RSV season. Thus, accurate epidemiologic data describing RSV season onset and offset are needed. The National Respiratory and Enteric Virus Surveillance System (NREVSS) was the primary source for state-level RSV data until June 7, 2013, when Montana began requiring all laboratories to report RSV test results. We aim to describe the newly developed, web-based, Montana RSV Surveillance System (MRSS). **METHODS**: We initiated recruitment and registration of all Montana laboratories known to perform RSV testing. Laboratories are required to submit on a weekly basis, October 1 through June 1, positive and negative RSV rapid test results. Provisional data are published weekly on the internet. **RESULTS**: Sixty laboratories registered with MRSS; of those, 58 (97%) reported 1761 tests during October 1, 2013–January 25, 2014. For the same 4-month period during 2007–2013, 5 labs reported to NREVSS an average of 427 tests. The 2013–2014 RSV season onset in Montana was estimated as the week ending January 18, 2014 using MRSS and in the Mountain Census Division as December 28, 2013 using NREVSS. **CONCLUSIONS**: We designed a web-based RSV surveillance system that detects 4 times as many RSV tests previously detected by NREVSS. RSV season onset and offset for states with low testing volumes or limited participation in NREVSS might be more accurately estimated using state-based reporting compared with regional estimates using NREVSS.

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INFLUENZA-LIKE ILLNESS IS ASSOCIATED WITH INCREASED {STREPTOCOCCUS PNEUMONIAE} CARRIAGE AMONG OTHERWISE HEALTHY COLLEGE STUDENTS. Brian Davis*, Victoire de Lastours, Allison Aiello, Usha Srinivasan, Betsy Foxman (University of Michigan, Ann Arbor. MI United States)

While infectious diseases are usually conceptualized as having a single cause, bacterial pneumonia and otitis media increase notably following or during viral infection. We explored this association among individuals with influenza-like illness (ILI) among participants in an intervention trial testing methods to prevent influenza transmission, the eX-FLU study. We examined throat and nasal swabs collected from 99 participants with ILI and 77 of their healthy contacts (HC) from 578 participants recruited using a social network referral model during the 2012-2013 influenza season. Specimens were screened for *Haemophilus influenzae* (HI), *Moraxella catarrhalis* (MC), *Staphylococcus aureus* (SA), and *Streptococcus pneumoniae* (SP), and presence of Influenza A and B and 11 other respiratory viruses using qPCR. The prevalence of bacteria did not significantly vary based on ILI status, though a higher proportion of ILI cases than HC were colonized with SP (20.2% ILI, 10.4% HC, p=0.08). Thirty-four percent (60/176) of participants tested positive for at least 1 virus (42 ILI, 18 HC, p=0.01); viral colonization was significantly associated with SP (23.3% viral positive, 12.1% viral negative, p=0.05), but no other bacterium. We observed 4 cases where both SP and SA were identified at the same time, and 17 total instances of bacterial co-colonization, suggesting that these bacteria are able co-habit participants at the same time. Our results suggest that SP growth may be enhanced by respiratory viral infections, which may precede bacterial super infection. These results add data from humans to works showing that viral infections increase risk of SP invasive disease in animal models and facilitate SP colonization and growth. Further research should examine the timing of co-infection and replicate the results among a larger population.

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GEOGRAPHICAL VARIATION IN ASSOCIATIONS BETWEEN HCV INFECTION AND RISK FACTORS AMONG DRUG USERS IN SOUTHWESTERN CHINA: A GEOGRAPHICALLY WEIGHTED LOGISTIC REGRESSION ANALYSIS. Yi-Biao Zhou*, Qi-Xing Wang, Mei-Xiao Yang, Yu-Han Gong, Song Liang, Shi-Jiao Nie, Lei Nan, Ai-Hui Yang, Qiang Liao, Yang Yang, Xiu-Xia Yang, Qing-Wu Jiang (Department of Epidemiology, School of Public Health, Fudan University, Shanghai China)

Hepatitis C virus (HCV) has become a global public health problem. Many studies have been performed to investigate the association between some factors and HCV infection. However, some of the results of these studies have been in conflict. Data regarding HCV infection, factors, and residency of all entrants to the 11 national methadone clinics in the Yi Autonomous Prefecture from March 2004 to December 2012 was collected from the national database. Both a non-spatial logistical regression and a geographically weighted logistic regression were used to analyze the association between HCV infection and some factors at individual level. The study enrolled 5,401 adult patients with 30.0% prevalence of HCV infection and prevalence exhibited stark geographical variations. The non-spatial logistical regression showed that injection history, drug rehabilitation, jobless and services were risk factors of HCV infection, and married and high school or above were protective factors of HCV infection. Similar to the results of the non-spatial logistical regression, injection history and drug rehabilitation were positively associated with HCV infection for all or most individuals and married was a protective factor of HCV infection for 92.8% individuals in spatial logistical regression model. However, service and jobless were risk factors of HCV infection for only 5.8% and 3.0% individuals respectively. Senior high school or above was negatively associated with HCV infection for 55.9% clients distributed in the northeastern counties, but positively related to HCV infection for 1.2% clients distributed in E county. Yi was a protective factor of HCV infection for 71.7% individuals. The spatial model creates better understanding the geographic non-stationary associations between HCV infection and factors, and interventions must focus on areas with high risk of HCV infection to prevent further transmission of HCV.

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A CLUSTER RANDOMIZED TRAIL OF PRE-DIVE CHECKLIST TO PREVENT SCUBA DIVING MISHAPS. Shabbar Ranapurwala*, Petar Denoble (University of North Carolina, Chapel Hill, Chapel Hill, NC United States)

Scuba diving mishaps caused by errors or inattention increase the risk of an injury. Pre-dive checklists may mitigate mishaps, but their effectiveness has not been assessed. Furthermore, the prevalence of checklist use is also unknown and is presumably low. A cluster randomized, single blinded, multi-location trial with parallel groups was conducted to evaluate the effect of using pre-dive checklist on the incidence of diving mishaps in recreational divers. Randomization was done by location-days to avoid cross contamination, but resulted in clustering. Intent -to-treat (ITT), per-protocol (PP), and marginal structural model (MSM) analyses were conducted using Poisson models with generalized estimating equations. 1043 divers participated and made 2041 dives on 70 location-days (40 intervention, 30 control). 8% divers had their own written checklists. The most common major mishaps were rapid ascent, lost buddy contact, and low-to-out-of-air. The crude incidence rate of major mishaps was 7.4/100 dives in the intervention group and 10.2/100 dives in the controls. The number needed to treat was 37 dives. The adjusted rate ratio of major mishaps for intervention vs control was 0.66 (95% CI: 0.48, 0.90) – ITT, 0.68 (95% CI: 0.49, 0.95) – PP, and 0.64 (95% CI: 0.47, 0.87) – MSM; among those who did not have their own written checklist adjusted RR was 0.59 (95% CI: 0.43, 0.83) – ITT, 0.63 (95% CI: 0.45, 0.88) – PP, and 0.59 (95% CI: 0.43, 0.82) – MSM. In this study pre-dive checklists reduced the incidence of mishaps which may reduce injuries and fatalities. It is imperative to promote the use of pre-dive checklists and incorporate them into the diving safety culture.

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ESTIMATING SEMIPARAMETRIC DIFFERENCES AND RATIOS IN MEDIAN TIME TO EVENT. Elizabeth T. Rogawski*, Daniel Westreich, Stephen R. Cole (University of North Carolina - Chapel Hill, Chapel Hill. NC United States)

In observational studies of the occurrence and timing of health outcomes, default analysis often relies on the Cox proportional hazards model to generate adjusted hazard ratios. However, hazard ratios are not easily interpreted when applied to recurrent outcomes. Measures that focus on time between episodes (episode frequency) are more relevant for common outcomes, but non- and semiparametric analyses for estimating these effects are not straightforward to implement in common statistical analysis packages. We develop a SAS macro for estimating time differences and time ratios between exposure groups based on weighted Kaplan-Meier (KM) curves. The macro uses a logistic model to calculate inverse probability (IP) weights stabilized by the marginal probability of exposure. IP weighted KM curves are drawn for exposed and unexposed groups, and the time difference (t1-t0) and time ratio (t1/t0) at p% survival are calculated (default is 50%, median survival time). 95% confidence intervals (CI) are constructed by bootstrap with a user-defined number of resamples (default is 200).We provide an example that estimates the effect of gender on time to second diarrhea episode in a cohort of 433 children experiencing at least one diarrhea episode from Vellore, India. With default user-inputs, the macro estimated that boys had their second diarrhea episode 1 month (median time difference: 32 days, 95% CI: 2, 62) and 40% (median time ratio: 1.40, 95% CI: 1.00, 1.95) sooner than girls, adjusting for socioeconomic status and severity of first diarrhea episode. Time difference and ratio measures are a clarifying measure of effect and should be reported more often. The macro provided allows adjustment for covariates without relying on a proportional hazards (or proportional times) assumption, and the resulting estimates will often be more interpretable than hazards ratios for common and recurrent outcomes.

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NOVEL METHODS TO ESTIMATE POPULATION-LEVEL YOUNG DRIVER COMPLIANCE WITH GRADUATED DRIVER LICENSING RESTRICTIONS. Allison E. Curry*, Melissa R. Pfeiffer, Konny H. Kim, Michael R. Elliott, Dennis R. Durbin (The Children's Hospital of Philadelphia, Philadelphia, PA United States)

Motor vehicle crashes are the leading cause of death among US adolescents. Carrying multiple peer passengers and nighttime driving are both well-established crash risk factors among newly-licensed young drivers, and therefore are often restricted under state Graduated Driver Licensing (GDL) programs. However, we know very little about the extent to which teens' comply with their states' GDL restrictions. Further, methods previously used to measure compliance (e.g., surveys, direct observations) are limited in their ability to provide population-level estimates. Thus, we proposed a novel application of the quasi-induced exposure (QIE) method, which is frequently used in traffic safety research to adjust crash involvement ratios for relative driving exposure. Specifically, we borrowed QIE's primary assumption—that non-responsible drivers in two-vehicle "clean" crashes (i.e., crashes in which there was only one responsible driver) are randomly selected by the responsible driver and thus are reasonably representative of the general driving population. In the current study, we first validated QIE's primary assumption using the population of newly-licensed young drivers under age 21 in New Jersey in 2010–2011. We then applied this method to estimate newly-licensed young drivers' compliance with NJ's GDL one -passenger limit and restriction on driving from 11:01 pm – 4:59 am. Using this method, we estimated that the rate of non-compliance with passenger and nighttime restrictions among the population of NJ young drivers is 8.5% and 3.1%, respectively. These estimates are similar to those made via substantially more resource-intensive methods, including in-vehicle technology and direct observations. This method provides a feasible way to estimate population-level compliance and—more broadly—the extent to and conditions under which young drivers engage in risky driving behaviors.

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USING THE CAPTURE-RECAPTURE APPROACH TO ESTIMATE THE INCIDENCE OF UNINTENTIONAL MUSCULOSKELETAL INJURIES AMONG NAVAL SPECIAL WARFARE SEA, AIR AND LAND OPERATORS. Mita Lovalekar*, John Abt, Timothy Sell, Yuefang Chang, Scott Lephart (University of Pittsburgh, Pittsburgh, PA United States)

Background/ purpose: Injury epidemiology studies among military populations utilize either self-reported or medial chart reviewed injury data. Self-reported data are prone to issues with recall, and medial chart reviewed data are available only if medical care was sought. The purpose of this study was to use the capture-recapture (CRC) approach to estimate the ascertainment-corrected incidence of unintentional musculoskeletal injury among a sample of Naval Special Warfare Seal, Air and Land Operators. **Methods**: Capture-recapture analysis was conducted by application of the Chapman modification of the Peterson estimator to two sources of unintentional musculoskeletal injury data: self-reports and medical chart reviewed data, to estimate the cumulative incidence during a one year period. Injuries were analyzed further according to injury type. **Results**: Data were available for 105 subjects (age: 28.4, 5.7 (mean, standard deviation)). The number of subjects identified as injured during a one year period were 30 and 26 in the self-reported and the medical chart reviewed data respectively, while the CRC estimate of the number of injured subjects was 48.2 (95% confidence interval (95% CI) 38.9, 57.5). The overall, medical chart and self-report ascertainment percent were 82.9, 53.9 and 62.2, respectively. The CRC cumulative incidence during a one year period was 45.9 (95% CI 37.1, 54.8), while the medical chart and self-reported incidence was 24.8 and 28.6. When various injury types were analyzed separately, overall ascertainment was high for fractures (84.5%), while it was low for less severe injuries such as strain (23.0%). **Conclusion**: The overall ascertainment was generally good, but varied by injury type. Further investigation of the utility and methods of the CRC technique to assess the validity of unintentional musculoskeletal injury data obtained from military populations is needed.

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VALIDATING A SHORTENED FORM OF THE CESD AMONG WOMEN AFFECTED BY THE DEEPWATER HORIZON OIL SPILL (DWOS) IN LOUISIANA. Ariane Rung*, Evrim Oral, Symielle Gaston, Nicole Nugent, Edward Trapido, Edward Peters (Louisiana State University Health Sciences Center School of Public Health, New Orleans, LA United States)

Epidemiologic studies assess numerous exposures and outcomes yet must minimize participant response burden. The WaTCH Study follows women exposed to the DWOS in southern Louisiana. The 20-item CESD was used to measure depression in Wave 1. A 10-item version was derived for use in future waves to shorten the survey length. We evaluated the validity of the CESD-10 compared to the CESD-20. 2463 women in 7 coastal Louisiana parishes were interviewed by telephone between July 2012 and December 2013. Spearman correlations and kappa coefficients were calculated to assess agreement between the CESD-10 and the CESD-20. Internal reliability was measured using Cronbach's alpha. Sensitivity, specificity and positive predictive value were examined. Associations between demographic characteristics and depression on each instrument were compared. Participants were 59% White, 62% married, 26% with college education, 45% reported income of >= $50,000/year and mean age of 46 years. The mean CESD-20 score was 11.8 (SD 12.5). The correlation between CESD-20 and CESD-10 was 0.97 ($p<0.001$); when dichotomizing using established cut points the Kappa coefficient was 0.88 (0.86-0.90), demonstrating good agreement between the 2 instruments. Cronbach's alpha for CESD-10 was 0.88, demonstrating good internal consistency. Sensitivity, specificity and positive predictive value of the CESD-10 were 92%, 97% and 91%, respectively. The magnitude, direction and significance of associations between participant characteristics and CESD-10 or CESD-20 were similar, with greater exposure to the oil spill, less education, lower income, African American race, being unmarried, unemployment, lower self-efficacy and less social support all being significantly associated with greater levels of depression on both instruments. The short form CESD-10 is a valid abbreviated instrument for measuring depressive symptoms among women affected by the DWOS.

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TO MATCH OR NOT TO MATCH: CONTROL SELECTION IN DISEASE BIOMARKER DISCOVERY STUDIES. Stephen Mooney*, Benjamin Rybicki, Andrew Rundle (Columbia University/ Mailman School of Public Health, New York, NY United States)

BACKGROUND: Biomarker discovery studies commonly match controls to cases on disease risks (e.g. smoking status in a lung cancer biomarker discovery study) yet ignore this design feature during data analysis to select top marker candidates. We tested empirically whether such matching and improper analysis increases the false positive detection rate in biomarker discovery studies and whether anti-matching (e.g. matching an old case to a young control and vice-versa) can decrease the false positive rate. **METHODS**: We added 10,000 simulated weakly predictive biomarkers (the 'haystack') to prostate specific antigen (PSA) data (the 'needle') from a cohort of 5,168 men followed up for prostate cancer incidence (n=780, 15.1%). We performed nested case-control analyses (n=100 cases) within this cohort using three control selection strategies, 1000 times per design: controls matched on age and race, controls selected randomly, and controls anti-matched on age and race. We compared the proportion of analyses in which PSA had the highest area under receiver operator characteristic curves (AUC) across study designs (i.e. we found the needle in the haystack). **RESULTS**: The unmatched case-control design produced the highest percentage of studies (46%) in which PSA had the highest AUC, followed by the anti-matched (42%) and the matched (39%) designs. We demonstrate mathematically the conditions under which an anti-matched design would on average outperform an unmatched design. **CONCLUSIONS**: When analysis does not account for matching, biomarker discovery studies using unmatched designs outperform matched designs. In some circumstances anti-matching on a risk factor may improve performance. Optimally, matching should be taken into account during analyses.

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ESTIMATION OF RECUMBENT LENGTH AND HEIGHT FROM ULNAR LENGTH AND ARM SPAN AMONG INFANTS AND CHILDREN AGED 0-5.9 YEARS. Yeyi Zhu*, Michele R Forman, Ladia M Hernandez, John H Himes, Yongquan Dong, Robert K Danish, Kyla James, Laura E Caulfield, Jean M Kerver, Lenore Arab, Steven Hirschfeld (Department of Nutritional Sciences, The University of Texas at Austin, Austin, TX United States)

Background: Surrogate measures are needed when recumbent length or height is unobtainable or unreliable. Arm span has been used as a surrogate but is not feasible in children with shoulder or arm contractures. Ulnar length is not usually impaired by joint deformities, yet its ability as a surrogate has not been well studied. Objective: We aimed to examine the accuracy and reliability of ulnar lengths measured by different tools as surrogate measures of length and height. Design: In this cross-sectional study, anthropometrics (weight, recumbent length, height, arm span, and ulnar lengths by caliper [ULC], ruler [ULR], and grid [ULG]) were measured in 1479 healthy infants and children aged <6 y across 8 study centers in the US. Multivariate mixed-effects linear regression models for length and height were developed using ulnar length and arm span as surrogate measures. The agreement between the actual length or height and the predicted length or height by ULC, ULR, and ULG were examined by Bland-Altman plots. **Results**: ULC, ULR, ULG, and arm span, were highly correlated with length and height. Linear regression models of length prediction by ULC (R^2 = 0.928), ULR (R^2 = 0.915), and ULG (R^2 = 0.914) using age, sex, and ethnicity as covariates were comparable to that by arm span (R^2 = 0.914); however, height prediction by ULC (R^2 = 0.866), ULR (R^2 = 0.846), and ULR (R^2 = 0.872) was less accurate than that by arm span (R^2 = 0.945). Overestimation of predicted length but not predicted height was observed when using ULC or ULR. **Conclusion**s: Ulnar length can serve as an accurate and reliable surrogate measure of length and height. Further testing of ulnar length as a surrogate is warranted in physically impaired or nonambulatory children.

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INSTRUMENTAL VARIABLE ESTIMATION IN A SURVIVAL CONTEXT. Eric Tchetgen Tchetgen*, Stefan Walter, Maria Glymour, Stijn Vansteelandt, Torben Martinussen (Harvard School of Public Health, Boston, MA United States)

Bias due to unobserved confounding can seldom be ruled out with certainty when using nonexperimental data to draw inferences about causal effects. The instrumental variable (IV) design offers under certain assumptions, the opportunity to tame confounding bias, without directly observing all confounders. The IV approach is very well developed in the context of linear regression but also for certain generalized linear models with non-linear link function. However, IV methods are not as well developed for censored survival outcomes. We develop the instrumental variable approach in a survival context, under an additive hazards model, and we describe two simple strategies for estimating causal effects for this context. The first strategy entails a straightforward two stage regression approach analogous to two stage least squares commonly used for IV estimation in linear models, whereby the fitted value from a first stage regression of the exposure on the IV is entered in place of the exposure in the second stage hazard model to recover the causal effect in view. The second strategy is a so-called control variable approach, which entails adding as confounding control covariate to the additive hazards regression model for the exposure effect, the residual from a first stage regression of the exposure on the IV. Formal conditions are given justifying each strategy, and both strategies are illustrated in a novel application to a Mendelian randomization study of the effects of BMI on mortality using data from the health and retirement study, validated using data from the Rotterdam Study. It is also shown that analogous estimation strategies can also be used under a proportional hazards model specification provided the outcome is rare.

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USE OF UNCERTAINTY ANALYSIS TO QUANTIFY THE IMPACT OF DISEASE MISCLASSIFICATION DUE TO LOSS TO FOLLOW-UP ON AN ESTIMATE OF EFFECT FOR OCCUPATIONAL EXPOSURE TO TCDD-CONTAMINATED CHEMICALS AND ISCHEMIC HEART DISEASE. Laura Scott, George Maldonado* (University of Minnesota School of Public Health, Minneapolis, MN United States)

PURPOSE: To quantify the effect of disease misclassification from loss to follow-up on the odds ratio (OR) for ischemic heart disease (IHD) mortality in a cohort of trichlorophenol workers exposed to 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD). **METHODS**: Classification parameters were defined using 2008 mortality data for the New Zealand population and the proportions of deaths in the cohort for individuals not lost to follow-up. The distribution shapes for each parameter were constructed based on expert judgment and were varied to account for potential differences in mortality due to exposure status, gender and ethnicity. Probabilistic uncertainty analysis, which uses Monte Carlo simulation techniques, was then used to sample each parameter distribution, calculating ORs corrected for disease misclassification resulting from loss to follow-up. **RESULTS**: The median $OR_{corrected}$ ranged from 3.05 to 3.73 and was larger than the $OR_{observed}$ of 3.05 for 11 of the 12 scenarios evaluated. The lower-bound 95% credible limits ranged from 2.92 to 3.14. Between 61.4% and 99.8% of the simulation trials yielded corrected ORs greater than the $OR_{observed}$. **CONCLUSIONS**: The application of uncertainty analysis to a mortality study of workers occupationally exposed to TCDD-contaminated chemicals provides valuable insight into the magnitude and direction of misclassification error and the impact on an estimate of effect. Further refinement of the parameter distributions and adjustment of the $OR_{observed}$ for other study limitations is necessary to determine whether a true causal relationship between exposure and disease exists or if the effect observed in these workers is an artifact of systematic error.

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A NOVEL APPROACH TO ACCOUNT FOR SURVIVAL BIAS IN PERINATAL EPIDEMIOLOGY: AN APPLICATION TO HIV RESEARCH. Eric Tchetgen, Kelesitse Phiri*, Roger Shapiro (Harvard School of Public Health, Boston, MA United States)

In perinatal epidemiology, birth outcomes such as birthweight (BW) are often unobserved for a pregnancy ending with a stillbirth (SB). It is sometimes said that BW is truncated by SB, a phenomenon which can give rise to survival bias. This will occur when the exposure of interest influences both the risk for SB and BW, particularly if as typically the case there also are unobserved common causes of SB and BW. We consider a study of possible harmful effects of maternal exposure to highly active antiretroviral therapy (HAART) during pregnancy on BW in a sample of pregnant women infected with human immunodeficiency virus (HIV) from Botswana. We hypothesize that previous estimates of the effects of HAART on BW are likely conservative because they fail to account for the under-representation of live births in the exposed arm. We propose a simple yet novel regression-based approach to account for survival bias induced by SB. The approach produces an estimate of the so-called survivor average causal effect (SACE) of HAART, which is the exposure effect on BW among births that would be live irrespective of maternal HAART status. Key advantages of the approach are: lack of ambiguity of the effect estimate since for SACE, BW is well defined in both exposure arms; the simplicity of the proposed analysis, which entails a simple modification of standard multiple linear regression easily implemented with standard software; robustness to latent dependence between SB risk and BW; and a formal statistical test of the null hypothesis of no survival bias. Using 2268 HIV pregnancies, standard complete-case analysis estimated an average decrease of 160 grams in BW (95%CI:-220 grams to -100 grams) due to HAART. Our SACE estimate was substantially larger, indicating an average decrease in birth weight of 211 grams BW (95%CI:-284 grams to -139 grams), and there was significant evidence rejecting the null of no survival bias (p-value =0.016).

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POTENTIALLY LARGE COLLIDER BIAS IN USUAL EFFECT ESTIMATORS IN INDEX EVENT STUDIES – WITHOUT ANY UNCONTROLLED DISEASE RISK FACTORS. W Dana Flanders*, Ronald C Eldridge, William McClellan (Rollins School of Public Health, Atlanta, GA United States)

Factors that cause certain diseases and death are often associated with lower mortality among those with the disease. Such "reversed" associations could be biased by selection of diseased individuals for study, sometimes called index-event bias. It's expected if an uncontrolled factor causes both the disease and death. Here we evaluate the magnitude of a technically-different collider bias in usual index-event studies, one that's expected if an uncontrolled factor U directly affects death but not the disease. We illustrate using obesity, likely causing both ESRD and death but associating with lower mortality after ESRD onset. Obesity merely illustrates the bias since it can exist even if an exposure with long-term effects were randomized at birth. We use accelerated-life models to model causal effects since the inherent monotonicity of effects avoids certain definition problems. Our Monte Carlo simulations using observed obesity-ESRD-mortality associations show the bias can be large if any mortality-risk factor is uncontrolled - even with no uncontrolled ESRD-risk factor. The bias can make harmful risk factors (e.g., causal RR=1.8) appear protective (observed RR = 0.9). It's likely present in the situations described as control of all mortality-risk factors is implausible. This collider ("survival") bias is similar to censoring-by-death, but differs because one can show that it can occur with non-fatal outcomes. It's important when estimating direct effects like those in the obesity-ESRD-mortality studies since it's likely whenever exposure causes the outcome and any outcome-risk factor is uncontrolled.

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COMPARISON OF LINEAR STRUCTURAL EQUATION AND MARGINAL STRUCTURAL LINEAR MODELS FOR ESTIMATING THE DIRECT EFFECT OF EARLY LIFE WEALTH ON ADULT WAIST CIRCUMFERENCE NOT MEDIATED BY ADULT WEALTH. Marissa J. Seamans*, Kenneth A. Bollen, Stephen R. Cole, Whitney R. Robinson, Emma Tzioumis, Linda S. Adair (University of North Carolina at Chapel Hill, Chapel Hill, NC United States)

Early-life material disadvantage may have independent effects on adult health. We compare two methods to investigate the relationship between early-life wealth and adult waist circumference among 660 men born in 1983-84 in Cebu, Philippines who were followed for 25 years. Wealth was measured by 32 household assets at birth and in 2005; waist circumference (cm) in adulthood was measured in 2007. A wealth score representing urban assets was dichotomized as high vs. low wealth for this analysis. Marginal structural and structural equation linear models controlling for birth weight, adult smoking status, alcohol use, height, and urbanicity were used to estimate the direct effect of high vs. low early-life wealth on waist circumference that is not mediated through adult wealth. Using marginal structural models, we found evidence that men who had higher wealth in early life as characterized by urban assets had larger waist circumference than their less wealthy counterparts (β = 2.22 cm; 95% CI: 0.35, 4.08), independent of baseline covariates and adult wealth. However, using structural equation models, we did not find evidence of a direct effect of early-life wealth on adult waist circumference (β = 1.38 cm; 95% CI: -0.32, 3.08). As expected due to the additional assumptions, the result from the linear structural equation model was more precise (confidence interval range = 3.40 cm) than the result from the marginal structural linear model (range = 3.73 cm). Substantively, the observed differences suggest that evidence of a direct effect of early-life wealth on adult body size remains inconclusive. Model misspecification or other biases may have led to the divergence of findings from the two methodological approaches.

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REGRESSION DISCONTINUITY IN EPIDEMIOLOGY: QUANTIFYING BIAS DUE TO FORCING VARIABLE MISREPORTING. Jeremy Labrecque*, Jay Kaufman, Richard MacLehose, Aluísio Barros (McGill University, Montreal Canada)

Objective: Regression discontinuity (RD), a methodology making inroads into epidemiology, can be used to identify the causal effect of policies on epidemiologic outcomes. However, RD can be biased if people misreport a variable that determines whether they qualify for a policy (also known as a forcing variable). Currently, no studies exist examining this bias. We quantify this bias in the context of a Brazilian cash transfer policy and its effect on child growth. **Methods**: Data on household income and child growth to four years were simulated using parameters from the 2004 Pelotas Birth Cohort. Households earning less than 100 Reais (~41 US dollars) are eligible to receive the cash transfer. To simulate the effect of the policy, two centimeters of growth were added to all observations below the 100 Reais threshold. Income misreporting was simulated by probabilistically selecting observations whose true income was above the threshold and reassigning them an income below the threshold. The probability was based on the distance above the threshold and, to simulate differential manipulation, the observed child growth. The bias was then calculated as the difference between the RD estimate before and after income misreporting. **Results**: When misreporting was non-differential with respect to child growth, the bias was negligible although precision was lost. The largest bias (0.7cm, 95% confidence interval: 0.1, 1.2) occurred when misreporting was differential, those up to 200 Reais from the threshold misreported their income, and 25% of policy participants were misreporters. Bias increased with the distance of misinformers from the threshold and percent policy participants that were misinformers. **Conclusion**: This study addresses and important gap in the RD literature. Even under conditions with important misreporting, the bias due to misreporting can remain relatively small.

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A BRIEF ASSESSMENT OF NEIGHBOURHOOD EFFECT ON NEONATAL MORTALITY: TRANSLATION OF AREA LEVEL VARIANCE IN THE ODDS RATIO SCALE IN MULTILEVEL LOGISTIC REGRESSION. Bhaskar Thakur*, Vishnubhatla Sreenivas, Sadanand Dwivedi, Arvind Pandey (All India Institute of Medical Sciences, New Delhi India)

Introduction: Logistic regression is frequently used in epidemiological and public health research to measure the binary outcome. Unlike linear regression analysis, logistic regression does not agree the interpretational attribute of the normal model. It is always contend the dissatisfactory of existing measures while quantifying results from multilevel logistic regression model. The variability at different levels is not directly comparable. Quantifying area-level variance in a meaningful way is a challenge in multilevel logistic regression. **Method**: We obtained individual and district level information on the binary outcome neo-natal mortality from District Level Household Survey-3. The exploration of data structure confesses the consideration of only two-level structure in analysis, conceptualized as children nested within districts. Estimations of Variance Component Model (empty model) and Random Intercept Model in multilevel logistic analysis were carried out. The latent variable method converts the individual level variance from the probability scale to the logistic scale to compute the intra-class correlation. The median odds ratio translates the area level variance on the odds ratio scale. **Result**: the median odds ratio was equal to 1.60, in the empty model which shows if a person moves from one district to another district with a higher probability of neonatal mortality, their risk of mortality (in median) will increase by 1.6 times, when randomly picking out two persons in different districts. After adjusting the individual effect in the random intercept model, this ratio reduced to 1.54. Area level variance and Intra-class correlation were 0.246 and 0.067 in the empty model as well as 0.210 and 0.059 in the subsequent model respectively. **Conclusion**: The usual odds ratio are not proper interpretable for district-level covariates because it is impossible to make comparison within district. As MOR quantifies cluster variance in terms of odds ratios, it is comparable to the fixed effects odds ratio and can be useful in epidemiological studies.

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CONSIDERATIONS IN POOLING AND REFINEMENT OF MASS SPECTROMETRY CALIBRATION. Neil Perkins*, Sunni Mumford, Karen Schliep, Jennifer Weck, Enrique Schisterman (National Institutes of Health, Rockville, MD United States)

Calibration of mass spectrometry measurements consists of a two stage process where laboratory equipment yields a relative measure which is subsequently transformed to the unit of interest using a calibration experiment. The calibration experiment uses stepped samples of known biomarker levels to establish the relation between the measured relative units and sample biomarker levels. To account for changing laboratory conditions when large numbers of samples are assayed, periodic independent calibration experiments are conducted. Collapsing calibration information has been shown to reduce measurement error and improve estimation of parameters of interest. Collapsing in practice can also create an additional layer of quality control and optimization in part of the laboratory measurement process that is often highly automated. Here we use mass spectrometry data to motivate and display the benefits of recalibration, such as detecting and overcoming faulty calibration experiments and reducing the need for rerunning out of range samples. Caffeine data in 3875 biospecimens from the BioCycle study of hormonal variability were measured using mass spectrometry over several days with 21 calibration experiments. The laboratory used linear relations and regression in calibration, and these same techniques were employed in recalibration. Collapsing calibration experiments reduced variability (Coefficient of variation was reduced by approximately 10%), as well as enabled measurement of over 1000 values that would have been missing as out of range. These simple and useful procedures are minor adjustments that can be executed by study personnel without modifying laboratory protocols which could result in better estimation and cost savings, particularly for population-based studies.

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EVALUATION OF A QUALITY CONTROL TOOL FOR SCREENINGTITLES AND ABSTRACTS IN SYSTEMATIC REVIEWS. Immaculate Nevis*, Conrad Kabali, Chenglin Ye, Nancy Sikich, Les Levine (Health Quality Ontario, Toronto Canada)

Background: Systematic reviews (SR) remain a core of evidence based medicine. For quality assurance, most journals and guidelines require two reviewers to screen titles and abstracts of citations in SR. Nonetheless, to align with timely execution of policy recommendations, a single reviewer is sometimes used. This approach could potentially lead to selection bias if no quality check mechanism is in place. Moreover, many organizations lack a standardized way to reliably evaluate the quality of this approach within a short time frame. We therefore recommend that a sample size 50-100 citations, if randomly selected, is adequate to provide an insight on the quality of a SR. We evaluate the performance of this approach in a simulation study. **Method**: 20,000 citations were randomly "extracted' from a left skewed distribution and assigned a score based on the proportion of agreement. This distribution was chosen to take into account that high level of disagreement is unlikely for trained reviewers. From these, we randomly drew a fixed number of citations repeating the iteration 1000 times. In each of the iteration, the sample size was fixed at 50, 100, and 200. For brevity, any citation exceeding 80% agreement was assigned to 'Agree' group. In each of the drawn samples, we computed the percentage 'Agree' and examined its distribution properties in the samples of size 50, 100, and 200. We then derived the 95% confidence limits (CL) and evaluated the accuracy of sample estimates. **Results**: 86.7% of 20,000 citations met the threshold of agreement. The average percent of agreement for citation sets with sample size of 50, 100, and 200 were 86.7% (95% CL 76%; 96%), 86.7% (95% CL 79%; 93%), and 86.6% (95% CL 81.5%; 91.5%) respectively. **Conclusion**: In settings where reviewers have a satisfactory level of training, a random sample of size 50-100 citations can be used as a quality assurance tool for SR.

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MODEL SELECTION FOR THE EFFECT OF BINARY EXPOSURES OVER THE LIFE COURSE. Kate Tilling*, Andrew Smith (School of Social and Community Medicine, Bristol University, Bristol United Kingdom)

Background: Epidemiologists are often interested in examining the effect on an outcome of an exposure measured over the whole life course. One approach is to specify hypotheses for this relationship (e.g. accumulation of risk, critical period), and identify which hypothesis best explains the observed outcome by comparing the fit of nested models. This method relies on P-values and is unable to identify the most important hypothesis, or examine whether combinations of hypotheses might explain the observed data. **Methods**: We used the example of a cohort study in which the exposure was socio-economic position and the outcome body mass index, and encoded a set of proposed simple and compound hypotheses as one or more variables respectively. We used least angle regression (LARS) to select the variable(s) (and hence the associated hypothesis/hypotheses) that best explained the observed outcome. Simulated data were used to examine how often our proposed method identified the correct hypothesis under different combinations of study design and strength of associations. **Results**: In this example, for men, our approach gave similar conclusions to an established method. However, our method suggested that a critical period hypothesis (in addition to an accumulation hypothesis) explained variation in the outcome in women, implying that a sensitive period model best fit these data. In simulations, the LARS approach selected the correct hypothesis with high probability in even moderately sized samples, although with slightly lower probability for hypotheses involving social mobility. **Conclusion**s: LARS may be used to select the hypothesis that gives the best explanation for observed data, based on a list of proposed hypotheses. Compound hypotheses can be built up from simpler ones in a straightforward way, using a small number of variables.

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PREDICTORS OF RESPONSE TO IN-HOME BIOLOGIC SPECIMEN COLLECTION IN THE WOMEN AND THEIR CHILDREN'S HEALTH STUDY (WATCH). Symielle Gaston*, Edward Peters, Evrim Oral, Edward Trapido, Ariane Rung (Louisiana State University Health Sciences Center, New Orleans, LA United States)

In recent years and across various modes of data collection, there has been a consistent decline in participant survey response, which could lead to systematic bias. The goal of this study is to assess the effectiveness of protocol changes among WaTCH study participants who completed in-home visits compared to those who did not. WaTCH is a population-based cohort study designed to assess the long-term health effects of women residing in 7 coastal Louisiana parishes most affected by the Deepwater Horizon Oil Spill. Participants complete a telephone survey and are then asked to participate in a home visit to collect anthropometrics and biospecimens. To increase participation for the home visit, 3 different recruitment approaches were tried: 1) increased value of monetary incentive, 2) form of incentive (check vs. gift card), and 3) type of call center (WaTCH study staff vs. independent contractor). Frequencies and chi square tests were calculated to assess predictors of response, which were then modeled using logistic regression. Results showed that increased monetary incentives (OR= 5.34, 3.10-9.22), use of gift cards (OR = 5.88, 3.61-9.58), and telephone interviews conducted by WaTCH study staff (OR = 1.54, 1.29-1.85) were independent predictors of home visit completion. Crude results showed that African American participants were more likely than Caucasians to complete in-home visits; however, this association was no longer significant after adjustment for income. Furthermore, participants completing the home visit were more likely to have a household income below 200% of the federal poverty line and report depressive symptoms. Protocol changes enacted in this study are positively associated with improved in-home visit participation.

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DUCHENNE AND BECKER MUSCULAR DYSTROPHY: SURVIVAL THROUGH 2010 OF A U.S. POPULATION-BASED COHORT BORN 1985-1999 AND ASCERTAINED BY THE MUSCULAR DYSTROPHY SURVEILLANCE, TRACKING, AND RESEARCH NETWORK (MD STARNET). Melissa Adams*, Lisa Miller, Christopher Cunniff, Soman Puzhankara, Pangaja Paramsothy, Ke Liu, John Sladky (RTI International, Atlanta, GA United States)

The population-based descriptive epidemiology of the survival of a U.S. cohort with Duchenne or Becker Muscular Dystrophy (DBMD) is unknown. Using population-based surveillance data from MD STARnet, we described the associations between demographic and clinical factors and the mortality hazard in males with DBMD. The study included 588 males with DBMD, born in 1985 1999, from Arizona (23%), Colorado (22%), Georgia (27%), Iowa (14%), and western New York (14%) and followed through 2010. Overall, 31% were born 1985-89, 59% were non-Hispanic white, 78% had signs and symptoms before age 6 years, 45% stopped walking before age 12 years and 66% had no family DBMD history. We used Kaplan-Meier curves and Cox proportional hazards regression (univariate and adjusted) to compute age-specific, conditional and cumulative probabilities of survival and mortality hazard ratios (HRs). Of 93 deaths, 68 occurred before age 20.0 years (80.3% survival; 95% Confidence Interval (CI): 75.4%-84.3%). The youngest decedent was aged 10.7 years and the oldest was 24.2. Conditional on survival at age 20.0 years, 75.9% (95% CI: 64.8-83.9) survived up to age 26.0. Crude mortality HRs did not differ significantly among 5-year birth intervals and sites or by race/ethnicity or family history of DBMD. Crude mortality HRs differed statistically significantly by neighborhood socioeconomic status (highest 25% v. lowest 25%: HR=2.5 (95% CI: 1.3-4.9)); age at first DBMD symptoms (<6 years v. >6 years: HR=2.1 (95% CI: 1.2-3.9)); and age at loss of ability to walk (<12 years v. >12 years: HR = 3.6 (95% CI: 2.1 6.2)). Living in a low socioeconomic status neighborhood and relatively younger ages when signs of muscular weakness occurred were independently associated with elevated mortality hazards.

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OCCUPATIONAL AND RECREATIONAL ACTIVITY LEVELS IN ADULTHOOD TO THE RISK OF PARKINSON'S DISEASE. I -Fan Shih*, Zeyan Liew, Yvette Bordelon, Beate Ritz (University of California, Los Angeles, Department of Epidemiology, Los Angeles, CA United States)

While several environmental risk factors, such as pesticides, smoking, and caffeine use have been associated with Parkinson's disease (PD), modifiable lifestyle factors such as physical activity have not been given as much attention. We used data from a population-based case-control study in Central California that recruited 357 incident PD cases and 341 controls in 1998-2007 to examine whether occupational and recreational physical activity during different periods in an individual's lifetime are associated with risk of PD. We calculated the Metabolic Equivalent of Task (MET) in 4 stages of adulthood (young adulthood <25 years), adulthood (25 to 44 years), middle age (45 to 64 years), and older adulthood (65 years or older)) based on self-reported average duration and intensity of physical activity that participant engaged in at work or during leisure time using question 8 of the Paffenbarger Physical Activity Scale. Odds ratios (OR) and 95% confidence intervals (CI) were estimated using unconditional logistic regression, adjusting for age, sex, education, family history of PD, smoking, and pesticide exposures. We found an exposure-response pattern of decreasing risk of PD (P trend = 0.03) with increasing physical activity reported in middle age; for the highest quartile of physical activity (=168 MET-hour/week) compared with the lowest quartile (=28 MET-hour/week) the OR was 0.57 (95%CI: 0.35-0.95). A very similar pattern was also observed in older adulthood but no consistent pattern was found between physical activity and PD in younger adults (ages <45 years). Physical activity during middle and senior ages may protect against PD or, alternatively, during the long prodromal stages of this insidious disease, PD patients may reduce their physical activity below that of comparison populations decades prior to motor symptom onset.

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PREVALENCE OF DEPRESSION IN PATIENTS WITH IDIOPATHIC PARKINSON'S DISEASE IN KOREA. Won Chan Kim* (CHA Bundang Medical Center, Seongnam Korea)

Introduction: Depression is one of the most common non-motor symptoms of Parkinson's disease (PD). The prevalence rates vary widely according to the diagnostic criteria. However, in Korea, there are very few epidemiologic data concerning the prevalence of depression in PD. The aim of this study is to investigate the prevalence of depression and factors influencing depression in patients with PD. **Methods**: Newly diagnosed 252 consecutive PD patients were included and followed as part of an ongoing PD registry. PD was diagnosed according to the United Kingdom brain bank diagnostic criteria. 79 PD patients fulfilled the DSM-IV criteria for major depression. The UPDRS motor score was checked at the best 'on' period to assess the clinical severity of PD. We compared the clinical data between depressive (DP, n=79) and non-depressive (NDP, n=173) groups. **Results**: The prevalence rate of depression in PD was 31.3% in this study. There was no difference in age (DP: 62.3±2.5, NDP: 59.8±2.7yrs), age of disease onset (DP: 52.0±3.7yrs, NDP: 54.7±3.8yrs), UPDRS motor scores (DP: 36.2±5.6, NDP: 33.8±3.7) and Hoehn and Yahr stage (DP: 3.34±0.52 , NDP: 2.91±0.63) between two groups. **Conclusion**: There was no significant difference in clinical features between DP and NDP groups in this study. These results suggest that depression in PD is not influenced the severity of motor symptoms and that non-dopaminergic neurotransmitters, such as norepinephrine and acetylcholine, at least associated with the pathophysiology of depression in PD.

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STRUCTURAL BRAIN LESIONS AND RESTLESS LEGS SYNDROME: A CROSS-SECTIONAL POPULATION-BASED ANALYSIS. Pamela Rist*, Christophe Tzourio, Tobias Kurth (Brigham and Women's Hospital, Boston, MA United States)

Restless legs syndrome (RLS) is a common neurological disorder that originates in the motoneurons of the brain and is characterized by an urge to move the legs and unpleasant leg sensations. Previous studies have shown that RLS is associated with several vascular risk factors and CVD. As vascular risk factors and CVD are strongly associated with WML and silent infarcts, we aimed to evaluate whether RLS also interrelates with WML. However, little research has explored whether RLS is associated with white matter lesions and infarcts. We performed a cross-sectional study among 1268 individuals from the population-based Dijon, France center of the Three-City study (mean age 72.0 years) who had available information on volume of white matter lesions (WML) from magnetic resonance imaging scans and in whom RLS was assessed using a standardized and validated tool. White matter lesion volume was measured using an automated and validated tissue segmentation method. Logistic regression was used to evaluate multivariable-adjusted associations between tertiles of WML volume and RLS and between brain lesions and RLS. 218 individuals (17.2%) reported RLS. Compared to those in the first tertile, individuals in the second tertile (odds ratio [OR]=0.95; 95% CI: 0.66, 1.37) or third tertile (OR=1.00; 95% CI: 0.69, 1.46) did not have an increased prevalence of RLS. We also did not observe associations between the volume of deep or periventricular WML and RLS. We did not observe an association between brain infarcts and RLS (OR=0.61; 95% CI: 0.33, 1.11). Higher volume of WML and the presence of brain infarcts were not associated with an increased prevalence of restless legs syndrome in this population-based cohort of elderly individuals.

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THE RHINELAND STUDY: A NOVEL PROSPECTIVE COHORT STUDY. Monique M.B. Breteler* (DZNE, Bonn Germany)

The insights from epidemiologic research over the last decades into the causes of neurodegenerative diseases also delineate the need for a new prospective cohort to study these further: First, neurodegenerative diseases typically develop over decades rather than years until they manifest late in life. Second, most age-related neurodegenerative diseases occur as the resultant of varying combinations of protective, restorative, and detrimental factors. This asks for additional measurements and approaches to study the etiology of neurodegenerative diseases beyond a focus on determinants of occurrence of disease, including a focus on normal physiology, brain plasticity and repair capacity. Finally, tremendous technological progress has been made in the last decades, particularly in the areas of imaging and –omics and we need to include those more advanced measurements, in larger numbers, and in the potentially more relevant age-groups in cohort studies. We here present the Rhineland Study, a new prospective cohort study that is primarily designed to investigate causes and biomarkers for neurodegenerative and neuropsychiatric diseases and to investigate determinants of normal and pathological brain structure and function over the adult life course. It is a single center community-based study that will recruit up to 30,000 people aged 30 years or over at baseline. All participants will undergo a 7 hour core protocol that includes brain imaging on 3 dedicated 3T MRI scanners, detailed cognitive, neurologic and sensory assessments, cardiovascular measurements, assessment of physical activity and physical fitness, and extensive collection of biomaterials (including plasma, serum, DNA, RNA, cells, urine, stool). Full re-examinations will take place every 3 to 4 years. The study is planned to run for decades. The study design and setting allows for additional examinations in subsets of the cohorts.

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MODIFIABLE LIFE-COURSE DETERMINANTS OF RESERVE IN COGNITIVE AGING. Dorota Chapko*, Roisin McCormack, Corri Black, Roger Staff, Alison Murray (Aberdeen Biomedical Imaging Centre, University of Aberdeen, United Kingdom)

Background: Cognitive reserve (CR) is defined as a moderator which allows an individual to preserve cognitive functions despite underlying brain pathology. To study CR properly, three measures have to be performed: neuropathology, cognitive performance and moderating factors which might explain this discrepancy. There is no consensus of what determinants are of greater importance and whether specific CRs are malleable throughout a life-course. The aim of this review was to identify modifiable life-course factors which protect older individual from expressing cognitive decline despite the presence of brain pathology. **Methods**: A systematic review search was performed in MEDLINE, EMBASE and PsycheInfo (no date restriction). The search strategy reflected the synonyms of CR. Only studies which included in a single model the measurements of biomarkers underlying dementia-related neuropathology, cognitive function test, and factors providing CR were included. **Results**: 39 studies out of 9,229 screened records met our inclusion criteria. Education was examined the most and in 23 out of 28 studies was classified as a reserve against different neuropathologies and across the spectrum of cognitive functions. Both occupation and pre-morbid cognition provided reserve in 5 out of 6 studies. Childhood intelligence, bilingualism, early linguistic ability, personality and lifetime SES were assessed only once and the first four were determined as reserve factors. **Conclusion**: This review demonstrates that education provides reserve against brain pathology. Future research should examine what specific features of education might provide greater reserve, look at the interactions between education/occupation/pre-morbid IQ in providing reserve and explore what other aspects of early-life environment contribute to CR in late-life.

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ENVIRONMENTAL RISK FACTORS FOR PROGRESSION IN PD: AN INVESTIGATION INTO ORGANOPHOSPHATE EXPOSURE AND COGNITIVE DECLINE IN PARKINSON'S DISEASE PATIENTS. Kimberly Paul*, Janet S. Sinsheimer, Myles Cockburn, Jeff M. Bronstein, Yvette Bordelon, Beate Ritz (University of California, Los Angeles, Los Angeles, CA United States)

Background: Parkinson's disease (PD) is a neurodegenerative disorder characterized by the depletion of dopaminergic neurons in the brain. The progressive nature of the disease results in decline involving both motor and non-motor functions, but the course and severity of symptom progression is highly variable. Cognitive decline is well recognized in PD, with estimates of dementia in patients 2-6-fold higher than found in same age referents. Yet, what contributes to cognitive impairment is not well understood and nothing is known about the contributions of environmental factors. Some pesticides, including widely used organophosphates (OP), are recognized as neurotoxic and resulting in neuropsychiatric symptoms. **Methods**: In a longitudinal cohort, consisting of 242 incident PD patients from three highly agricultural counties, we repeatedly assessed progression symptoms, including cognition via mini-mental state exam (MMSE), the primary outcome of interest. We conducted interviews, and estimated OP exposure using a unique geographic information systems (GIS) based exposure assessment. Using linear mixed-effects models, we tested for association between long term ambient OP exposure and change in cognitive function over time. **Results**: High, chronic OP exposure was associated with faster decline in cognitive abilities (MMSE score) over time (P=0.05). Specifically, those exposed are expected to show on average a loss of nearly 4.5 points more over lifetime than those not exposed; this decline is greater than the decline due to aging in PD patients, with those exposed to OPs experiencing over twice the loss in score per year relative to those with little or no exposure. Potential confounding factors age, sex, race/ethnicity, and education were controlled for. **Conclusion**: This study is the first to investigate and support that chronic exposure to OPs is a risk factor for cognitive decline in PD patients.

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NON-PARAMETRIC ANALYSIS OF SEASONALITY IN BIRTH AND MULTIPLE SCLEROSIS RISK IN SECOND GENERATION OF MIGRANTS IN KUWAIT. Saeed Akhtar*, Raed Alroughani, Ahmad Al-Shammari, Jarrah Al-Abkal, Yasser Ayad (Kuwait University/ Community Medicine & Behavioral Sciences, Jabriya, Kuwait)

Background: There are inconsistent reports about the multiple sclerosis (MS) risk among migrants from low to high MS risk geographical regions. This study assessed the overall MS incidence and evaluated seasonality in birth and subsequent MS risk in second generation of migrants born and lived in Kuwait. **Methods**: We assessed the overall and gender-specific MS risk in second generation of migrants born and lived in Kuwait between January 1, 1950 and April 30, 2013. Data on migrants' MS patients diagnosed and registered in Kuwait National MS Registry were evaluated for seasonality in births in comparison with the births of second generation of migrants in general population using Hewitt's non-parametric test. **Results**: During the study period, migrants in Kuwait had an overall risk of MS births (per 100,000 non-Kuwaiti births in general population) as 23.8 (95% CI: 20.8 – 27.0). Gender-specific MS risk showed non-Kuwaiti female had statistically significant (p= 0.003) more risk (20.0; 95% CI: 20.2 – 28.2) than non-Kuwaiti males (16.2; 95% CI: 13.1–19.8). The month-specific distribution of migrants' MS births compared with migrants' births in general population did not differ significantly ($\chi 2$ goodness-of-fit test statistic = 9.51, p = 0.575). Hewitt's non-parametric test revealed an evidence of slight but statistically non-significant (p = 0.090) increased tendency of migrants' MS births during September through February. **Conclusion**s: The proportion of migrants' MS births (per 100,000 migrants' births in general population) over the study period was 23.8 (95% CI: 20.8 – 27.0), which was statistically significantly higher than the previously reported Kuwaiti national MS births (16.2; 95% CI: 15.1–17.4) in Kuwait. Non-parametric analysis showed slight but statistically non-significant increased tendency of migrants' MS births from September through February.

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VOICE, SPEECH, AND LANGUAGE DISORDERS IN THE U.S. ADULT POPULATION: THE 2012 NATIONAL HEALTH INTERVIEW SURVEY (NHIS). Howard J. Hoffman*, Chuan-Ming Li, Katalin M. Losonczy, May S. Chiu, Jacqueline B. Lucas, Kenneth O. St. Louis (National Institute on Deafness and Other Communication Disorders, National Institutes of Health, Bethesda, MD United States)

INTRODUCTION: Reliable prevalence estimates of communication disorders (CD) are lacking. Ruben (Laryngoscope, 2000) estimated the 1999 cost of lost or degraded employment opportunities due to CD exceeded $154 billion, or 1.5% of U.S. Gross National Product. Hence, increasing the utilization of healthcare/treatments for CD is a new objective in Healthy People 2020. **METHODS**: The National Institute on Deafness and Other Communication Disorders provided funds to the National Center for Health Statistics to conduct the first ever Voice, Speech and Language Supplement to the 2012 NHIS, a nationally-representative survey of the U.S. population. A sample of 34,525 adults (18+ years) reported voice (V), swallowing (Sw), speech (Sp), and language (L) disorders and age at onset, duration, severity, and health care visits for evaluation/treatment. The response rate was 79.7% conditional on successful family interview. **RESULTS**: Prevalence was 7.0%, i.e., 16.5 million (M) U.S. adults had CD lasting 1+ week during the last 12 months; 33.3% had received a diagnosis. The most prevalent disorder was voice, 4.0% (9.4M), then swallowing (2.5%; 6.0M), speech (2.0%; 4.7M) and language (1.2%; 2.8M). The largest CD risk factor was 'stroke', odds ratio (OR)=2.9, 95% confidence interval (CI): 2.2-3.7; sore throat, hearing trouble, and cancer all had increased ORs. 12.1% with CD received treatment in the past year, which rose to 21.2% for those with "moderate or worse" problems. Family physicians, ENT, and rehab therapists were the most common providers of treatments for V/Sw, while speech-language pathologists were most common for Sp/L disorders. Rehabilitation led to improved personal/social quality of life (QoL) for 55%; school/work QoL improved for 29%.**CONCLUSIONS**: Since CD are common among adults, the Healthy People 2020 goal to increase healthcare/treatments is aimed at increasing awareness and improving outcomes.

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PRENATAL MATERNAL STRESS AND RISK OF AUTISM SPECTRUM DISORDER (ASD). Amrita Vavilikolanu*, Michaeline Bresnahan, Andrew Schwatrz, Xiouyu Che, W. Ian Lipkin, Mady Hornig (Columbia University Mailman School of Public Health, New York, NY United States)

Prenatal exposure to environmental stressors is associated with adverse neurodevelopmental outcomes. Several studies have reported increased risk of autism spectrum disorders (ASD) after prenatal exposure to environmental or psychosocial stressors. However, no prior investigations of ASD risk have used prospective maternal report of exposures in a population-based pregnancy/birth cohort study. The aim of this study is to determine whether exposure to acute stressors during pregnancy increases risk of ASD. The study sample included 402 subjects (373 boys, 74 girls) with ASD diagnoses and 92,972 controls from the Norwegian Mother and Child Cohort. Maternal questionnaires at gestational weeks 17 and 30 provided data on exposure to stressors. Fetal sex; birth year; breastfeeding; prematurity and maternal education, age and smoking status served as covariates in logistic regression analyses. Sex-stratified analyses were performed with the same covariates. Maternal exposure to any stressors increased risk for ASD during pregnancy, with and without covariate adjustment (Odds Ratio [OR]stressor=1.30, 95% CI: 1.08, 1.57); adjusted Odds Ratio [aOR]stressor=1.25, 95% CI: 1.03, 1.51). Sex-stratification revealed a significant relationship in males but not females (aORstressorM=1.24, 95% CI: 1.01, 1.53; aORstressorF=1.28, 95% CI: 0.81, 2.03). The results for females might be strengthened as more females with ASD are ascertained. Assessment of maternal anxiety/depression as a potential mediator of this relationship diminished the association of stressors with ASD risk in both males and females (aORstressor=1.17, 95% CI: 0.96, 1.42). This is the first demonstration in a population-based study for increased risk of ASD relating to maternal prenatal stressors. Future work will further explore potential interactions of these stressors, their timing, variation by fetal sex and other mediating factors.

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ASSOCIATION OF AMYOTROPHIC LATERAL SCLEROSIS WITH PESTICIDE EXPOSURE DURING MILITARY SERVICE OR DEPLOYMENT. John D. Beard*, David M. Umbach, Kelli D. Allen, Jean Keller, Eugene Z. Oddone, Dale P. Sandler, Silke Schmidt, Freya Kamel (University of North Carolina at Chapel Hill, Chapel Hill, NC United States)

U.S. military veterans, particularly those deployed to the 1990-1991 Persian Gulf War, may have a higher rate of amyotrophic lateral sclerosis (ALS) than non-veterans. Though no specific factors associated with this increased rate have been identified, studies of non-veterans suggest an association with pesticide exposure. Therefore, we evaluated associations between ALS and 10 pesticide-related exposures incurred during military service. We used data from the Genes and Environmental Exposures in Veterans with ALS study, a case-control study of veterans including 630 medical-record-confirmed cases and 975 controls frequency matched to cases on age at diagnosis/interview and use of the Department of Veterans Affairs (VA) health care system before diagnosis/interview. Information on two exposures was ascertained from all veterans in the study, whereas information on the other eight was ascertained only from those deployed to a combat theater during World War II or the Korean, Vietnam, or Gulf Wars (234 cases, 347 controls). After adjustment for age, use of the VA health care system, sex, race/ethnicity, and military branch of longest service, exposure to Agent Orange in the field (Vietnam only) was positively associated with ALS (OR = 2.2; 95% CI = 1.2, 3.9). Mixing and applying Agent Orange (Vietnam only), ever taking pyridostigmine bromide pills, exposure to nerve gas (Gulf War only), ground level fumigation (Gulf War only), and three other herbicide-related variables were also positively associated with ALS, but none was statistically significant, possibly due to small numbers. Personal pesticide use and pesticide use for clothing or bedding were not associated with ALS. Our results suggest an association between military exposure to pesticides, particularly Agent Orange, and ALS.

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NEGATIVE LIFE EVENTS AND MIGRAINE: A CROSS-SECTIONAL ANALYSIS OF THE BRAZILIAN LONGITUDINAL STUDY OF ADULT HEALTH (ELSA-BRASIL) BASELINE DATA. Itamar Santos, Andre Brunoni, Alessandra Goulart, Rosane Griep, Paulo Lotufo*, Isabela Benseñor (Faculdade de Medicina da Universidade de São Paulo, Brazil)

Background: Stress is a typical migraine trigger. However, impact of negative life events on migraine activity is poorly studied. The aim of the present study was to investigate the association between negative life events and migraine in the Brazilian Longitudinal Study of Adult Health (ELSA-Brasil) baseline assessment. **Methods**: ELSA-Brasil is a multicenter cohort study conducted in six Brazilian cities. Baseline assessment included validated questionnaires for headache classification and five pre-specified negative life events. We built crude and adjusted logistic regression models to study the association between the occurrences of negative life events and migraine diagnosis and activity. **Results**: We included a total of 4,405 individuals with migraine and 4,457 participants without headache (reference). After adjustment for age, sex, race, income and educational level, we found that the occurrence of any negative life event (Odds ratio = 1.31; 95% confidence interval = 1.19 – 1.45), financial hardship (Odds ratio = 1.65; 95% confidence interval = 1.46 – 1.87) and hospitalization (Odds ratio = 1.47; 95% confidence interval = 1.25 – 1.72) were independently associated with migraine. Further adjustment for a current major depression episode or report of religious activity did not significantly change the results. Considering migraine frequency, financial hardship and hospitalization remained significantly associated with migraine in all episode frequency strata, with higher odds ratios for higher frequencies in adjusted models. We also observed an association between death of relative and the highest migraine frequency stratum. **Conclusion**: We found that the occurrence of financial hardship and hospitalization had a direct and independent association with migraine diagnosis and frequency. Death of a close relative was also associated with the highest migraine frequency stratum.

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MATERNAL FISH INTAKE DURING PREGNANCY IN ASSOCIATION WITH AUTISM SPECTRUM DISORDER AND DEVELOPMENTAL DELAYS. Yunru Huang*, Rebecca Schmidt, Irva Hertz-Picciotto (Department of Public Health Sciences, University of California Davis, School of Medicine, Davis, CA United States)

Background: Studies suggest that omega-3 and other polyunsaturated fatty acids (PUFAs) could have protective effects on neurodevelopmental outcomes. Fish is the main source of PUFAs. **Objectives**: To examine the association between maternal fish intake during pregnancy and Autism Spectrum Disorder (ASD) as well as developmental delays (DD) in the CHARGE (Childhood Autism Risks from Genetics and Environment) case –control study. **Methods**: Eligible children were those with a diagnosis of ASD, DD or typical development (TD) validated at University of California Davis MIND Institute with standardized clinical tools. Mothers were interviewed by telephone using a food frequency questionnaire to obtain fish intake information during pregnancy. Data included nine options of frequency and several options of quantity. **Results**: Adjusting for child's age, maternal education and homeownership, total fish intake during pregnancy did not differ for mothers of children with ASD (odds ratio (OR) =0.59, 95% confidence interval (CI): 0.28, 1.23) or DD (OR=0.79, CI: 0.36, 1.75) compared to the TD group. However, tuna consumption differed (OR=0.45, CI: 0.22, 0.91) for mothers in ASD and TD group, as did fried fish (OR=0.46, CI: 0.22, 0.98) and fish prepared other ways (OR=0.44, CI: 0.22, 0.92), while fried fish made from white fish (OR=0.70, CI: 0.32, 1.53) did not differ. Fish cooked without fry (OR=0.29, CI: 0.13, 0.66) and white fish (OR=0.40, CI: 0.14, 0.95) intake differed for mothers in DD and TD groups, while fried fish (OR=0.92, CI: 0.43, 1.94) and fried fish made from white fish (OR=1.08, CI: 0.49, 2.42) did not differ. **Conclusion**: This preliminary study provides first evidence for a protective association between maternal intake of certain types of fish, especially fatty fish and fish cooked without fry, and both ASD and DD during pregnancy. Further analyses are needed to examine this potential role in more detail.

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THE THOMPSON-MCFADDEN COMMISSION, JOSEPH GOLDBERGER, AND PELLAGRA: RECONSIDERING TWO HISTORICAL INVESTIGATIONS OF PELLAGRA IN COTTON-MILL VILLAGES IN SOUTH CAROLINA. Steve Mooney, Justin Knox*, Alfredo Morabia (Columbia University, NY United States)

As pellagra in the Southern United States reached epidemic proportions in the early 20th century, two teams assessed the causes of its incidence in cotton-mill villages in South Carolina. The first, the Thompson-McFadden Commission, concluded incorrectly that pellagra was likely infectious. Whereas the second, a Public Health Service investigation led by Joseph Goldberger, concluded correctly that pellagra was due to a dietary deficiency. Why did the two studies lead to differing conclusions? We argue this is because the Public Health Service investigation started with the correct a priori hypothesis, measured income, diet and pellagra more accurately, and sampled villages with more dietary variability. Our work reviews these investigations and uses simulations to test the hypothesis that error in the Thompson-McFadden Commission's measurement of diet and pellagra were responsible for their incorrect conclusions. Operating under the assumption that the Public Health Service data were correct, we simulated measurement error in a magnitude analogous to the postulated misclassification in the Thompson-McFadden Commission's study, finding that a 25% misclassification in meat supply removed the associations between diet (meat supply) and pellagra. Furthermore, we note how variability of food availability in the Public Health Service investigation's sample of villages allowed them to demonstrate that differences between villages in the observed association between household income and pellagra could be explained by food availability in those settings. We conclude that in this historical example, gathering accurate data, improved sampling variability and an informal but novel multi-level approach enabled the Public Health Service study to differentiate correctly between competing hypotheses.

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EXPOSURE TO HEALTH MARKETING CAMPAIGNS SHOULD BE COUPLED TO FOOD ENVIRONMENT INTERVENTIONS, AS POPULATION SODIUM KNOWLEDGE AND CHOOSING HEALTHY FOODS REMAIN LOW AMONG RESIDENTS OF LOS ANGELES COUNTY, USA. Patricia L. Cummings*, Rachel Adams, MPH, Nicolle Rueras, MPH, Tony Kuo, MD, MSHS (Los Angeles County Department of Public Health & Fielding School of Public Health at UCLA, Los Angeles, CA United States)

The average sodium intake among U.S. adults is ~3300 mg/day – well above the daily Tolerable-Upper-Intake-Level (2300 mg). A paucity of research has assessed population sodium knowledge and food choice after exposure to food service interventions and health marketing. To address this gap, a cross-sectional survey was administered to a target population of Los Angeles County (LAC) residents who regularly use public transportation and were exposed to recent food environment changes and health marketing focused on sodium reduction. Street intercept surveys were conducted at two central, high volume bus/Metro-rail stops in the region. Participants were required to be a permanent resident, >age 18, speak English or Spanish, and not be pregnant. Of 1,032 invited, 706 adults completed the survey (response rate=69%). About half were female and Hispanic. A majority was aged 25-44 (34%), spoke English at home (39%) and earned an annual income of <$14,000 (26%). When asked about daily sodium limit, less than 4% reported within the accurate range (1500-2300 mg). A series of multivariable logistic regressions were performed to examine the relationships between sodium knowledge and several key variables (e.g., fast food consumption and weight status). Study findings showed the odds of underreporting the recommended daily sodium limit was 1.6 times higher among participants who ate fast food/restaurant food >15 times per month (referent group: those who ate 0 times). The odds of underreporting sodium content when shown a double cheeseburger meal example was 1.4 times lower among participants who were overweight/obese as compared to those who were not. These results suggest that most adults continued to lack knowledge of healthy sodium levels despite public education, affirming the need for complementary changes to the food environment (e.g., nutrient limits, signage, product placement, pricing strategies).

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CONSUMPTION OF ADDED SUGARS FROM LIQUID BUT NOT SOLID SOURCES PREDICTS IMPAIRED GLUCOSE HOMEOSTASIS AND INSULIN RESISTANCE AMONG YOUTH AT RISK OF OBESITY. JiaWei Wang*, Kelly Light, Melanie Henderson, Jennifer O'Loughlin, Marie-Eve Mathieu, Gilles Paradis, Katherine Gray-Donald (University of Montreal Hospital Research Centre (CRCHUM), Montreal Canada)

Little is known about longitudinal associations between added sugar consumption (solid and liquid sources) and glucose-insulin homeostasis among youth. Caucasian children (8–10 y) with at least one obese biological parent were recruited in the Quebec Adipose and Lifestyle Investigation in Youth cohort (n = 630) and followed-up 2 y later (n = 564). Added sugars were assessed by three 24-h dietary recalls at baseline. Two-year changes were examined in multivariate linear regression models, adjusting for baseline level, age, sex, tanner stage, energy intake, fat mass (dual-energy X-ray absorptiometry), and physical activity (7 d accelerometer). Added sugar intake in either liquid or solid sources was not related to changes in adiposity measures (fat mass, body mass index, or waist circumference). However, a higher consumption (10 g/d) of added sugars from liquid sources was associated with 0.04 mmol/L higher fasting glucose, 2.3 pmol/L higher fasting insulin, 0.1 unit higher homeostasis model assessment of insulin resistance (HOMA-IR), and 0.4 unit lower Matsuda-insulin sensitivity index (Matsuda-ISI) in all participants ($P < 0.01$). No associations were observed with consumption of added sugars from solid sources. Overweight/obese children at baseline had greater increases in adiposity indicators, fasting insulin, and HOMA-IR and decreases in Matsuda-ISI during 2 y than normal-weight children. Consumption of added sugars from liquid or solid sources was not associated with changes in adiposity, but liquid added sugars were a risk factor for the development of impaired glucose homeostasis and insulin resistance over 2 y among youth at risk of obesity.

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SODIUM INTAKE, HIGH WAIST CIRCUMFERENCE AND SEX ARE ASSOCIATED WITH HIGH BLOOD PRESSURE IN YOUNG FILIPINO ADULTS. Melecia Wright*, Linda Adair (University of North Carolina at Chapel Hill, Chapel Hill, NC United States)

There has been much debate regarding the association of salt intake and blood pressure. Here we characterized the association between dietary sodium intake and hypertension (systolic>130 or diastolic>85mmHg) in 1815 adults (aged 20-22) from the Cebu Longitudinal Health and Nutrition Survey, Philippines. Cross-sectional dietary data was collected from 24-hour dietary recalls administered in 2005. Sodium intake was categorized as high (> the RDA of 2300mg) or normal. Sex and a dichotomous indicator of high waist circumference were also included in the adjusted model. Potential confounders (SES and caloric intake) did not substantially alter the results and were omitted from the final model. Prevalence odds ratios and 95% confidence intervals (POR, 95%CI) were calculated using a logistic regression model. Both the crude 2.09 (1.52, 2.88) and adjusted 1.99 (1.42, 2.78) PORs indicate a positive association between sodium intake and hypertension. Those with high waist circumference have 6 times the odds of hypertension OR= 6.17 (3.82, 9.96). Interestingly, females had only 9% of the odds of hypertension OR= 0.09 (0.06, 0.16) when compared to males. A synergistic effect of high waist circumference and high sodium intake was detected (interaction contrast ratio= 3.90 (-0.97,10.78)). In this young cohort, sodium intake, high waist circumference and male sex contribute significantly to hypertension; high waist circumference and dietary sodium intake are modifiable risk factors that may help mitigate cardiovascular disease burden.

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DIFFERENTIAL CHANGES IN CIRCULATING LONG CHAIN POLYUNSATURATED FATTY ACIDS IN THE 3RD TRIMESTER OF PREGNANCY IN GESTATIONAL DIABETIC VERSUS NON-DIABETIC WOMEN. Jinping Zhao*, Emile Levy, Bryna Shatenstein, Pierre Julien, William Fraser, Zhong-Cheng Luo (Sainte Justine University Hospital Research Center, Montreal Canada)

Background: In normal pregnancy, absolute circulating concentrations of long-chain polyunsaturated fatty acids (LC-PUFA) plasma phospholipids especially docosahexaenoic acid (DHA, 22:6n-3) rise, whereas relative concentrations (as % of total fatty acids) of DHA decline during pregnancy. It is unknown whether there are differential changes in the plasma LCPUFA profile in gestational diabetic vs. non-diabetic women. Objective: To assess changes in circulating levels of LC-PUFAs in the third trimester of pregnancy in gestational diabetic vs. non-diabetic women. **Design**: In a prospective singleton pregnancy cohort, plasma fatty acids were measured twice during pregnancy (24-28 and 32-35 weeks) in 24 gestational diabetic and 116 non-diabetic women. Usual dietary nutrient intakes were estimated by a validated, semi-quantitative food frequency questionnaire at 24-28 weeks of gestation. **Results**: Absolute plasma concentrations (μmol/L) rose by 8.1% for DHA and 12.8% for 22:4n-6 between 24-28 and 32-35 weeks gestation (all $P<0.01$) in non-diabetic women, whereas there were no significant changes in gestational diabetic women. Absolute concentrations of 22:5n-3 declined by 14.5% ($P = 0.04$) in gestational diabetic women, whereas there was no significant change in non-diabetic women. Relative plasma concentrations of DHA declined in both gestational diabetic and non-diabetic women. Dietary intakes of LCPUFA, DHA and other fatty acids were comparable between the two groups ($P >0.3$). **Conclusion**s: Gestational diabetes is associated with altered circulating LC-PUFAs profile in the third trimester of pregnancy. The normal increase in absolute DHA concentrations is compromised in gestational diabetes, suggesting impaired DHA mobilization or synthesis.

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GESTATIONAL VITAMIN D AND ITS RELATIONSHIP WITH AUTISM SPECTRUM DISORDERS. Jaime Sconberg*, Flora Tassone, Kathleen Angkustsiri, Rebecca J. Schmidt (University of California, Davis, Davis, CA United States)

BACKGROUND: Approximately 1 in 88 children are diagnosed with autism spectrum disorder (ASD) in the United States. Given the complex nature of this disorder, with variable symptoms and severity, it is likely that a variety of risk factors are involved in ASD causation. Little has been studied on possible effects of vitamin D and gene interaction. Maternal vitamin D levels are thought to be critical for brain development of the child during pregnancy. We evaluated whether low levels of self-reported vitamin D supplementation during pregnancy, alone and in combination with selected maternal vitamin D metabolism gene variants were associated with increased risk for ASD in the child. **METHODS**: We quantified the amount of vitamin D intake from supplements and measured variants of six vitamin D metabolism pathway genes in mothers from the CHARGE case-control study. Cases and controls are children with confirmed diagnoses of ASD (597) or typical development (415), recruited between 2003 and 2011 in Northern California. Vitamin D intake was analyzed alone and in combination with each gene variant. Odds Ratios were used to determine the association between gestational vitamin D and ASD. **RESULTS**: We found no significant independent associations between diagnosis of ASD in the child and maternal vitamin D intake from supplements. However, significant interaction effects were observed for maternal BSM1 CC genotypes, with higher risk when mothers consumed less than 600 IU of vitamin D through supplements. **CONCLUSIONS**: Biological plausibility and previous ASD studies suggest a possible link between vitamin D and ASD. We recommend further exploration in future studies consisting of longitudinal based study populations in which sun exposure, daily supplemental and food intake journals, and maternal blood serum levels throughout the index period are collected.

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CLASSIFICATION OF ENERGY INTAKE REPORTING USING THE GOLDBERG METHOD AND PHYSICAL ACTIVITY LEVELS (PAL) DERIVED FROM SELF-REPORTED ACTIVITY: VALIDATION AGAINST DOUBLY LABELED WATER. Ilona Csizmadi*, Shervin Asgari, Karen A Kopciuk, Farah Khandwala, Christine M Friedenreich, Yutaka Yasui, Rémi Rabasa-Lhoret, Diane Mignault, Heather E Bryant, Paula J Robson (Alberta Health Services-CancerControl, Calgary Canada)

Valid estimates of dietary intake are essential for elucidating the role of diet in health and disease; however, it is well recognized that under-reporting is common with self-reporting methods. Few biomarkers are available for assessing usual diet and they are cost-prohibitive for most large epidemiologic studies. Hence, statistical methods have been proposed to identify valid dietary data. The Goldberg estimate of 95% Confidence Intervals (CI) for Physical Activity Levels (PAL), is one such method against which individual level ratios of energy intake to basal metabolic rate can be compared. We assessed usual diet with the Canadian Diet History Questionnaire (DHQ), and PALs-derived from self-reported activity on the Sedentary Time and Activity Reporting Questionnaire (STAR-Q). Valid reporting was estimated using the Goldberg 95% CIs for PAL and compared with results using 'gold standard' doubly labeled water (DLW) estimates of energy expenditure. In 2009, 100 men and women (mean [SD]: 48 [8] years) were recruited to complete questionnaires and a two week DLW study in Calgary, Canada. With fixed DHQ within-person variation assumed, 48% of men were classified as under-reporters by DLW and 55% by the Goldberg method. The sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV) and accuracy (proportion correct) for the Goldberg method were: 0.89, 0.76, 0.77, 0.89, and 0.83, respectively. Among women 37% were classified as under-reporters by DLW and 64% by the Goldberg method. Assuming the same within-person variation for women, sensitivity, specificity, PPV, NPV and accuracy were: 1.00, 0.57, 0.58, 1.00 and 0.73, respectively. The Goldberg method employed with self-reported activity has potential for identifying individual level energy intake misreporting, but accuracy may vary with gender, particularly if within-person variation for dietary intake is gender-specific.

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SERUM NUTRITIONAL BIOMARKERS AND THEIR ASSOCIATIONS WITH SLEEP AMONG US ADULTS IN RECENT NATIONAL SURVEYS. May Beydoun*, Alyssa Gamaldo, Jose A. Canas, Hind Beydoun, Mauli Shah, Jessica McNealy, Alan Zonderman (National Institute on Aging, NIA/NIH/IRP, Baltimore, MD United States)

The associations between nutritional biomarkers and measures of sleep quantity and quality remain unclear. Cross-sectional data from the National Health and Nutrition Examination Surveys (NHANES) 2005-2006 were used. We selected 2,459 adults aged 20-85y, with complete data on key variables. Five sleep measures were constructed as primary outcomes: (A) Sleep duration; (B) Sleep disorder; (C) Three factors obtained from factor analysis of 15 items and labeled as "Poor sleep-related daytime dysfunction" (Factor 1), "Sleepiness" (Factor 2) and "Sleep disturbance" (Factor 3). Main exposures were serum concentrations of key nutrients, namely retinol, retinyl esters, carotenoids (α-carotene, β-carotene, β-cryptoxanthin, lutein+zeaxanthin, lycopene), folate, vitamin B-12, total homocysteine (tHcy), vitamin C, 25-hydroxyvitamin D (25(OH)D) and vitamin E. Main analyses consisted of multiple linear, logistic and multinomial logit models. Among key findings, independent inverse associations were found between serum vitamin B-12 and sleep duration, 25(OH)D and sleepiness, and between folate and sleep disturbance. Serum total carotenoids concentration was linked to higher odds of short sleep duration (i.e. 5-6 h per night) compared to normal sleep duration (7-8 h per night). A few of the selected serum nutritional biomarkers were associated with sleep quantity and quality, with some improving sleep quality with higher values (e.g. 25 (OH)D vs. sleepiness, folate vs. sleep disturbance) while others reducing sleep duration with higher values (e.g. vitamin B-12 and total carotenoids). Longitudinal studies are needed to ascertain temporality and assess putative causal relationships.

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ANEMIA AND RELATED NUTRIENT DEFICIENCIES AFTER ROUX-EN Y GASTRIC BYPASS SURGERY. Ting-Chia Weng*, Chia-Hsuin Chang, Yaa-Hui Dong, Lee-Ming Chuang (National Taiwan University, Taipei Taiwan)

Roux-en-Y Gastric Bypass (RYGB) surgery is well-known to lead to weight loss and glycemic control. Its long-term impact on anemia and related nutrient deficiencies remains unclear. MEDLINE and Cochrane Library were searched to identify all English reports published before 1/31/2013. The outcomes of interest included changes of the following measurements from the baseline, including proportion of anemia, hemoglobin, hematocrit, and ferritin levels, plasma-iron, vitamin B12, and folate deficiency. Articles were selected if case number >100, follow-up period >12 months, and presenting data both before and after surgery. Two reviewers independently extracted and reviewed the data. We used both fixed effect and random effect models with inverse variance weights to calculate the summary estimates of outcome of interest at 6, 12, 24, and 36 months after surgery. We identified 10 retrospective and 3 prospective studies with 5,497 enrolled patients for planned comparisons. Proportion of patients with anemia increased from 12.8% at baseline to 28.7% at 12 month follow-up, with a consistent decrease in hemoglobin and hemotocrit level. The plasma-iron level remained unchanged one year after surgery with even declining porportion of patients under lower limits. However, the proportion of patients with low ferritin level had two-fold increase. Proportion of patients with vitamin B12 defeciency increased from 2.8% to 4.6% at 12 month after surgery, while no obvious change was found for folate defiency. RYGB surgery is associated with an increased risk of anemia and detoriated metobolism of iron and vitamin B12. The causes of anemia are multifactorial that warrant regular monitoring and nutrient supplementation after surgery.

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MENU LABELING LEGISLATION IS ASSOCIATED WITH MENU LABELING USAGE AMONG ADULTS - BEHAVIORAL RISK FACTOR SURVEILLANCE SYSTEM - 18 STATES, 2012. Seung Hee Lee-Kwan*, Liping Pan, Gayathri Kumar, Leah M. Maynard, Sohyun Park (Centers for Disease Control and Prevention, Atlanta, GA United States)

Menu labeling (ML) may guide individuals to select foods/beverages with lower calories and may help reduce the obesity prevalence among US adults. In 2010, a federal law was passed requiring restaurants with ≥20 establishments to post nutrition information but the implementation of this law was delayed and state-level legislation enactment varied. Due to limited information on ML usage when available, we examined the prevalence of self-reported ML usage and its association with state ML legislation (MLL) status (obtained from National Conference of State Legislatures) as of January 1, 2012 (enacted, proposed, or none) as a proxy for ML availability/awareness among 102,173 adults from 18 states using the 2012 BRFSS. ML usage was assessed by the following question: "When calorie information is available in the restaurant, how often does this information help you decide what to order?" Adults who answered never noticed/could not find (2%) were excluded. Responses were categorized as frequent (always/most of the time), moderate (half the time/sometimes), and never. Multivariable logistic regression was used to estimate adjusted odds ratios (OR) and 95% confidence intervals (CI) for the association between MLL and ML usage, controlling for covariates. Among the 18 states, 2 enacted MLL, 8 proposed MLL, and 8 had none. Overall, 32% of adults were frequent ML users and 33% were moderate users. The odds for being frequent ML users were greater among adults in states where MLL was enacted (OR=4.35; CI=3.81–4.96) or proposed (OR=1.25; CI=1.16–1.34) compared to none. The odds for being moderate ML users were greater among adults in states where MLL was enacted (OR=2.37; CI=1.06–2.72). Findings indicated that adults living in states with enacted or proposed MLL were more likely to use ML. Encouraging efforts to increase ML availability/awareness may increase use of calorie information to make lower caloric choices.

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SUGAR-SWEETENED BEVERAGE CONSUMPTION AMONG U.S. ADULTS IN 18 STATES – BEHAVIORAL RISK FACTOR SURVEILLANCE SYSTEM, 2012. Gayathri Kumar*, Liping Pan, Sohyun Park, Seung-Hee Lee-Kwan, Stephen Onufrak, Heidi Blanck (Centers for Disease Control and Prevention, Atlanta, GA United States)

Sugar-sweetened beverages (SSB) are major sources of added sugars in Americans' diets. Daily SSB intake has been associated with obesity, diabetes and cardiovascular disease. Given that there is limited information on state-level adult SSB intake, we assessed SSB intake (i.e., regular soda and fruit drink) among 96,659 adults in 18 states using the SSB Optional Module of the 2012 Behavior Risk Factor Surveillance System. Total daily SSB intake frequency was calculated by adding daily regular soda and fruit drinks intake frequencies. Multivariable logistic regression was used to determine if total daily SSB intake differed by age, sex, and race/ethnicity for all states in aggregate. Prevalence estimates where the sample sizes were <50 or where the relative standard errors were ≥30% were not reported. Among the 18 states surveyed, 26.6% (range: 20.8%-40.9%) of adults consumed total SSB daily (≥1 time/day), 17.2% consumed regular soda daily, and 11.8% consumed fruit drinks daily. Daily intake exceeded 30% in Georgia (33.9%), Kansas (30.3%), Nevada (34.6%), and Oklahoma (34.5%), and surpassed 40% in Mississippi (40.9%) and Tennessee (40.8%). In contrast, Hawaii (20.8%) and New Hampshire (20.9%) had the lowest daily total SSB intake. In aggregate, the odds of daily SSB intake was greater among 18-34 year olds (OR = 5.9; 95% CI: 5.0, 6.8 vs. ≥ 55 year olds), males (1.85; 95% CI: 1.7, 2.00 vs. females), non-Hispanic blacks (3.1, 95% CI: 2.7, 3.7 vs. whites), and Hispanics (2.3, 95% CI: 1.9, 2.7 vs whites). Reducing SSB intake as part of a healthy lifestyle may help weight management and reduce chronic diseases prevalent among US adults. States with higher daily SSB intake could consider strategies to reduce SSB intake such as increasing access to and consumption of more healthful alternatives including water, especially among high-intake groups.

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EXCESSIVE GESTATIONAL WEIGHT GAIN IS ASSOCIATED WITH CHILDHOOD BODY COMPOSITION AT SEVEN YEARS IN AFRICAN AMERICAN AND DOMINICAN CHILDREN IN THE BRONX AND NORTHERN MANHATTAN. Elizabeth Widen*, Robin Whyatt, Lori Hoepner, Judyth Ramirez-Carvey, Sharon Oberfield, Abeer Hassoun, Frederica Perera, Dympna Gallagher, Andrew Rundle (Columbia University, New York, NY United States)

Gestational weight gain (GWG) is associated with short-term offspring size and body composition; yet, whether these associations persist into childhood is unclear, particularly in diverse cohorts. We examined the association between GWG and offspring size and body composition at 7 years in a cohort of African American and Dominican dyads (n=299) in the Columbia Children's Center for Environmental Health study in Northern Manhattan. Child measures include weight, height, waist circumference (WC), body-mass-index Z-score (BMIZ) and bioelectrical impedance analysis estimates of fat mass (FM), fat-free mass (FFM) and percentage body fat (%fat). Using linear regression stratified by sex, we evaluated the association between total or excessive GWG, greater than the 2009 Institute of Medicine (IOM) guidelines, and outcomes, adjusting for pregravid BMI and covariates (maternal education, race, parity, receipt of public assistance, report of not being able to afford food during pregnancy, child age). Pregravid BMI (mean±SD, all such values) and total GWG were 26±7 kg/m2 (44% BMI ≥25 kg/m2) and 16±8 kg (63% > IOM), respectively. Excessive GWG was associated with higher FM and %fat in boys [FM β: 1.5 kg, p=0.03; %fat β: 2.4 %, p=0.02] and higher FM, FFM, BMZ, weight and height in girls [FM β: 1.2 kg, p=0.02; FFM β: 1.2 kg, p=0.02; BMIZ β: 0.40, p=0.02, Weight β: 2.94 kg, p=0.002, Height β: 1.80 cm, p=0.04]. Total GWG was associated with higher FM, FFM, %fat, WC, and weight in boys [FM β: 0.14 kg, p=0.003, FFM β: 0.11 kg, p=0.009; %fat β: 0.18 %, p=0.01; WC β: 0.22 cm, p=0.02; weight β: 0.21 kg, p=0.02] and higher FFM and weight in girls [FFM β: 0.07 kg, p=0.02; weight β: 0.15 kg, p=0.02]. Excessive GWG was highly prevalent and was associated with several childhood weight and body composition outcomes in boys and girls. Strategies to support healthy weight gain in pregnancy are warranted.

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SEX OF THE OFFSPRING INFLUENCES THE RELATIONSHIPS BETWEEN INFANT FEEDING, PREECLAMPSIA STATUS AND EARLY PUBERTAL HORMONAL LEVELS. Jeremy Schraw*, Bjorn Ogland, Yong Quan Dong, Stein Tore Nilsen, Lars Vatten, Michele Forman (University of Texas at Austin Dell Pediatric Research Center, Austin, TX United States)

Background: Cord blood insulin like growth factor-1 (IGF-1) levels are lower in preeclamptic (PE) than in normotensive (NT) pregnancies. Early childhood IGF-1 levels are lower in breastfed than formula fed infants. The aims of this study are to examine: 1) the association between infant feeding practices and childhood IGF-1 levels in offspring of NT and PE pregnancies and 2) the association between pubertal status and hormones by PE status and sex of the offspring. **Methods**: A cohort of 565 Norwegian offspring of PE (37%) and NT pregnancies born 1993-1995 was followed through puberty. Medical record linked data from prenatal and childhood exposures through 10.8 years in girls and 11.8 years in boys were abstracted. During clinical visits through puberty anthropometrics, Tanner staging, and maternal-reported diet through the life course were collected; biospecimens were collected and analyzed for serum hormones and IGF-1. **Results**: The percent exclusively breastfed was 75.5%, 27% and 1.4% at < 3, 3-6 and 6-9 months in PE and NT. In linear regression models, duration of exclusive breastfeeding was positively related to IGF-1 levels in boys but not girls after adjustment for formula feeding, age introduced to solids, childhood diet, weight, height, Tanner Stage and PE status ($p < 0.05$) ($R2= 0.31$). Compared to NT offspring of the same sex and pubertal (Tanner 2+) stage, PE boys had higher mean serum IGF-1 and testosterone (T) levels ($p = 0.01$); PE girls had higher dehydroepiandrostenedione sulfate (DHEAS). In contrast prepubertal (Tanner stage 1) PE boys had lower DHEAS and higher T ($p < 0.05$); PE girls had higher DHEAS and lower T levels ($p < 0.001$). **Conclusion**s: Sex-specific associations were observed: Duration of exclusive breast feeding and PE status in puberty was associated with IGF-1 levels in boys. PE status was associated with DHEAS and T levels in girls.

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MATERNAL CONCENTRATION OF 25-HYDROXYVITAMIN D (25 (OH)D) IN PREGNANCY AND RISK OF OFFSPRING ASTHMA: RESULTS FROM A PROSPECTIVE DANISH COHORT WITH 20 YEARS OF FOLLOW-UP USING NATIONAL DISEASE REGISTRIES. Susanne Hansen*, Ekaterina Maslova, Marin Strøm, Arieh Cohen, Allan Linneberg, Sjurdur F. Olsen (Centre for Fetal Programming, Department of Epidemiology Research, Statens Serum Institute, Copenhagen Denmark)

Background: Results from studies examining the relation of maternal levels of 25-hydroxy(OH)D with offspring asthma have been conflicting. No studies have followed-up offspring until adulthood. Objective: To examine the relation of maternal levels of 25(OH)D in gestational week 30 with offspring risk of asthma in a cohort with 20 years of follow-up using national disease registries and self-report. **Methods**: We used data from a prospective birth cohort including 965 Danish pregnant women from 1988-1989. Maternal levels of 25(OH)D were quantified in serum by the LC-MS/MS method (n=850). We obtained information about offspring asthma from the Registry of Medicinal Product Statistics (n=850) and the National Patient Register (n=850) and from offspring self-report (n=654,71%). We calculated multivariable hazard ratios (HR) and 95% CI by using Cox regression models for the association of maternal 25(OH)D with the registry outcomes. Log-binomial regression was used to calculate relative risks (RRs) and 95% CI for the self-reported outcomes. **Results**: Median (IQR) level of maternal 25(OH)D was 76.2(57.0) nmol/L. According to the registries, 15% of the offspring had used asthma medication and 4% had been admitted to the hospital for asthma during the follow-up period. A 10 nmol/L increase in maternal 25(OH)D led to a corresponding increase in the HR of both offspring asthma medication use (HR=1.04, 95% CI: 1.00-1.08, p=0.09) and asthma hospitalizations (HR=1.14, 1.05-1.21, p=0.001). There was no association with offspring self-reported doctor diagnosis of asthma, but a 10 nmol/L increase in maternal 25(OH)D increased the RR of self-reported current medication use by 1.09 (1.02-1.16, p=0.01). **Conclusion**: We found evidence of a modest direct association between maternal 25(OH)D levels and offspring use of asthma medication and hospitalizations assessed in national registries and of self-reported asthma medication use at age 20.

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PERICONCEPTUAL AND PREGNANCY FOLIC ACID SUPPLEMENTATION AND CHILD ALLERGIC DISEASE – EVIDENCE FROM THE DANISH NATIONAL BIRTH COHORT. Ekaterina Maslova*, Susanne Hansen, Charlotta Granstrom, Sesilje Petersen, Sjurdur F. Olsen (Centre for Fetal Programming, Statens Serum Institut, COPENHAGEN Denmark)

Background: Early evidence suggested that maternal supplementation of folic acid during pregnancy increase the risk of child wheeze and asthma; these have not been substantiated by later studies. Further, potential trimester-specific effects have not been thoroughly examined. Objective: We examined maternal folic acid supplementation periconceptually and by trimester in relation to child allergic disease. **Methods**: We calculated folic acid intake from supplements starting 4 weeks prior to conception until gestational week 44 using maternal self-report. Dietary folate was quantified using a validated FFQ in mid-pregnancy. Mothers reported on doctor-diagnosed child asthma at 18 months and 7 years; and allergic rhinitis at age 7. We also extracted information on asthma diagnosis and medication from national registries. We used multivariable log-binomial models to calculate risk ratios (RR) and 95% CI for the periconceptual period (-4 to 8 weeks) and for each trimester in relation to child outcomes. **Results**: A total of 33,918 pregnant women had data on folic acid use. Mean(SD) intake of folic acid was 196(164)µg/day in the periconceptual period; 8% reported no use of supplements. The means (SDs) were 259(148)µg/day, 276(153)µg/day, and 242(140)µg/day for first, second, and third trimester, respectively; and 351(68)µg/day for dietary folate. We found no associations for any of the time periods with any of the outcomes. However, children of mothers who were in the highest quintile (Q5) of folic acid intake in all trimesters had a non-significant increased risk of asthma hospitalization compared to mothers in Q2-Q4 (RR: 1.33, 95% CI: 0.92, 1.91). Dietary folate was inversely associated with asthma at 18 months only (Q5 vs. Q1: RR: 0.90, 95% CI: 0.82, 0.99). **Conclusion**s: We found no associations of maternal folic acid intake with child allergic disease. Intake source may be of importance for early asthma.

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PREDICTED VITAMIN D STATUS IN MID-PREGNANCY AND CHILD ALLERGIC DISEASE -A PROSPECTIVE STUDY FROM THE DANISH NATIONAL BIRTH COHORT. Ekaterina Maslova*, Susanne Hansen, Andrew Thorne-Lyman, Camilla B. Jensen, Marin Strøm, Arieh Cohen, Nina O. Nielsen, Sjurdur F. Olsen (Centre for Fetal Programming, Statens Serum Institut, COPENHAGEN Denmark)

Background: Vitamin D deficiency in pregnancy may be a risk factor for child allergic disease. However, less is known about disease risk across different levels of vitamin D. Objective: To examine the relation between a maternal vitamin D prediction score and child asthma and allergic rhinitis. **Methods**: A total of 32,456 pregnant women were enrolled in the Danish National Birth Cohort (1996-2003) and had data on a validated vitamin D prediction score based on 1,497 serum 25(OH)D samples taken in mid-pregnancy. Child allergic disease was assessed at 18 months and at 7 years using questionnaire data and national registry extracts. We used multivariable log-binomial models to quantify the relation between maternal vitamin D prediction score and child allergic disease. Serum 25(OH)D was examined in a stability analysis. **Results**: Median(IQR) vitamin D prediction score was 58.7(49.2-69.0)nmol/L. Prevalence of child allergic disease varied from 4% for current asthma at age 7 to 31% for asthma defined by prescription medication. In main analysis there was no association between vitamin D prediction score and child allergic disease. However, maternal vitamin D prediction score >=100nmol/L (vs. 50-79.9nmol/L) was associated with increased risks of child asthma at 18 months (risk ratio (RR): 1.36, 95% CI: 1.02, 1.80) and asthma by hospital admission (RR: 1.65, 95% CI: 1.04, 2.62), which were robust to covariate adjustment. For vitamin D prediction score <25-30 nmol/L there were non-significant increased risks of child asthma by hospital admission and allergic rhinitis at age 7, which got attenuated after adjustment. Similar results were found for serum 25(OH)D. **Conclusion**s: Overall we found no association between maternal vitamin D prediction score and child allergic disease. However increased risks were observed for vitamin D prediction score <25nmol/L and >=100nmol/L, but more consistently so for the latter.

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MULTIVITAMIN USE AND ALL-CAUSE MORTALITY IN THE NURSES' HEALTH STUDY. Elizabeth Poole*, Youjin Je, Walter Willett, Edward Giovannucci (Brigham and Women's Hospital and Harvard Medical School, Boston, MA United States)

Introduction: Multivitamins (MV) use is common, but the benefits are unclear. Prospective studies of MVs and mortality are mixed, but most only assessed MVs once or twice over follow-up, limiting the ability to account for changes in behavior due to illness. A meta-analysis of randomized trials reported no association, but most trials had limited follow-up. In the Nurses' Health Study (NHS), we queried MV use every 2 years for 30 years and have detailed information on chronic disease and other factors that might confound an association between MVs and mortality. **Methods**: We used Cox proportional hazards regression to model associations between MV use and total and cause-specific mortality, stratified on age and calendar time and adjusted for body mass index, other supplement use, smoking, physical activity, coffee intake, baseline history of high cholesterol, diabetes, or hypertension, race, chronic disease diagnosis, aspirin use, menopause status, postmenopausal hormone use, screening, and diet quality. To account for post-diagnosis changes in behavior, we performed an analysis in which we did not update MV use post- cancer or cardiovascular disease (CVD) diagnosis. **Results**: At baseline (1980), 33% of NHS currently used MVs; 22,994 women died over 2,775,257 woman-years. When MV use was updated every two years, current use (vs. never) was associated with increased risk of total mortality (RR: 1.13; 95%CI: 1.08 -1.19). However, when we stopped updating MV use after disease diagnosis, there was no association (RR: 0.99; 95%CI: 0.95-1.03), suggesting that post-diagnosis changes in behavior may account for the association. Similar results were observed for cancer and CVD mortality. **Discussion**: Overall, there was a weak association between MV use and mortality, which was likely driven by changes in lifestyle post-chronic disease diagnosis. Our results do not support a substantial impact of MV use on mortality.

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BIOLOGICAL DETERMINANTS OF SPONTANEOUS LATE PRETERM AND EARLY TERM BIRTH. Hilary K. Brown*, Kathy N. Speechley, Jennifer Macnab, Renato Natale, M. Karen Campbell (The University of Western Ontario, London Canada)

Most studies examining causes of spontaneous preterm birth have focused on very preterm birth (<34 weeks gestation). The aim of this study was to examine the association between biological determinants of preterm birth (i.e., infection and inflammation, placental ischemia and other hypoxia, and other biological determinants) and spontaneous late preterm (34-36 weeks) and early term (37-38 weeks) birth. This was a retrospective cohort study. The sample included singleton births, delivered at 34-41 weeks to London-Middlesex (Canada) mothers between 2002 and 2011 (N=17,678). Data were obtained from a city-wide perinatal database. Multivariable multinomial logistic regression was used to determine the association between biological determinants of preterm birth and spontaneous late preterm and early term birth (vs. full term birth [39-41 weeks]). After controlling for covariates, there were associations between infection and inflammation and late preterm birth (adjusted odds ratio [aOR]=2.07, 95% CI 1.65, 2.60); between placental ischemia and other hypoxia and late preterm (aOR=2.21, 95% CI 1.88, 2.61) and early term (aOR=1.25, 95% CI 1.13, 1.39) birth; and between other biological determinants of preterm birth (pre-existing and gestational diabetes, polyhydramnios, oligohydramnios) and late preterm (aOR=3.61, 95% CI 2.77, 4.69) and early term (aOR=2.52, 95% CI 2.12, 3.00) birth. Our findings demonstrate the multifactorial aetiology of spontaneous late preterm and early term birth and, importantly, show that delivery following spontaneous labour even close to full term is often a result of pathological processes. Because these biological determinants of preterm birth contribute to an adverse intrauterine environment, they have important implications for foetal and neonatal health.

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A PROSPECTIVE STUDY OF VITAMIN D AND GESTATIONAL DIABETES MELLITUS IN ETHNICALLY DIVERSE WOMEN. Carrie Nobles*, Glenn Markenson, Lisa Chasan-Taber (University of Massachusetts Amherst, Amherst, MA United States)

Gestational diabetes mellitus (GDM) is a common complication of pregnancy associated with poor maternal and infant health outcomes. Low levels of vitamin D have been implicated as a potential risk factor for GDM in some observational studies, but not in others. Recent review articles have called for consideration of confounding variables such as race/ethnicity and adiposity. Therefore, we evaluated the relationship between vitamin D, GDM, and impaired glucose tolerance (IGT) among a diverse population of 228 high risk women in the Behaviors Affecting Baby and You (B.A.B.Y.) Study, a randomized trial of exercise and GDM. Serum concentrations of 25-hydroxyvitamin D [25(OH)D] were measured using the DiaSorin Liaison assay at 15.1±4.8 weeks gestation. Diagnosis of GDM and IGT were based upon medical record abstraction. Almost two-thirds of participants were Hispanic (57.9%) and 61% were obese (BMI≥30 kg/m2). A total of 31 (13.6%) participants were diagnosed with GDM, and 13 (5.7%) with IGT. One-fifth of participants were vitamin D deficient (21.0% <20 ng/mL) and 31.1% were insufficient (20-<30 ng/mL). Obese women (β= -3.4 ng/mL, SE=1.62, p=0.04) and Hispanic women (β= -5.3 ng/mL, SE=1.6, p<0.01) had significantly lower mean vitamin D levels as compared to non-obese and non-Hispanic women respectively. After adjusting for age, pre-pregnancy BMI, ethnicity, gestational age at blood draw, and study arm, vitamin D deficiency was not significantly associated with GDM (OR=0.40, 95% CI 0.10-1.60) or IGT (OR=1.66, 95% CI 0.32-8.53). Similarly, there were no significant associations between vitamin D insufficiency and GDM (OR=0.95, 95% CI 0.36-2.48) or IGT (OR=1.01, 95% CI 0.20-5.04). In this high risk diverse population, we did not observe statistically significant associations between vitamin D deficiency and insufficiency and risk of glucose abnormalities.

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POSTPARTUM HOSPITAL READMISSIONS IN CALIFORNIA 2004-2010. Kerry Bommarito*, Victoria Fraser, Margaret Olsen (Washington University School of Medicine in St. Louis, St. Louis, MO United States)

Background: With the increasing rate of cesarean delivery (CSEC) and decreasing hospital length of stay it is important to analyze rates and indications for hospital readmission after delivery. Objective: To determine rates and reasons for readmission stratified by delivery method in a state population. **Methods**: We used the 2004-2010 HCUP CA State Inpatient Database to determine 6-week readmission rates following vaginal (VAG) and CSEC delivery. Reasons for readmission were identified using ICD-9-CM diagnosis codes. **Results**: Of 2,305,110 deliveries, 2.0% (47,997) were readmitted to the hospital within 6 months after delivery hospitalization discharge; 1.0% (25,211) were readmitted within 6 weeks of discharge. The overall rate of 6-week readmission increased from 1.0% in 2004 to 1.1% in 2010 (10% increase). The overall rate of readmission was 1.9% for Whites, 3.2% for Blacks, 2.3% for Hispanics, 1.3% for Asians, and 4.5% for Native Americans. More women were readmitted within 6 weeks after CSEC (1.6%) than after VAG delivery (0.8%); the rate increased from 2004-2010 by 6.2% for CSEC and 21% for VAG deliveries. The rate of readmission increased by 18% after scheduled repeat CSEC, 5.2% after primary CSEC, and 15.7% after failed labor deliveries. The most common principle diagnosis codes for the first readmission within 6 weeks were major puerperal infection (14.1%), post-operative infection or complications of surgical wounds (12.0%), postpartum conditions (e.g., diseases of arteries, cardiovascular, cerebrovascular, nutritional deficiencies; 9.3%), complications of the puerperium (8.8%), cholecystitis (7.3%), and postpartum hemorrhage (6.4%). **Conclusion**s: The rate of 6-week readmission increased from 2004 to 2010 in California, particularly following vaginal and scheduled repeat cesarean deliveries. The most common indications for readmission were postpartum infections and wound complications.

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NEONATAL SEIZURES AND VAGINAL BREECH DELIVERIES AT HOME COMPARED TO THEIR COUNTERPARTS IN HOSPITAL. Qing Li* (Department of Epidemiology & Biostatistics, Michigan State University, East Lansing, MI United States)

Home birth has increased in the U.S. since 2004 and been associated with a higher risk of neonatal seizures (NS) than did hospital birth among singleton term births. However, vaginal breech delivery (VBD), one of the most useful indicator conditions which predispose to asphyxia and can easily be mismanaged in home birth, was unspecified or excluded from recent studies. We hypothesized that VBD at home had both more and unknown NS than their counterparts in hospital. We conducted a secondary analysis of VBD in 2010-2012 from the National Center for Health Statistics Natality File. We excluded multiple gestations and deliveries at <37 weeks or <2,500 grams. NS were abstracted from birth certificates (i.e., seizures, the 1989 revision; seizure or serious neurologic dysfunction, the 2003 revision). The 2003 revision of birth certificate specified accidental, intended, or unknown home birth. Maternal race/ethnicity and age were adjusted in Logistic regressions. Among 87,139 VBDs, 1,065 (1.22%) were delivered at home; both recorded and unknown NS were significantly higher at home birth than those in the hospital (7/986 vs 17/80,704; 95% CI: 33.9; 14.0, 82.0; 9/986 vs 166/80,704; 95% CI: 4.5; 2.3, 8.8). NS were significantly higher at both unintended (2/169) and intended VBD at home (5/715) than those in the hospital (17/80,704; 95% CI: 52.9; 8.3, 188.2; 33.4; 12.3, 90.8); unknown NS were higher in unintended home births (95% CI: 7.8; 1.9, 21.0). NS at intended home births by other midwife (4/255) were significantly higher than those by medical doctors in the hospital (13/67,277; 95% CI: 73.9; 20.1, 220.0). Unknown status of NS were significantly higher among Non-White mothers comparing to White mothers (95% CI: 2.5; 1.8-3.3). Further studies are needed to include prospective assessments and multiple sources of NS measures at home birth. NS were more likely to be recorded or unknown among VBD at home. VBD at home is a warning sign for neonatal seizures in the Institute of Medicine's call to evaluate the effects of maternal care services in diverse settings on birth outcomes, and to improve the data quality of birth certificates.

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COMBINED EFFECTS OF PRENATAL AIR POLLUTANT EXPOSURE AND MATERNAL FOLIC ACID SUPPLEMENTATION ON RISK OF AUTISM SPECTRUM DISORDER. Amanda Goodrich*, Heather Volk, Robin Hansen, Rebecca Schmidt (University of Southern California, Los Angeles, CA United States)

Introduction: Little is known about the risk factors of autism spectrum disorder (ASD). Studies show that periconceptional folic acid (FA) and prenatal vitamin (PV) supplementation decrease the risk of ASD while exposure to traffic-related air pollution (TRAP) during pregnancy increases the risk of ASD. The aim of our study was to examine the combined effects of TRAP with FA or PVs intake on ASD. **Methods**: We studied 417 ASD cases in the CHARGE case-control study with autism diagnoses confirmed on both the Autism Diagnostic Observational Schedule and Autism Diagnostic Interview–Revised. 252 population-based controls met criteria for typical development using the Social Communications Questionnaire, Mullen's Scales of Early Learning and the Vineland Adaptive Behavior Scales. Nutrient intake was quantified from telephone interview information on the mother's consumption of supplements and cereals from 3 months before conception through the end of breastfeeding, including the brand, dose, frequency, and which months consumed. The CALINE4 line-source air quality dispersion model was applied to self-reported residential history to obtain model-based estimates of TRAP exposure. **Results**: For all analyses, the referent group was mothers in the lowest three quartiles of TRAP across pregnancy and who either took PVs 3 months before or during first month of pregnancy or took at least 800μg of FA during the first month of pregnancy. Though not statistically significant, mothers not taking PVs and in the highest quartile of TRAP were associated with 1.5 times the risk for having a child with ASD (95% CI: 0.92, 2.56). Mothers who took less than 800μg of FA during the first month of pregnancy and were in the highest quartile of TRAP were associated with 2.1 times the risk for having a child with ASD (95% CI: 1.11, 4.00). **Conclusion**: Periconceptional FA or PV intake may reduce ASD risk in those with high levels of TRAP.

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EXCLUSIVE BREASTFEEDING DURATION AND WEIGHT GAIN IN INFANCY. Kimberly Doughty*, Katherine Reeves, Lindiwe Sibeko, Alayne Ronnenberg (University of Massachusetts Amherst, Amherst, MA United States)

Background: There is growing evidence that rapid postnatal weight gain is associated with greater risk of obesity in childhood. Breastfeeding has been associated with reduced risk of childhood obesity in some studies, but to our knowledge, the association between exclusive breastfeeding duration and weight gain during infancy has not yet been investigated in a U.S. population. **Methods**: ANOVA and Chi square tests were used to assess the associations between exclusive breastfeeding duration (no exclusive breastfeeding, <4 months, 4-6 months, or ≥ 6 months) and mean absolute change in weight-for-age z-score from birth to 12 months of age; and odds of catch-up growth, defined as an increase in weight-for-age z-score of >0.67 in a sample of 1346 infants from the Infant Feeding Practices Study II cohort. **Results**: Infants who were never exclusively breastfeed had a mean increase in WAZ of 0.12 ± 1.31. Mean changes in weight-for-age z-score among infants exclusively breastfed for up to 4 months, 4-6 months, and ≥ 6 months were 0.63 ± 1.11, -0.45 ± 1.12, and -0.58 ± 0.95, respectively. Differences were significant for 4-6 months of exclusive breastfeeding compared with none (p<0.001) or <4 months (p<0.001) and for ≥ 6 months compared with none (p=0.001) or <4 months (p=0.005). There was also a significant association between exclusive breastfeeding duration and odds of catch-up growth (p<0.001). The proportion of infants with catch-up growth was 32.9%, 29.5%, 14.7%, and 7.3% among those with no exclusive breastfeeding, <4 months, 4-6 months, and ≥ 6 months, respectively. **Conclusion**: The results of this study suggest that exclusive breastfeeding duration may be associated with less rapid weight gain during infancy. However, additional studies with adjustment for confounding variables are needed. Multivariate analyses in this cohort are ongoing.

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PERICONCEPTIONAL FOLIC ACID-CONTAINING SUPPLEMENTS AND GLOBAL DNA METHYLATION IN THE MARBLES PROSPECTIVE STUDY OF AUTISM SPECTRUM DISORDER. Rebecca J. Schmidt*, Ana-Maria Iosif, J. Erin Dienes, Florence Crary, Janine M. LaSalle (University of California Davis, Davis, CA United States)

Epigenetic factors likely contribute to the etiology of autism spectrum disorders (ASD). Dietary methyl-donors like folate are essential for methylation reactions, and maternal levels near conception could influence DNA methylation profiles in the child. In the MARBLES prospective study of high-risk ASD-affected families, we examined relationships between early prenatal vitamin use and DNA methylation of common LINE-1 repeats as a global epigenetic indicator. We also investigated maternal and child DNA methylation in relation to the child's development of ASD. Maternal interviews collected information on prenatal vitamin use and time initiated. Global DNA methylation levels were measured by bisulfite conversion and LINE-1 pyrosequencing in DNA extracted from maternal whole blood collected during each trimester and at delivery, and the child's cord and peripheral blood. The Autism Diagnostic Observation Schedule (ADOS) was conducted on children at 24 and 36 months and final clinical diagnoses were made at 36 months. Taking prenatal vitamins before or during the first month of pregnancy was not significantly associated with maternal LINE-1 DNA methylation, but was associated a trend towards higher LINE-1 DNA methylation in the child's peripheral blood. Meeting ADOS ASD criteria at 24 months was associated with significantly higher DNA methylation in cord blood, and significantly lower DNA methylation in the child's peripheral blood. In the subset of children with final diagnoses, ASD was similarly associated with few methylation differences in the maternal blood, and trends toward LINE-1 DNA methylation that was higher in cord blood and lower in the child's peripheral blood. Further research is needed to confirm these preliminary findings that suggest taking prenatal vitamins before and near conception could impact the child's LINE-1 DNA methylation levels, which are associated with autism symptomatology.

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VITAMIN D EXPOSURE DURING PREGNANCY AND EARLY CHILDHOOD AND WHEEZING RISK IN YOUNG CHILDREN. Laura N. Anderson*, Yang Chen, Jessica A. Omand, Catherine S. Birken, Patricia C. Parkin, Teresa To, Jonathon L. Maguire, and the TARGet Kids Collaboration (The Hospital for Sick Children and St. Michael's Hospital, Toronto Canada)

Vitamin D intake during pregnancy has been associated with lower risk of wheezing and asthma in childhood, but the association between children's serum 25-hydroxyvitamin D (25(OH)D) concentration and wheezing in early childhood is unclear. We conducted a cohort study to evaluate the association between vitamin D, during both pregnancy and early childhood, and childhood wheezing. Healthy children (0 to 8 years) were recruited from 2008-2013 through the TARGet Kids! primary care research network. The primary exposure was serum 25(OH)D concentration in children. Secondary exposures were mothers' reported vitamin D supplementation during pregnancy, and parent reported early childhood vitamin D supplementation. The primary outcome was parent reported childhood wheezing at any time in the past. Adjusted odds ratios (aOR) and 95% confidence intervals (CI) were estimated using multivariable logistic regression adjusted for age, sex, body mass index, birthweight, outdoor play, breastfeeding duration, daycare status, parental smoking and ethnicity. Baseline 25(OH)D and follow-up wheezing data were available on 1559 children. Mean child age was 2.9 years at 25(OH)D measurement and mean follow-up was 2 years. Mean 25(OH)D was 84 nmol/L. At follow-up, 20% of children had ever had wheezing. Neither 25(OH)D in early childhood (aOR per 10nmol/L =1.01, 95% CI: 0.96-1.05) nor childhood vitamin D supplement use (aOR=1.04; 95% CI: 0.80-1.35) were associated with wheezing. Vitamin D supplementation during pregnancy was associated with lower odds of childhood wheezing (aOR=0.61; 95% CI: 0.40-0.94). Early childhood 25(OH)D and vitamin D supplement use were not associated with wheezing. However, vitamin D supplementation during pregnancy was associated with reduced odds of wheezing suggesting that the timing of exposure may be important in understanding the association between vitamin D and childhood wheezing.

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VITAMIN D SUPPLEMENTATION IN PREGNANCY ON NEONATAL OUTCOMES: A SYSTEMATIC REVIEW. Shu Qin Wei*, William Fraser (CHU Ste-Justine, Montreal Canada)

Background: Vitamin D deficiency or insufficiency is common in pregnant women. Low maternal vitamin D status has been associated with low birth weight or small for gestational age (SGA). Vitamin D supplementation during pregnancy might protect adverse neonatal outcomes. OBJECTIVE: To determine the effect of vitamin D supplementation during pregnancy on newborn anthropometric measures (birthweight, length, head circumference). **STUDY DESIGN**: We searched electronic databases of the literature in PubMed, the Cochrane Library and clinicaltrial.gov up to January, 2014 using the following keywords: 'vitamin D' and 'supplementation' and 'pregnancy'. A systematic review and meta-analysis was conducted on randomized clinical trials (RCTs) that reported vitamin D supplementation during pregnancy and neonatal outcomes including birth weight, birth length, head circumference, low birth weight or small-for-gestational age (SGA). **RESULTS**: Eight RCTs met the inclusion criteria. Data from the above 8 trials involving 1169 women found that women who received vitamin D supplements during pregnancy had a higher mean birth weight (g) (mean difference 146.48, 95% CI 83.67 to 209.30), larger body length (cm) (mean difference 0.98, 95% CI 0.66 to 1.30), larger head circumference (cm) (mean difference 0.59, 95% CI 0.42 to 0.76). There were less frequently had a baby with a birth weight below 2500 grams in women with vitamin D supplementation than those women receiving standard care or placebo (RR 0.38, 95% CI 0.21 to 0.66). Only one study reported on SGA, but the sample size was too small (n=110) to detect an effect on the risk of SGA. **CONCLUSION**: Vitamin D supplementation during pregnancy may increase baby's birthweight. However, the trials included were small. These finding support the need for a single larger trial with enough power to validate this effect. KEYWORDS: Vitamin D, pregnancy, neonatal outcome

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ASSOCIATIONS BETWEEN MATERNAL PREPREGNANCY BODY MASS INDEX AND CHILD PSYCHOSOCIAL DEVELOPMENT AT 6 YEARS OF AGE. Heejoo Jo*, Laura Schieve, Andrea Sharma, Stefanie Hinkle, Ruowei Li, Jennifer Lind (Centers for Disease Control and Prevention, Atlanta, GA United States)

Objective: Maternal obesity is associated with child neurodevelopmental outcomes. We used the 2005–2007 Infant Feeding Practices Study II and 2012 Year 6 Follow-Up to examine associations between maternal prepregnancy body mass index (BMI) and child psychosocial development. **Methods**: Children were categorized according to mothers' prepregnancy BMI [underweight (<18.5 kg/m2), normal weight (18.5-24.9), overweight (25.0-29.9), obese class I (30.0-34.9), and obese class II/III (≥35.0)] (n=1523). Child's development was assessed by maternal report of child's psychosocial difficulties measured in the Strengths and Difficulties Questionnaire, developmental diagnoses, and receipt of special-needs services. Multivariable logistic regression models included sociodemographic characteristics. Additional models included potential mediators of prepregnancy BMI-child development associations (birthweight, pregnancy weight gain, gestational diabetes, breastfeeding, and postpartum depression). **Results**: Adjusting for sociodemographic factors, children of obese class II/III mothers had increased odds of emotional symptoms [odds ratio (OR) 2.13; 95% confidence interval (CI) 1.22-3.70], peer problems [OR 2.06; 95%CI 1.27-3.33], total psychosocial difficulties [OR 2.05; 95%CI 1.20-3.53], attention deficit hyperactivity disorder diagnosis [OR 4.13; 95%CI 1.72-9.90], autism/developmental delay diagnosis [OR 2.67; 95%CI 1.02-6.97], receipt of speech/language therapy [OR 1.75; 95%CI 1.08-2.82], receipt of psychological services [OR 2.33; 95%CI 1.16-4.65], and receipt of any special-needs service [OR 1.93; 95%CI 1.31-2.86] compared with children of normal weight mothers. There was only slight attenuation of a few estimates after adjustment for potential mediators. **Conclusion**s: Severe maternal prepregnancy obesity is associated with adverse childhood neurodevelopmental outcomes. Further study of the underlying mechanism is needed.

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IDENTIFICATION OF FETAL GROWTH RESTRICTION AND OVERGROWTH USING LATENT CLASS ANALYSIS. Janne Boone-Heinonen*, Sheila Markwardt, Rebecca Rdesinski, Celine Hollombe, Kimberly Vesco, Lynne Messer (Oregon Health & Science University, Portland, OR United States)

Background: Maternal under- or over-nutrition can be detrimental to fetal growth and life course health. Related epidemiologic research relies primarily on fetal development proxies such as birth weight, yet other measures such as disproportionate head circumference also indicate sub-optimal fetal development. We sought to identify latent constructs of fetal growth that incorporate multiple neonatal measures and capture both growth restriction and overgrowth. **Methods**: We linked electronic medical records from 15,864 women and their newborn infants delivered at a health maintenance organization between 2000 and 2010. Using latent class analysis, we derived classes of fetal growth characterized by birth weight and head circumference. We compared the fetal development classes with indicators of maternal over-nutrition (pre-pregnancy Body Mass Index classification, adherence to gestational weight gain recommendations, gestational diabetes) in age-adjusted multinomial logistic regression models. **Results**: Six latent classes were identified: three small birth size typologies (S1: moderately small; S2: uniformly small; S3: small with disproportionately small head circumference), two large size typologies (L1: moderately large; L2: large with disproportionately large head circumference), and one class with average birth size (referent outcome). Maternal obesity was more strongly associated with L2 [OR (95% CI): 2.02 (1.67, 2.45)] than L1 [1.32 (1.14, 1.54)]. Maternal underweight was most strongly associated with S3 but was not significant [1.32 (0.74, 2.36)]. **Conclusion**s: Maternal obesity and underweight was most predictive of large and small birth size, respectively, with disproportionate head circumference. Latent class analysis is useful for revealing complex fetal growth typologies that may reflect sub-optimal development but would likely be overlooked with traditional analytical techniques.

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INFORMING PRECONCEPTION WEIGHT LOSS COUNSELING FOR WOMEN ABOVE THEIR IDEAL BODY WEIGHT. Laura Schummers*, Jennifer Hutcheon, Lisa Bodnar, Katherine Himes (Harvard School of Public Health, Boston, MA United States)

Background: Overweight and obese women are at increased risk of adverse pregnancy outcomes compared with normal-weight women. A large body of literature compares risks across BMI categories (overweight or obese vs. normal-weight). While preconception weight loss counseling is recommended for overweight and obese women, few women lose enough weight to shift an entire BMI category. The benefit of more achievable weight loss is unknown. This study estimates the absolute risk of adverse maternal and perinatal outcomes based on small (10 lb) differences in prepregnancy weight. **Methods**: The study population for this population-based cohort study (n=229,387) was drawn from all singleton births in British Columbia (Canada) from 2004-2012. The relationships between prepregnancy weight and adverse pregnancy outcomes were examined using logistic regression. Analyses were adjusted for maternal age, height, parity, smoking in pregnancy, and calendar year. Prepregnancy weight was modeled with a restricted cubic spline to allow smooth, curvilinear relationships. We report adjusted risks for each outcome associated with prepregnancy weight in 10 lb. increments. **Results**: Incremental increases in prepregnancy weight were associated with increasing maternal risk of pre-eclampsia, gestational diabetes, and cesarean section, and newborn risk of macrosomia (birth weight>4500g), birth injury secondary to shoulder dystocia, NICU admission =48 hours, and in-hospital newborn mortality. Increasing prepregnancy weight was not associated with increased risk of postpartum hemorrhage requiring intervention, maternal mortality/severe maternal morbidity, spontaneous preterm labour <32 weeks, or stillbirth. **Conclusion**: These results can inform prepregnancy weight loss counseling and define achievable weight loss goals for patients that reduce their risk of poor perinatal outcomes.

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PATTERNS OF GESTATIONAL WEIGHT GAIN AMONG OVERWEIGHT AND OBESE WOMEN RELATED TO SMALL AND LARGE FOR GESTATIONAL AGE BIRTHS. Janet Catov*, Diane Abatemarco, Andrew Althouse, Esa Davis, Carl Hubel (University of Pittsburgh, Pittsburgh, PA United States)

Rates of obesity among children have tripled over the past 30 years, and risk is particularly high among infants born to overweight or obese mothers, perhaps related to excess gestational weight gain (GWG). Maternal obesity is associated with increased risk of large for gestational age (LGA) infants; it is also associated with hypertension in pregnancy and its related risk of small for gestational age (SGA) births. We considered that patterns of GWG in the first vs. second half of pregnancy among overweight or obese women may help disentangle these competing risks. We characterized patterns of GWG among a cohort of predominantly overweight or obese women (65% African American) recruited early in pregnancy and followed through delivery (n=567). GWG adequacy before 20 weeks and at delivery was based on the Institute of Medicine recommendations. SGA and LGA were those <10th or >90th percentile, respectively, for race based on a fetal ultrasound standard. Rates of SGA in this cohort were higher than LGA (15.2% vs. 8.3%). Four patterns of GWG were identified: early adequate/late excessive (n=183, 33.2%), and overall inadequate (n=112, 20.3%), adequate (n=94, 17.0%)], and excessive [n=162, 29.4%]. After accounting for age, race, prepregnancy BMI, parity, smoking and preeclampsia, inadequate GWG was associated with excess risk of SGA compared to adequate GWG (OR 2.06 [0.91, 4.67]). Early adequate/late excessive GWG was associated with reduced risk of SGA (OR 0.59 [0.26, 1.33]). As expected, risk of LGA was particularly high in women with consistently excessive GWG (7.3 [1.62, 33.1]). Although LGA risk was elevated among those with early adequate/ late excessive GWG, the magnitude appeared to be more modest (OR 5.0 [1.1, 23.0]). Among a cohort of overweight/obese women, rates of inadequate GWG and SGA were high. Adequate GWG in the first half of pregnancy among overweight/obese women may be associated with improved infant outcomes, even when weight gain is excessive later in gestation. How these GWG patterns may be related to offspring weight gain patterns after delivery warrants further study.

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THE INFLUENCE OF PRE-PREGNANCY BODY MASS INDEX AND FETAL SEX ON THE ASSOCIATION BETWEEN FETAL ADIPOKINES AND BIRTH WEIGHT. Linda Dodds*, Jillian Ashley -Martin, Tye Arbuckle, Adrienne Ettinger, Mandy Fisher, Shayne Taback, Erin Keely, Maryse Bouchard, Patricia Monnier, Renee Dallaire, Gabriel Shapiro (Dalhousie University, Halifax Canada)

The intrauterine environment plays an important role in fetal growth and may also be an important factor in childhood obesity. Fetal adipokines are thought to be associated with fetal growth, although results are not always consistent. Some studies suggest that maternal pre-pregnancy body mass index (BMI) and infant sex modify the association between the adipokines, leptin and adiponectin, and fetal growth. These relationships were explored in a cohort of pregnant women enrolled in the Maternal Infant Research on Environmental Chemicals Study (MIREC). The MIREC study enrolled 2001 women during the first trimester of pregnancy from 10 Canadian sites. Of these, 1237 women were non-diabetic, had a singleton live birth and had a cord blood sample collected at delivery. Covariates, including parity and socio-demographic variables were evaluated as potential confounders. Infant sex and BMI were considered as potential effect modifiers. The outcomes assessed were: birth weight analyzed as a continuous variable and dichotomous variables representing macrosomia (>4000 grams), large for gestational age (> 90th percentile) and small for gestational age (< 10th percentile). Adjusted logistic regression models were used to estimate ORs and 95% CIs for the associations between the outcomes and fetal levels of leptin and adiponectin. No evidence of effect modification by pre-pregnancy BMI or infant sex was observed. Cord blood levels of leptin and adiponectin in the top quartile were associated with adjusted ORs and 95% CIs for macrosomia of 11.5 (5.6-23.6) for leptin and 2.5 (1.6-3.9) for adiponectin, compared to the bottom quartile. Higher levels of cord blood leptin and adiponectin were associated with increased birth weight, independent of maternal BMI, infant sex and other factors. Thus, these measures may serve as a marker for the amount of fetal adipose tissue and future body composition.

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IMPACT OF PARENTAL MULTIPLE SCLEROSIS AND THE ASSOCIATED MENTAL COMORBIDITY ON EARLY CHILDHOOD DEVELOPMENT. Neda Razaz*, Helen Tremlett, Martin Guhn, W. Tom Boyce, KS Joseph, Ruth Ann Marrie (University of British Columbia, Vancouver Canada)

INTRODUCTION: Exposure to early-life stressors, are believed to tax children's bodies and mind, leading to harmful changes in their social and emotional functioning. We aimed to examine the impact of parental multiple sclerosis (MS) and the associated mental comorbidity on child developmental outcomes. **METHODS**: Retrospective matched cohort study in Manitoba, Canada, using linked population-based administrative databases. Of 49,328 children who were part of the Early Development Instrument data (EDI) collection, and born between 1999 and 2006, those with an MS parent were compared to children matched from the general population. MS and mental comorbidity were identified through validated algorithms using health administrative data. Developmental outcomes included the 5 EDI domains: physical health, social competence, emotional maturity, language, and communication skills. Findings were expressed as adjusted odds ratios (aOR) from multivariable conditional logistic regression models adjusting for confounders. **RESULTS**: Overall, 153 children had an MS parent and 888 formed the matched cohort. Children with an MS parent were similar to the matched population on all EDI domains, except vulnerability in social competence (aOR 0.50;95% CI:0.25-0.97). However, mental comorbidity affected more MS parents compared to the general population (77/153 [50.3%] vs. 313/888 [35.3%],P<0.001). Compared to unaffected MS parents, those with mental comorbidity were more likely to have a child who was vulnerable on the social competence (aOR 5.33;95%CI:1.12–25.44) or emotional maturity (aOR 3.11;95%CI:1.10–8.77) domains. **CONCLUSION**: The presence of parental MS was not independently associated with adverse developmental outcomes in children. However, mental comorbidity was more common in MS parents and had a detrimental impact on development. Appropriate support for these children and their families is needed.

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A PROSPECTIVE COHORT STUDY OF TIME-TO-PREGNANCY AND ADVERSE PREGNANCY OUTCOMES. Lauren A Wise*, Ellen M Mikkelsen, Henrik T Sorensen, Anders H Riis, Kenneth J Rothman, Elizabeth E Hatch (Slone Epidemiology Center at Boston University, Boston, MA United States)

Previous studies indicate that longer time-to-pregnancy (TTP) is associated with an increased risk of adverse pregnancy outcomes, independent of fertility treatment use. We used data from a prospective cohort study of Danish pregnancy planners (2007-2011) to examine the relation between TTP and selected pregnancy outcomes. TTP was ascertained prospectively from self-administered questionnaires. Outcomes were derived from the National Danish Birth and Patient Registries and included preterm birth (PTB; <37 weeks' gestation), low birth weight (<2500 g), preeclampsia, placental disorders (placenta previa, abruptio placenta, placenta accreta, or placental insufficiency), and caesarean delivery. The cohort was restricted to women with singleton births (N=3,630). We used log-binomial regression models to estimate risk ratios (RR) and 95% confidence intervals (CI), adjusting for maternal and paternal age, maternal body mass index (kg/m2), maternal smoking, infant sex, and parity. RRs (95% CIs) for risk of PTB in relation to TTP of 3-5, 6-11, and ≥12 versus <3 cycles were 1.69 (0.99, 2.87), 1.07 (0.61, 1.86), and 1.69 (1.01, 2.86). When PTB was defined as <36 weeks, the respective RRs were 1.46 (0.68, 3.12), 1.63 (0.78, 3.40), and 2.08 (1.02, 4.25). Longer TTP was associated with increased risk of placental disorders (TTP ≥12 vs. <3: RR=2.22, 95% CI: 0.99, 5.00), caesarean delivery (TTP ≥12 vs. <3: RR=1.89, 95% CI: 1.34, 2.67), and low birth weight (TTP ≥12 vs. <3: RR=1.92, 95% CI: 1.01, 3.65). However, the latter association was attenuated after control for PTB (RR=1.52, 95% CI: 0.88, 2.63). TTP was not appreciably associated with preeclampsia overall or within strata of parity. Further control for fertility treatment use, prepregnancy hypertension, or diabetes made little difference in the RRs. These data suggest that delayed conception is a marker of increased risk of some adverse pregnancy outcomes.

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OPTIC NERVE HYPOPLASIA IN THE UNITED STATES: THE PREVALENCE AND ASSOCIATION WITH SOCIO-ECONOMIC STATUS. Pamela Garcia-Filion*, Cassandra Fink, MPH, Joyce Sutedja, Mark Borchert, MD* (Children's Hospital Los Angeles, Los Angeles, CA United States)

Background: Optic nerve hypoplasia (ONH), a birth defect associated with lifelong morbidity, increased in prevalence 6-fold since 1970 to 1.1 per 10,000 children. Primiparity and young age increase risk but the underlying association is unclear. Recent research implicates nutritional status. Study objectives were to describe the prevalence of ONH in the United States (US), and to examine an association with socioeconomic status (SES). **Methods**: This is a retrospective analysis of a registry of cases of ONH born in the US. The registry contains prenatal residential data collected by online survey. First trimester address data were geocoded to the smallest unit possible: zip code or census tract. Pediatric (<18years) population data were used to estimate disease prevalence for affected zip codes and census tracts, presented as median (interquartile range). With the census tract subgroup, aggregate prevalence data were compared to census data on unemployment, household income, and poverty using nonparametric statistical tests. **Results**: The study cohort consisted of 1650 cases of ONH born 1954-2012. Nearly all cases (99%) were successfully geocoded; 979 at zip code and 668 at census tract levels. Median prevalence of ONH in affected zip codes and census tracts was 1.78 (1.09, 3.43) and 7.77 (5.52, 11.24) per 10,000 children less than 18 years of age, respectively. In the census tract subgroup, a higher prevalence correlated with lower household income ($p<0.01$) and higher poverty rates, albeit marginally statistically significant ($p=0.05$). The prevalence of ONH was not associated with unemployment ($p=0.39$). **Conclusion**: The prevalence of ONH in the US was previously unknown. Our findings suggest not only a higher prevalence but provide evidence of a possible association with SES. There is a need to further investigate this association with individual level study designs in areas with high density of cases.

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POPULATION-BASED SURVEILLANCE AND PREVALENCE OF STILLBIRTHS: IOWA STILLBIRTH SURVEILLANCE PROJECT (ISSP). Paul Romitti*, K PIPER, C FALL, S GORTON, F FOO, K CONWAY, S AU, C DRUSCHEL, M RUTTENBER (The University of Iowa, Iowa City, IA United States)

Introduction: In the United States, stillbirth prevalence is commonly estimated from fetal death certificates (FDCs) with reports of 6/1,000 deliveries. FDC reporting is guided by the Model State Vital Statistics Act and Regulations (Model Law), which recommends defining a fetal death as a stillbirth if delivery weight was =350 grams or gestation was =20 weeks. Each state, however, develops its own FDC criteria, which limits its use for generating national estimates. **Methods**: An alternative to FDCs is use of birth defect surveillance systems to identify stillbirths. In 2005, the ISSP engaged the Iowa Registry for Congenital and Inherited Disorders to conduct population-based stillbirth surveillance among nearly 40,000 deliveries annually. Iowa defines a reportable stillbirth per the Model Law. Using this definition, we conducted multisource surveillance (e.g., FDCs, perinatal reports, inpatient and outpatient records) and estimated stillbirth prevalence (N stillbirths/N live birth+stillbirth deliveries) in Iowa. **Results**: From 2005-2011, we ascertained 1,363 reportable stillbirths among 278,666 deliveries, producing an overall prevalence of 4.9/1,000 deliveries; annual estimates ranged from 4.2 to 5.9. Our multisource ascertainment verified that 82% of FDCs issued were for reportable stillbirths. Additionally, 15% of all reportable stillbirths were not issued a FDC. **Conclusion**s: Our population-based estimates for stillbirths tend to attenuate those previously reported. Our approach can serve as a model for other states to conduct stillbirth surveillance. To this end, we recently expanded to birth defect surveillance systems in Colorado, Hawaii, and New York State, and now annually monitor more than 120,000 deliveries with a diverse racial/ethnic composition.

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PRENATAL EXPOSURE TO TRIPTAN MEDICATIONS AND BEHAVIORAL PROBLEMS IN CHILDREN: RESULTS FROM THE NORWEGIAN MOTHER AND CHILD COHORT STUDY. Mollie Wood*, Eivind Ystrøm, Kate Lapane, Jean Frazier, Hedvig Nordeng (University of Massachusetts Medical School, Worcester, MA United States)

Background: Triptans are serotonin agonists used to treat migraine. Triptans cross the placenta and the fetal blood-brain barrier, and are plausible teratogens. No studies have examined neurodevelopmental effects of triptan exposure. **Objectives**: To quantify risk of behavior problems in children prenatally exposed to triptan medications. **Methods**: The Norwegian Mother and Child Cohort Study is a birth cohort that includes more than 100000 women recruited during pregnancy. Data are collected through questionnaires and linkage to birth registries. This study included 101625 live singleton births without major malformations. 48029 were present at 36 months. Exposure groups were: (1) triptans in pregnancy (N=457, 1.0%) (2) triptans pre-pregnancy only (N=911, 1.9%) (3) migraine with no history of triptans (N=5218, 8.0%), and (4) no history of migraine or triptan use (N=48029, 89.1%). A T score of 70 or higher on the internalizing or externalizing subscales of the Child Behavior Checklist indicated clinically significant problems. Logistic regression models accounting for clustering of children within mothers provided odds ratios (95% confidence intervals) adjusted for medication exposure, depression, substance use, and maternal characteristics. **Results**: Children prenatally exposed to triptans had an increased risk of externalizing problems relative to children whose mothers reported triptan use before pregnancy (OR=1.8, 95%CI 1.1- 2.9), migraine with no triptan use (OR=1.8, 95%CI 1.2-2.6), and no triptan use or migraine (OR=2.0, 95%CI 1.4-2.8). An increased risk of internalizing problems was observed in children whose mothers only used triptans before pregnancy compared to the no-migraine group (OR=1.4, 95%CI 1.0-2.0); no differences were observed between other exposure groups. **Conclusion**: This study is the first to report that prenatal triptan exposure is associated with behavior problems in children.

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SLEEP QUALITY AND PREGNANCY OUTCOME. Mark Klebanoff*, Reena Oza-Frank, Sarah Keim, Courtney Lynch (The Ohio State University, Columbus, OH United States)

Background: Poor quality sleep has been associated with increased risk of pregnancy complications. We assessed risk factors for poor quality sleep and the association between sleep quality and pregnancy outcome. **Methods**: High-risk pregnant women (n=264) in the Ohio Perinatal Research Network Perinatal Research Repository completed the Pittsburgh Sleep Quality Inventory (PSQI) at enrollment and each trimester; scores >5 represented poor quality sleep. Statistical significance was assessed by linear and logistic regression with GEE. **Results**: 67% of scores were elevated. Mean score was higher among smokers (8.6 vs 7.2, $p=0.007$), among white (8.8) vs black (7.4, $p=0.006$) and other (6.5, $p=0.02$) women, and with decreasing age (-.02/year, $p=0.07$). Mean score did not vary significantly by trimester (7.9 1st , 7.3 2nd, 8.1 3rd), by education (7.7 >HS, 7.8 HS, 7.9 5 were similar. Associations between PSQI and pregnancy outcomes were then restricted to scores before the 3rd trimester to minimize reverse causation. Mean 1st and 2nd trimester PSQI was similar between women delivering preterm or term (7.8 vs 7.4, $p=0.53$), women with and without GDM (7.4 vs 7.9, $p=0.57$), and women with and without hypertensive disorders (7.2 vs 7.8, $p=0.43$). **Conclusion**: Poor quality sleep was common, but 1st and 2nd trimester sleep quality was not associated with outcome.

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UNDERSTANDING DECLINES IN STILLBIRTH AND NEONATAL MORTALITY IN EUROPE. Ashna Mohangoo*, Jennifer Zeitlin, The Euro-Peristat Research Group (TNO Netherlands Organization for Applied Scientific Research, Department Child Health, Leiden Netherlands)

Background: Fetal and neonatal mortality rates declined in most countries of Europe between 2004 and 2010. We investigated the contribution of changing gestational age distributions and gestational-age specific mortality rates to these declines. **Methods**: Aggregate data on live births, fetal and neonatal deaths by gestational age were collected using a common protocol from countries and regions in the Euro-Peristat project in 2004 and 2010. Overall mortality rates were computed using inclusion thresholds of 28+ weeks for fetal deaths (N=25 countries) and 24+ weeks for neonatal deaths (N=22 countries). Rate ratios (RR) for mortality in 2010 versus 2004 were computed overall and by gestational age subgroups (24-27, 28-31, 32-36, 37+ weeks); pooled RR were derived using random-effects models. **Results**: Changes in the gestational age distribution contributed little to declines in mortality between 2004 and 2010. Mortality declined in all gestational age subgroups. For fetal mortality, RR were 0.81 [95% CI: 0.79 - 0.84] for all births, 0.88 [95% CI: 0.79-.1.03] at 28 to 31 weeks of gestation, 0.84 [95% CI: 0.77-0.91] at 32 to 36 weeks and 0.81 [95% CI: 0.72-0.92] at 37+ weeks. The corresponding RR for neonatal mortality were 0.72 [95% CI: 0.67-0.79], 0.75 [95% CI: 0.67-0.83], 0.78 [95% CI: 0.67-0.91] and 0.75 [95% CI: 0.64-0.85] respectively. **Conclusion**s: Recent declines in fetal and neonatal mortality have been driven by a reduction in gestational-age-specific mortality with gains at all gestational ages. Because of the distribution of births by gestational age, absolute declines in number of deaths were highest for births at term.

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POPULATION AVERAGE TREATMENT EFFECT OF THE MEDICAL HOME FOR RECEIPT OF PEDIATRIC DEVELOPMENTAL SCREENING, 2011-2012 NATIONAL SURVEY OF CHILDREN'S HEALTH. Nicole Richmond*, Tri Tran, Susan Berry (Louisiana State University Health Sciences Center, New Orleans, LA United States)

The medical home (MH) model of pediatric medical care is associated with increased health service access and healthier outcomes. Pediatric developmental screening policy by the American Academy of Pediatrics specifies all children be given a formal evaluation at 3 ages and continuous surveillance. A complementary policy cites such screening and surveillance is part of the MH. Most studies to guide MH and screening policy are from observational designs. We applied a propensity score inverse probability of treatment weight (IPTW) to estimate the population average treatment effect (PATE) using novel methods that account for the extrapolation limitations arising from complex survey data. Propensity scores for the MH were calculated using 15 child/family characteristics and survey design elements. IPTWs were standardized and multiplied by child's survey weight. Screening misclassification was assessed in 3 ways based on history of diagnoses that may indicate screening. Selection bias reduction ranged from 44.7 to 99.8% after IPTW adjustment. About 61% and 32% of children were reported to have a MH and receive screening, respectively. Children with a MH have a higher screening prevalence (32.94%, 95% CI: 30.68-35.28) compared to those without a MH (29.60%, 27.61-31.68). This corresponds to a PATE of 17% (OR: 1.17, 1.01-1.35). Differential misclassification is indicated with each bias rubric tested. We found plausible mechanisms by child and family factors. Although evaluation of all children for delay is pediatric best practice policy, we found a small fraction of the eligible population was screened. The MH is associated with a nominal but significant increase, translating into approximately 1.7 million or 8.5% more children screened as a function of a MH. Policy to enable greater pediatric medical care delivered according to MH principles may concurrently increase the prevalence of children screened.

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PREDICTORS OF AGES AND STAGES QUESTIONNAIRE SCORES AT SIX MONTHS. Tia Kauffman*, Joanna Bulkley, Michelle Henninger, Allison Naleway (Kaiser Permanente Northwest Center for Health Research, Portland, OR United States)

Background The American Academy of Pediatrics recommends that children be screened for developmental delays and disorders at every well-child visit. One screening tool, the Ages and Stages Questionnaire Version 3 (ASQ), can be used with children from one month through five and a half years of age. Each age-specific ASQ has 30 questions covering 5 developmental domains. There is very little published literature about the use of the ASQ in the youngest infants. **Methods**: The Pregnancy and Influenza Project enrolled a cohort of pregnant woman at Kaiser Permanente Northwest and Northern California during the 2010-2011 influenza season. A total of 1,199 women completed a follow-up interview six months after delivery, which included the ASQ for their infants. The interviews collected data on maternal and infant characteristics; data also were gathered through the electronic medical record. We used hierarchical linear modeling to determine predictors of the ASQ scale scores. **Results**: Median ASQ scores were 50.0 for the Gross Motor, Personal Social, and Communication domains, and 55.0 for the Fine Motor and Problem Solving domains. Most of the variables examined were univariately correlated with ASQ scores, including infant age at ASQ, maternal age, race, ethnicity, maternal education, and infant birth weight. Maternal factors (e.g. age, race) and infant factors (e.g. age at ASQ, gender, birth weight) significantly predicted ASQ scores in multivariate models, with r-square values ranging from .045 to .119. Discussion: Few studies have reported the use of ASQ scores in young infants. This analysis identified some predictors of ASQ scores, including maternal factors, infant factors, and pregnancy factors. Although the factors were significantly correlated with ASQ scores, they explained about 11% or less of the variance in scores. Additional research is needed to identify other predictors of scores in young infants.

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MODIFICATION OF THE EFFECT OF PRETERM BIRTH ON ELEMENTARY SCHOOL ACADEMIC PERFORMANCE BY NEIGHBORHOOD DEPRIVATION IN EARLY CHILDHOOD. Jennifer Richards*, Michael Kramer, Theresa Chapple-McGruder (Department of Epidemiology, Rollins School of Public Health, Emory University, Atlanta, GA United States)

Preterm birth (<37 weeks) and lower socioeconomic status have been associated with poorer cognitive development and academic outcomes among children. We hypothesized that early life environment modifies the effect of earlier gestational age on academic outcomes, specifically that children born earlier in more deprived early life environments have poorer academic outcomes than those born in less deprived early life environments. We evaluated the joint estimated effect of preterm birth and neighborhood deprivation index (NDI) on first grade performance on the Georgia Criterion-Referenced Competency Test (CRCT) for mathematics, among 350,870 children born in Georgia from 1998-2003. We used generalized estimating equations clustered by census tract at birth to estimate risk ratios for the joint association of preterm birth and NDI with CRCT failure. In unadjusted and adjusted models, we found that there was significant interaction between preterm birth and NDI. After adjustment for potential confounders, being born preterm versus term at the same NDI was associated with 25% (95% CI: 22-28) higher risk of CRCT failure. Experiencing a 1 SD increase in NDI (corresponding to worse neighborhood environment) was associated with 5% (95% CI: 3-7) higher risk of CRCT failure among term infants, but only a 1% (95% CI: -2-4) higher risk of CRCT failure among preterm infants. These findings suggest that NDI may modify the effect of being born preterm on risk of worse academic performance in elementary school, but that infants born at earlier gestational age may be less affected by worse neighborhood environment.

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POSTTERM BIRTH AS A RESPONSE TO ENVIRONMENTAL STRESS: THE CASE OF SEPTEMBER 11, 2001. Claire Margerison-Zilko*, Julia Goodman, Elizabeth Anderson, Ralph Catalano (Michigan State University, East Lansing, MI United States)

Background. Despite growing interest in the role of maternal psychosocial stress as a determinant of preterm birth, no existing work has examined the relation between maternal stress and postterm birth (=42 completed weeks). **Methods**. We examined the relationship between exposure to the September 2001 terrorist attacks and odds of postterm birth in California. We calculated the expected odds of postterm birth among singleton male and female gestations reaching at least 37 weeks in California between July 1997 and November 2005. We then used time series analysis to compare the observed and expected odds of postterm birth at each month in the series. **Results**. The observed odds of postterm delivery among gestations reaching term in September 2001 were 25.2% and 24.0% higher than statistically expected for males and females, respectively. This difference exceeded any other over the 101 month test period. **Conclusion**s. Our finding that odds of postterm birth were higher than expected among term gestations exposed to the September 2001 terrorist attacks supports the hypothesis that exposure to psychosocial stress during pregnancy may result in prolonged gestation. Mechanisms may include biological responses to stress or changes in health care delivery.

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THE CONTRIBUTION OF MATERNAL BIRTH COHORT TO TERM SMALL FOR GESTATIONAL AGE IN THE U.S. 1989-2010: AN AGE, PERIOD, AND COHORT ANALYSIS. Claire Margerison-Zilko* (Michigan State Univeristy, East Lansing, MI United States)

Background. After decades of steady increase, mean birthweight in the U.S. declined throughout the 1990s and early 2000s. This trend is not fully explained by changes in length of gestation, medical practice, demographics, or maternal behaviors. We hypothesized that secular changes in health or social factors affecting women across their lifecourse may have contributed to this unexplained trend. In this study, we examined maternal birth cohort as a proxy measure of lifecourse determinants of fetal growth in the U.S. **Methods**. We used the age, period, and cohort (APC) intrinsic estimator (IE) approach to estimate the contribution of maternal birth cohort (independent of maternal age and period of birth) to small for gestational age, overall and among term births, in the U.S. from 1989-2010. We conducted analyses separately among foreign- and U.S.-born Hispanic, non-Hispanic black (NHB), and non-Hispanic white (NHW) mothers. **Results**. We found evidence of a U-shaped relationship between maternal birth cohort and SGA among NHB women only. After accounting for maternal age and period of birth, risk of SGA among NHB women born in 1950 was 21.1%, and this risk decreased to 15.9% in 1970 (a decline of 25%). However, NHB women born after 1970 experienced increasing risk, with risk climbing to 19.6 by the 1986 birth cohort.

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ANTIMUSCARINIC UTILIZATION IN THE PEDIATRIC POPULATION, UNITED STATES 2000-2011. Alan Kinlaw*, Jennifer M. Wu, Mitchell M. Conover, Virginia Pate, Michele Jonsson Funk (University of North Carolina at Chapel Hill, Department of Epidemiology, Chapel Hill, NC United States)

Background: Muscarinic receptor antagonists (antimuscarinics) are first line pharmacotherapy for overactive bladder; oxybutynin is the only one approved in the US for children 5 and older. There are no population-based estimates of utilization in children. **Methods**: We assessed longitudinal healthcare claims in Truven Health Analytics' MarketScan database from 2000 to 2011 for individuals <18 years of age, including person-time only when children had prescription drug coverage. Using National Drug Codes, we identified prescriptions for twelve antimuscarinic formulations and standardized prescription length to 30 days. We estimated utilization rates per 100,000 person-months, rate ratios (RR), and 99% confidence intervals (CI). We described diagnoses from the most proximate inpatient or outpatient visit preceding prescription, within 30 days. **Results**: We identified 60,628 children with 270,184 prescriptions among 34,416,978 children during 655,743,096 person-months of prescription coverage (rate: 41.2 prescriptions per 100,000 person-months; 99%CI: 41.0–41.4). Among children <7 years of age, oxybutynin syrup was the most common prescription; for older children, oxybutynin and tolterodine pills were prevalent. Utilization varied by age and was highest for ages 6-9 (rate: 66.6; 99%CI: 66.0–67.2). Utilization was 32% higher for females than males (RR: 1.32; 99%CI: 1.31–1.34). Use increased by 1.9% per calendar year from 2000 to 2011 (99%CI: 1.7–2.1). The most common diagnoses were urinary frequency (9%), incontinence (8%), urinary tract infection (8%), and nocturnal enuresis (6%). **Conclusion**: Antimuscarinic utilization in children and adolescents has increased and the highest rates are among girls age 6-9 years. Additional research is needed regarding the efficacy and safety of these drugs in the pediatric population.

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ASSOCIATIONS OF EARLY AND LATE GESTATIONAL WEIGHT GAIN WITH OFFSPRING BIRTHWEIGHT. Pandora Wander*, Colleen Sitlani, Sylvia Badon, David Siscovick, Michelle Williams, Daniel Enquobahrie (University of Washington, Seattle, WA United States)

Introduction: Higher gestational weight gain (GWG) is associated with higher birthweight (BW); however, associations of early- and late-pregnancy GWG with BW have not been rigorously examined. **Methods**: We studied 3624 mother-offspring pairs from Omega, a cohort study based in Seattle, WA. Demographics and history were obtained by questionnaire at an average of 16 weeks gestation. GWG and BW were abstracted from medical records. GWG (kg) was characterized by total, early (<20 weeks), and late (≥20 weeks). We used multivariable linear regression to calculate mean differences and 95% confidence intervals (CIs) relating GWG to BW overall and in sex-stratified analyses. Models were adjusted for maternal age, pre-pregnancy BMI, height, parity, race, smoking, education, medical comorbidities, offspring sex, and gestational age at delivery. **Results**: Average total, early, and late GWG were 16.3, 6.8, and 9.5 kg. A 1kg change in GWG was associated with a 16.4g change in BW (95% CI 13.8-18.9, p< 0.0001). A 1kg change in early GWG was associated with a 14.5g change (95% CI 10.8-18.2, p<0.0001) in BW adjusted for late GWG. A 1kg change in late GWG was associated with an 18.8g change (95% CI 14.8-22.9, p<0.0001) adjusted for early GWG. Overall, there was no evidence the association differed for early vs. late GWG (Wald test $\chi 2$ 3.99, p=0.0459). Associations were significant in sex-stratified models for males and females. Formal sex interaction terms were not significant (p=0.424 early, p=0.543 late). There was a suggestion the association was different for early vs. late GWG among female infants; however, this result did not reach significance ($\chi 2$ 3.60, p=0.0578). **Discussion**: Early and late GWG are associated with BW. Understanding GWG across pregnancy will help guide obstetric recommendations.

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CIRCADIAN RHYTHM OF PLACENTAL ABRUPTION ONSET. Miguel Angel Luque-Fernandez*, Cande V. Ananth, Sixto E. Sanchez, Chun-fang Qiu, Sonia Hernandez-Diaz, Unnur Valdimarsdottir, Bizu Gelaye, Michelle A. Williams (Department of Epidemiology, Harvard School of Public Health, Boston, MA United States)

Background: Circadian rhythms modulate physiologic processes including cortisol and oxytocin secretion; these rhythmic changes are, in turn, associated with the timing of myocardial infarction, stroke, and other vascular disorders. The circadian variation in the onset of placental abruption (PA) is unknown. We modeled the time of PA onset and assessed whether PA presents a different pattern by gestational age, infant sex and parity. **Methods**: We used parametric and nonparametric methods including trigonometric and fractional polynomial regression in the framework of generalized linear models to characterize the circadian variation in PA onset. The study population included 163 singleton pregnancies with PA and a non-induced delivery between 21-44 gestation weeks in Lima, Peru, between 2009 and 2010. We replicated our analysis with 633 PA cases from the US National Collaborative Perinatal Project (NCPP, 1959-66). **Results**: We observed a similar diurnal pattern of the time of PA onset in both populations, with an aggregation of cases during the morning, afternoons and late evening. We found a distinct morning peak at 07h:00' ranging between 06h:00' and 08h:00' in the Peruvian study and at 10h:00', ranging between 09h:00' and 11h:00', in the NCCP study. Diurnal pattern of PA onset was similar across groupings of gestational age, infant sex and parity, with no significant differences in a harmonic term by variable interaction test. **Conclusion**: The time-of-onset of PA in these studies showed a predominant diurnal circadian pattern. Increased understanding of circadian rhythms in pregnancy and parturition may yield important insights toward an understanding of the pathophysiologic processes and mechanisms leading to PA.

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PREDICTORS OF BREASTFEEDING INITIATION AND MAINTENANCE IN AN INTEGRATED HEALTHCARE SETTING. Michelle Henninger*, Stephanie Irving, Tia Kauffman, Allison Naleway (Kaiser Permanente Center for Health Research, Portland, OR United States)

Background The American Academy of Pediatrics recommends exclusive breastfeeding to age six months and continued breastfeeding for at least one year. Recent estimates suggest that 74% of women initiate breastfeeding, 14% breastfeed exclusively to six months, and 23% breastfeed to 12 months. **Methods**: Participants were 1,149 pregnant women enrolled in the Pregnancy and Influenza Project at Kaiser Permanente Northwest and Northern California during the 2010-2011 influenza season. Data were collected through enrollment interviews at baseline, follow-up interviews at one and six months postpartum, as well as participants' electronic medical records. **Results**: Most (99%) women reported initiating breastfeeding. Women with higher maternal education, higher scores on the Subjective Social Status scale, and lower parity were more likely to initiate breastfeeding. Rates of exclusive breastfeeding were 70% and 54% at one and six months postpartum, respectively. An additional 23% of women reported supplementing breastfeeding with formula at six months. Multiple factors were associated with maintenance of breastfeeding, including maternal age at delivery, marital status, race, ethnicity, subjective social status, normal term birth, pre-pregnancy body mass index, smoking status, vitamin/folic acid use prior to pregnancy, and mental health diagnoses during pregnancy. Of women who supplemented, the mean infant age at introduction of formula was 52 days (SD = 59 days). The mean infant age for stopping breastfeeding was 85 days (SD = 62 days). **Discussion**: Rates of breastfeeding initiation and maintenance in our population were higher than the general population. However, a significant number of women stopped breastfeeding or began supplementing with formula earlier than recommended. Two to three months postpartum may be a critical period when additional encouragement or intervention by healthcare providers may be warranted.

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VALIDATION OF MOTHER-INFANT LINKAGE USING THE MEDICAID CASE ID VARIABLE WITHIN THE MEDICAID ANALYTIC EXTRACT (MAX) DATABASE. Caitlin Knox*, Almut Winterstein (University of Florida, Gainesville, FL United States)

Background: The state-assigned Medicaid Case ID number in the Medicaid Analytic eXtract (MAX) allows for the possible unique linkage of mothers to infants. Research using the Medicaid Case ID number is limited, and no validation of respective linkage algorithms is available. **Objectives**: To establish and validate an algorithm within the MAX database that will link mothers to infants. **Methods**: We identified all women aged 12-55 years old with in- or outpatient billing record for delivery, and infants born in 1999-2004 in the MAX database. We then linked mothers to infants by Medicaid Case ID number and the delivery/birth dates using varying requirements for MAX eligibility periods. To examine the linking performance we used SSN and date of birth to link all identified MAX subjects to Florida Vital Birth Certificates (FVBC) to identify true mother-infant pairs. **Results**: We assessed 856,270 and 1,167,016 patient records in MAX and FVBC databases respectively. We found a sensitivity ranging from 57.1% to 73.6% with specificity of 98.0 to 99.9%; the positive predictive value (PPV) ranged from 6.6% to 88.2%, when varying the MAX eligibility of both the mothers and/or infants. We found that varying the delivery window (i.e. +/-5 days to -30 days) slightly increased the number of mother-infant pairs, but minimally changed the sensitivity, specificity, or PPV. Changing the required MAX eligibility period before delivery/birth (e.g. 1-month continuous eligibility before delivery/birth) varied the validity parameters by increasing sensitivity, specificity and PPV of a linkage to a certain point then decreasing minimally. **Conclusion**s: We were successful in identifying and validating a mother-infant linkage algorithm in MAX. The ability to link mothers to infants using the Medicaid Case ID number maximizes the utility of administrative claims data in population-based pregnancy research and enhances the evaluation of pregnancy outcomes by providing access to the health information of both mother and child.

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HISTORY OF ORAL CONTRACEPTIVE USE AND RISK OF SPONTANEOUS ABORTION. Kristen Hahn*, Elizabeth Hatch, Kenneth Rothman, Ellen Mikkelsen, Susan Brogly, Lauren Wise (Boston University School of Public Health, Boston, MA United States)

Introduction: Pregravid oral contraceptive (OC) use has been associated with a decreased risk of spontaneous abortion (SAB) in some but not all studies. Little is known about the influence of dose of estrogen or type of progestin on risk of SAB. **Methods**: We assessed SAB risk in relation to recency and total duration of OC use, as well as dose and generation of the most recent OC used, among 4862 Danish participants from a prospective cohort study. We divided recency of OC use into the following categories: 0-1, 2-6, 7-12, and >12 months. The categories of duration were: <4, 4-7, 8-11, and 12 or more years. We used discrete-time Cox regression to estimate risk ratios (RRs) and 95% confidence intervals (CI), controlling for potential confounders and mutually adjusting for recency and duration of OC use. **Results**: Use of OCs within 0-1 months of conception was associated with an 18% increase in risk of SAB vs. use >1 year before conception (RR: 1.18; 95% CI: 0.88, 1.57). Women who most recently used a 4th generation progestin had 1.14 times the risk of SAB compared with women who used a 3rd generation progestin (95% CI: 0.89, 1.48). Overall, duration of OC use and dose of estrogen were not materially associated with SAB risk. **Conclusion**s: More recent OC use and use of a 4th generation progestin as the recent formulation were independently associated with a small increase in SAB risk. Dose estrogen and duration of OC use were not materially associated with risk.

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MATERNAL AGE AND PRETERM BIRTHS IN INFANTS CONCEIVED BY IN VITRO FERTILIZATION IN THE UNITED STATES. Xu Xiong*, Richard P. Dickey, Gabriella Pridjian, Pierre Buekens (Tulane University School of Public Health and Tropical Medicine, New Orleans, LA United States)

In natural conception advanced maternal age (≥ 35 years) is associated with an increased risk of preterm birth. However, few studies have specifically examined this association in births resulting from in vitro fertilization (IVF). The objective of this study was to examine whether advanced maternal age is associated with an increased risk of preterm births in infants conceived by IVF. We conducted a retrospective cohort study of 97,288 singleton and 40,961 twin pregnancies resulting from fresh non-donor IVF cycles using 2006-2010 data from the Society for Assisted Reproductive Technology Clinic Online Reporting System. Rates of very early preterm (<28), early preterm (<32), and preterm birth (<37 completed weeks) decreased with increasing maternal age in both singleton and twin births (P-Trend <0.01). In both singletons and twins, with women aged 30-34 years as the referent, women aged ≤ 30 years were at increased risk of all types of preterm births. The increased risk of preterm births among younger women was even more significant in twins than in singletons. The adjusted odd ratios (95 % confidence intervals) of very early preterm twin birth, early preterm twin birth, and preterm twin birth in women aged <25 were 1.7(1.2-2.2), 1.3 (1.1-1.6), and 1.5 (1.3-1.8) (all P <0.01). However, women aged ≥ 35 years were not at increased risk of all types of preterm births in both singleton and twin births. The authors conclude that, in contrast to natural conception, advanced maternal age is not associated with increased risk of preterm births in infants conceived by IVF. Women who seek IVF treatments before 30 years old are at higher risk of all types of preterm births. This information should be included when counseling younger patients and an effort made to determine the cause of this clinical paradox.

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SOCIODEMOGRAPHIC AND HISPANIC ACCULTURATION FACTORS AND ISOLATED ANOTIA/MICROTIA. Mark Canfield*, Adrienne T Hoyt, Gary Shaw, Dorothy K Waller, Kara ND Polen, Tunu Ramadhani, Marlene Anderka, Angela Scheuerle (Texas Department of State Health Services; Birth Defects Epidemiology and Surveillance Branch, Austin, TX United States)

BACKGROUND: It has been observed in several studies that anotia/microtia is more common among Hispanics compared with other racial/ethnic groups. We examined the association between Hispanic ethnicity and selected acculturation factors and anotia/microtia in the National Birth Defects Prevention Study (NBDPS). **METHODS**: We examined data from mothers of 351 infants with isolated anotia/microtia and 8,435 unaffected infants from the NBDPS with an expected delivery date from 1997 to 2007. Sociodemographic and Hispanic acculturation factors (e.g. age, maternal education, household income, BMI, gestational diabetes, folic acid, smoking, alcohol intake, study center, parental birthplace and years lived in the United States, maternal language) were assessed as overall risk factors and also as risk factors among subgroups of Hispanics based on nativity status (US- and foreign-born). Adjusted odds ratios (aORs) and 95% confidence intervals (CIs) were estimated from logistic regression models. **RESULTS**: Compared to non-Hispanic whites, both US- and foreign-born Hispanic mothers demonstrated substantially higher odds of delivering infants with anotia/microtia across nearly all strata of sociodemographic and other maternal factors ((aORs) range: 2.3-8.3). The odds of anotia/microtia were particularly elevated among Hispanic mothers who emigrated from Mexico after age five (aOR=5.7, 95% CI=3.5-9.1) or who conducted the interview in Spanish (aOR=5.7, 95% CI=3.6-9.2). **CONCLUSIONS**: We observed that certain sociodemographic and acculturation factors are associated with higher risks of anotia/microtia among offspring of Hispanic mothers. Key words: anotia; microtia; acculturation; nativity; Hispanic

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PRETERM BIRTH IN THE CONTEXT OF INCREASING INCOME INEQUALITY IN THE UNITED STATES. Maeve Wallace*, Pauline Mendola, Zhen Chen, Beom Seuk Hwang, Katherine Laughon (Eunice Kennedy Shriver National Institute of Child Health and Human Development, Rockville, MD United States)

Income inequality may have a deleterious impact on population health. Preterm birth is a leading cause of infant morbidity and mortality in the United States, and rates are consistently higher among socioeconomically disadvantaged women. Little is known about the contextual effect of income inequality on preterm birth, an issue of increasing concern in the US where the economic divide is the largest since 1928. We sought to examine the relationship between increasing income inequality and preterm birth. We studied singleton deliveries from an electronic medical record-based cohort (n=223,502) conducted in 12 states from 2002-2008. Income inequality was determined using state-level Gini index, a measure of resource distribution in a population. Increasing income inequality was defined as a positive change in Gini index from the year prior to birth. Multi-level models were used to estimate independent effect of increasing inequality on preterm birth < 37 weeks. The preterm birth rate was higher in states when inequality increased (12.3%) compared to 10.9% where inequality was constant or decreased. After controlling for maternal demographic characteristics, markers of individual-level socioeconomic position, health behaviors, and underlying medical conditions, increasing inequality was still associated with preterm birth (adjusted odds ratio=1.07; 95% confidence interval=1.03, 1.10). The magnitude of inequality increase was less important than the increase itself and findings were similar regardless of the degree of initial inequality. Understanding processes through which increasing income inequality impact preterm delivery and identifying factors that limit risk among the most disadvantaged women should be priorities for future reproductive health research.

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MODELING THE EFFECTS OF THE ECONOMIC ENVIRONMENT ON UNINTENDED PREGNANCY AND RELATED OUTCOMES. Deborah Karasek* (University of California, Berkeley, San Francisco, CA United States)

Background: The economic recession in the U.S. has prompted a re-visitation of the literature on the health impacts of the economy. Variation in economic conditions may influence contraceptive and sexual behavior prior to pregnancy, thereby altering risk of unintended pregnancy. Additionally, the economic environment may impact individual abortion decision-making. Understanding how the recession and economic uncertainty affect fertility intention and decision-making may bring insight into the determinants of unintended pregnancy and abortion. **Methods**: Using self-reported data on 18,901 pregnancies from 1990 to 2010 from the National Survey of Family Growth (NSFG) and monthly national unemployment data from the National Bureau of Labor statistics (NLBS), I constructed multivariate generalized estimating equation (GEE) models to estimate the effect of unemployment on outcomes of (1) unintended pregnancy, mistimed and unwanted compared to wanted pregnancies, and (2) abortion and miscarriage compared to birth. Planned future analyses include using time-series methods to detrend unemployment data and an additional independent variable measure of consumer sentiment. **Results**: This analysis indicates that unemployment rates are positively associated with the odds of a pregnancy being reported as mistimed versus wanted (OR=1.05, 95% Confidence Interval [1.01, 1.09]), of abortion versus birth (OR=1.10, 95% CI [1.05, 1.17]) and miscarriage versus birth (OR=1.10, 95% CI [1.05, 1.16]), controlling for maternal characteristics. **Conclusion**: This result supports the hypothesis that economic uncertainty, as modeled through the unemployment rate, impacts fertility intention through changes in desired timing of pregnancy. These models also indicate that women are more likely to terminate a pregnancy in a time of greater economic risk.

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ASSESSING GENERAL HEALTH CHARACTERISTICS AMONG PREGNANT WOMEN: WEB-BASED QUESTIONNAIRES VERSUS OBSTETRICAL RECORDS. Marleen van Gelder, Naomi Schouten, Peter Merkus, Chris Verhaak, Jolt Roukema, Nel Roeleveld* (Radboud University Medical Center, Nijmegen Netherlands)

Although the use of Web-based questionnaires (WBQs) in medical research is increasing, data on the validity of this method of data collection are scarce. The aim of this study was to assess the validity of data on chronic conditions and allergies from a WBQ. Self-reported questionnaire data were compared with obstetrical records for 519 pregnant women participating in the Pregnancy and Infant Development (PRIDE) Study in the Netherlands from July 2011 through November 2012. These women completed WBQs around their first prenatal care visit (mostly weeks 8 -10) and in gestational weeks 17 and 34. We calculated kappa statistics and proportions of positive and negative agreement between the baseline questionnaire and obstetrical records for chronic conditions and allergies. In case of inconsistencies between these two data sources, medical records from the woman's general practitioner (GP) were consulted as the reference standard. In the WBQ and/or the obstetrical record, 146 women (28.1%) reported one or more chronic conditions resulting in kappa and proportions of positive and negative agreement of 0.61, 0.69, and 0.92, respectively. Allergies were reported by 259 women (49.9%) with kappa and agreements being 0.51, 0.70, and 0.81. The majority of kappa values for specific diseases or allergies ranged within +/- 0.10 of the overall kappa, but kappas as low as 0.21 and 0.30 were seen for insect sting allergies and migraine, while the kappa was 0.90 for thyroid disorders. Comparison with GP records revealed that the sensitivity of the WBQ was mostly higher than that of the obstetrical records ($p<0.05$ in half) with values of 1.00 versus 0.44 for migraine, but 0.67 versus 0.83 for polycystic ovarian syndrome. For most chronic conditions and allergies, valid data can be collected with a web-based questionnaire, which seems to have higher sensitivity than obstetrical records with almost equal specificity.

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CONTRACEPTIVE USE AMONG WOMEN WITH SELECTED MEDICAL CONDITIONS. Steven Champaloux*, Naomi Tepper, Michael Monsour, Kathryn Curtis, Lauren Zapata, Maura Whiteman, Polly Marchbanks, Denise Jamieson (ASPPH Fellow - Centers for Disease Control and Prevention, Atlanta, GA United States)

For women with certain medical conditions, pregnancies may carry serious risks. Use of contraception, particularly highly effective methods (e.g., long-acting reversible contraceptives [LARCs], intrauterine devices [IUDs], and implants), is critical to prevent unintended pregnancy among these women. This study examined the contraceptive methods that women with medical conditions such as diabetes and hypertension are utilizing. The Truven MarketScan Databases were used to identify privately-insured US women aged 15 - 49 years with an inpatient, outpatient, or pharmaceutical claim during 10/1/2010 to 9/30/2011. Medical conditions associated with increased health risks from an unintended pregnancy were identified using diagnosis and procedure codes. Contraception use was identified from diagnosis, procedure, and drug codes from the International Classification of Diseases- 9th Revision- Clinical Modifications, the Current Procedural Terminology- 4th Edition, and the National Drug Code and was defined as most recent use of a hormonal contraceptive method (implant, injectable, patch, ring, or pill) or an IUD. We used multivariate logistic regression to estimate the association between medical conditions and LARC use, adjusting for age. Of the 10.57 million women, 2.4% had diabetes and 5.3% had hypertension. Nearly 30% of all women had a code for contraceptive use, and 2.6% had a LARC code (IUD: 2.4%) for most recent use. Women with diabetes had lower odds of using LARCs versus non-diabetics, 1.8% versus 2.7%, Odds Ratio (OR): 0.77 (95% Confidence Interval (CI): 0.75 - 0.80). Similar results were found for hypertension, 2.2% versus 2.7%, OR: 0.94 (95% CI: 0.92 – 0.96). Many women with medical conditions are ideal candidates for LARCs, but use is low. Understanding the contraceptive methods that women with medical conditions are using is critical to address unmet contraceptive needs in this population.

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EFFECTS OF OVER-THE-COUNTER ANALGESIC USE ON REPRODUCTIVE HORMONES AND OVULATION. Rebecca Matyas*, Sunni Mumford, Karen Schliep, Katherine Ahrens, Lindsey Sjaarda, Neil Perkins, Jean Wactawski-Wende, Enrique Schisterman (Division of Intramural Population Health Research, Eunice Kennedy Shriver National Institute of Child Health and Human Development, National Institute, Rockville, MD United States)

Reproductive-age women are among the most likely to use analgesics, but effects of over-the-counter (OTC) analgesics on endogenous reproductive hormones and ovulatory function in premenopausal women have not been investigated on a population level. The BioCycle Study followed 259 healthy, premenopausal women without chronic medication use for up to 2 menstrual cycles. Participants provided fasting blood specimens for hormonal assessment at ≤8 visits per cycle timed using fertility monitors. Participants completed daily diaries of medication intake. Outcomes included ovulatory status and serum estradiol, progesterone, luteinizing hormone [LH], and follicle-stimulating hormone [FSH] concentrations. Over the study period, 256 cycles (50.4%) indicated analgesic use during the first half of the cycle (preovulation). The majority of analgesics used were ibuprofen and acetaminophen, while fewer women took aspirin and naproxen sodium. Analgesic use was associated with decreased odds of sporadic anovulation (OR 0.32, 95% CI 0.16-0.65). This finding remained significant after adjusting for age, race, body mass index, perceived stress level, and alcohol consumption, and also for potential confounding by indication by controlling for healthy cycle indicators including blood loss during preceding menstruation and menstrual pain (OR 0.33, 95% CI 0.14-0.76). In addition, progesterone was marginally higher ($p=0.08$ adjusted) in cycles with preovulation analgesic use, but analgesic use was not associated with estradiol, LH, or FSH. The associations of analgesic use before ovulation with higher subsequent levels of progesterone and a lower probability of sporadic ovulation suggest possible links between analgesic use and menstrual cycle function in premenopausal women that warrant further investigation.

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NEIGHBORHOOD DEPRIVATION AND UTILIZATION OF PRECONCEPTION CARE IN LOS ANGELES. Lujing Zhan*, JIHONG LIU, Stella Yu, Shin Chao, Anwar Merchant, Bo Cai (Arnold School of Public Health, University of South Carolina, Columbia, Columbia, SC United States)

Preconception care is recommended by the American Academy of Pediatrics and the American College of Obstetricians and Gynecologists to improve pregnancy outcomes. Yet no study has examined whether women living in deprived neighborhood were less likely to use preconception care. Data from the 2007 Los Angeles Mommy and Baby Project (LAMB) study were used, restricting to those living in Los Angeles county and with complete data (n=2,372). Women's residential addresses were geocoded at census tract level. Eight census-tract-level sociodemographic characteristics were used to compute Neighborhood Deprivation Index (NDI) score and categorize into quartiles. Multilevel logistic regression models with random intercept were used. About 28% of women reported using preconception care at 6 months before conception. Women who lived in the less deprived neighborhood (1st and 2nd quartiles) were 2.9 times (95% confidence interval (CI): 2.1, 4.2) and 1.7 times (95% CI: 1.2, 2.2) more likely to attend preconception care compared to the women who lived in the most deprived neighborhood (4th quartile of NDI), respectively. This association became insignificant after adjusting for individual-level characteristics. Significant individual-level characteristics for using preconception care were older maternal age (=35 years old), being parous, having health insurance, having college education, being married, and living in families with at least $60K annual income. **Results** suggested that preconception care attendance was low and women living in deprived neighborhood were less likely to receive preconception care. Our findings shed light on the risk factors associated with the utilization of preconception care, which can be used for the programs aiming at improving this recommended care.

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PERCEIVED INFERTILITY AMONG ADOLESCENTS. Maura Whiteman*, Melissa Kottke, Joan Kraft, Colleen Murray, Margaret C. Snead, Peg Goedken, Ralph DiClemente (Centers for Disease Control and Prevention, Atlanta, GA United States)

Adolescents' perceptions of their fertility may impact their contraceptive use. We examined the prevalence and correlates of perceived infertility and its association with contraceptive use among a sample of adolescents. Sexually active black females ages 14-19 seeking care in a publicly funded family planning clinic were recruited. Participants (n=350) responded to a standardized audio computer-assisted questionnaire addressing topics including whether they thought they might not be able to get pregnant or were infertile in the last 6 months (perceived infertility). Adjusted prevalence ratios (PRs) and 95% confidence intervals (CIs) were obtained from log-binomial regression to examine factors associated with perceived infertility and the association between perceived infertility and contraceptive use at last sex. Over one-quarter of participants (28.0%, n=98) reported perceived infertility. Perceived infertility was more common among those reporting a previous STD versus not (34.9% vs. 22.3%; PR=1.12, 95% CI 1.02–1.24), among those with ≥ 3 versus 1-2 lifetime sexual partners (32.6% vs. 18.5%; PR=1.11, 95% CI 1.01–1.23) and among those expressing some desire for pregnancy in the next 6 months versus not (PR=48.4% vs. 23.3%1; PR=1.29, 95% CI 1.14–1.45). Almost half of the participants with perceived infertility used no contraception at last sex (44.1%), compared to 31.8% of those without perceived infertility (PR=1.13, 95% CI 1.01–1.27). Perceived infertility was common in this adolescent sample and may be a barrier to contraceptive use. Our findings underscore the importance of understanding reasons for adolescents' perceptions about their fertility to tailor appropriate counseling messages.

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PREGNANCY INTENTIONS, SOCIO-ECONOMIC STATUS AND USE OF BIRTH CONTROL. Amy Metcalfe*, Rachel Talavlikan, Bea DuPrey, Suzanne Tough (University of British Columbia, Vancouver Canada)

It is estimated that approximately one third of pregnancies in Canada are unintended, meaning they were either mistimed (the woman wanted to be pregnant at a different point in time) or undesired (the woman did not want to be pregnant). This study aimed to assess contraception use and socio-economic characteristics of women with intended and unintended pregnancies. Data were obtained from two contemporaneous studies in Calgary Canada– one involving women seeking abortion services (n=577) and one involving women with continuing pregnancies (n=3552). Chi square tests and logistic regression were used to examine the association between socioeconomic variables, use of contraception and pregnancy intention. 96.5% of women seeking an abortion and 19.6% of women with ongoing pregnancies reported having an unintended pregnancy. Women with unintended pregnancies were significantly younger ($p<0.001$), less educated ($p<0.001$), had a lower household income ($p<0.001$) and were less likely to be in a stable relationship ($p<0.001$). 20.2% reported not using any form of birth control despite their desire to not get pregnant. Among women with unintended pregnancies, women seeking an abortion were more socioeconomically disadvantaged ($p<0.001$) and less likely to be in a stable relationship ($p<0.001$) than women with continuing pregnancies. Women who sought an abortion were more likely to have used condoms ($p<0.001$) or the emergency contraception pill ($p<0.001$); whereas women who opted to continue an unintended pregnancy were more likely to be using withdrawal as a form of birth control ($p<0.001$). Women who terminate an unintended pregnancy have more socioeconomic and relationship instability than women who do not, suggesting that these services are necessary and an important part of women's health care.

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SELF-REPORT OF TROUBLE SLEEPING BY RACE/ ETHNICITY IN PREGNANT WOMEN AND WOMEN OF CHILD-BEARING AGE. Melissa Amyx*, Xu Xiong, Yiqiong Xie, Pierre Buekens (Tulane University School of Public Health and Tropical Medicine, New Orleans, LA United States)

The purpose of this secondary analysis of data from the National Health and Nutrition Examination Survey (NHANES) from 2005-2010 was to examine report of trouble sleeping to a physician and inadequate sleep (≤5 hours) by race/ethnicity in pregnant (N=432) and non-pregnant women (N=3175) of childbearing age (15-44 years old). The proportion who reported trouble sleeping, inadequate sleep time, and both trouble sleeping and inadequate sleep was estimated by race/ethnicity, stratified by pregnancy status. The differences in the proportions by race/ethnicity were tested using the Rao-Scott $\chi 2$ statistic. In both pregnant and non-pregnant women, non-Hispanic white women (17.6% and 27.2% respectively) were more likely to have reported trouble sleeping than Mexican-American (9.2% and 10.0%) or non-Hispanic black women (11.4% and 19.6%), though the difference was only significant in non-pregnant women ($p<0.01$). In contrast, in both groups, non-Hispanic black women (19.7% pregnant and 22.7% non-pregnant) were significantly more likely to report inadequate sleep than non-Hispanic white (3.4% and 11.0%) and Mexican-American women (7.9% and 10.6%). Among women with inadequate sleep, non-Hispanic white women (37.9% pregnant and 51.8% non-pregnant) were most likely to report trouble sleeping, as compared to non-Hispanic blacks (16.1% and 27.8%) and Mexican-Americans (26.4% and 22.9%, $p<0.01$). In conclusion, non-Hispanic white women were more likely to report trouble sleeping to a physician, while non-Hispanic black women were more likely to report inadequate amounts of sleep. Further, non-Hispanic white women were more likely to have reported trouble sleeping to a physician than minority women getting the same amount of sleep.

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UNRAVELING DATA ON THE SEXUAL PRACTICES, VALUES AND PERCEPTIONS OF UNIVERSITY YOUTH FROM THE ARAB WORLD: THE CASE OF LEBANON. Lilian Ghandour*, Rola Yasmine, Noura El Salibi, Faysal El Kak (American University of Beirut, Beirut Lebanon)

Sexuality is a tabooed topic in the Arab world, particularly that of unmarried youth, which has limited research and evidence-informed practices and services. Using a secured online survey, this cross-sectional study is the first to investigate the sexual behaviors, attitudes and perceptions of private university students (N=2180) from Lebanon. Half the study participants (N=1,838) were sexually active (i.e. reported ever having had oral, anal or vaginal sexual intercourse). A third of the sexually active stated engaging in anal and/or oral (rather than vaginal) sex particularly to avoid hymen-breaking (higher percentages among the female students). Odds of engaging in penetrative sexual practices with an unfamiliar partner were 8 times higher in males ($p<0.0001$). Female students, however, were twice more likely to report engaging in sexual practices when they did not really want to (p-value<0.0001), and having been in a relationship where they felt things were moving too fast physically (p-value<0.0001). Moreover, about 21% of the female students reported nonconsensual sex at sexual debut compared to 13% of their male colleagues ($p=0.013$); also, 20% of the females reported ever having been sexually abused versus 7% of the males ($p<0.0001$). Males were twice more likely to be drinking or using drugs at sexual debut. Common sociocultural concerns of sexual initiation are gaining a bad reputation (60%), social rejection (69%), religion (75%) and parental disapproval (76%). Women were three times more concerned regarding reputation, losing self-respect, and societal disapproval and five times more regarding parental disapproval. Other intrapersonal concerns were fear of contradicting one's own beliefs (74%), feeling guilty afterwards (70%), and losing self-respect (69%). Understanding youth sexual practices, perceptions, and values and the underlying gender differences behind them is essential to direct research and implement effective programs targeting youth reproductive and sexual health.

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STUDY ON SCREENING TEST FOR HEALTH STATE IN SUSCEPTIBILITY PHASE BASED ON THE NATURAL HISTORY OF DISEASE AMONG YOUNG ADULTS. Hideo Yamazaki*, Soichi Sakabe, Jian-Guo Zhang, Qing Xiao (Tokoha University, Hamamatsu Japan)

Introduction: The purpose of the present study was to examine the validity of a screening test for semi-health symptoms which indicated a state of health in susceptibility phase based on the natural history of disease among young adults in Japan. We discussed on the prevalence, sensitivity, specificity, positive predictive value, and negative predictive value derived from the screening test for semi-health symptoms among young adults in Japan. Chronic diseases, such as metabolic syndrome and circulatory diseases, are called life-style related diseases in Japan. They are not only serious causes of death but also risk factors of broken health. They have been steadily increasing. **Methods**: The self-report questionnaire, which consisted of 53 items, was administered to 2,101 young adults in Japan in 2013. **Results**: A principal components analysis was applied to the valid data in order to extract indices which evaluated structural characteristics on semi-health condition. By this analysis, four principal components were extracted. Especially, the first principal component was extracted as an index which indicated a quantitative aspect of the semi-health condition. Every eigenvector of its component had a mark of plus. Therefore, this component was used as the semi-health index. Furthermore, a distribution of young adults with semi-health symptoms was determined by using this index. The prevalence, sensitivity, specificity, positive predictive value, and negative predictive value indicated 13.9%, 85.3%, 84.7%, 47.3%, and 97.3%, respectively. **Conclusion**s: Epidemiological indices based on the screening test will show an excellent level of discriminating the semi-health from good health state. Furthermore, it is likely that the receiver operating characteristic (ROC) curve derived from the sensitivity and specificity is in a good level.

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DISPARITIES IN COLORECTAL CANCER SCREENING. David T. Huang*, Yelena Gorina (National Center for Health Statistics, Centers for Disease Control and Prevention, Hyattsville, MD United States)

Research has shown that early detection through screening can improve treatment for and reduce death rates from colorectal cancer (CRC). Yet CRC screening rates remain relatively low compared to other cancer screenings, few demographic groups have met the Healthy People 2020 target, and disparities among various demographic groups persist. The current U.S. Preventive Services Task Force (USPSTF) guidelines recommend CRC screening for persons aged 50–75 by meeting one of the following recommendations: fecal occult blood testing annually, sigmoidoscopy every 5 years with fecal occult blood testing every 3 years, or colonoscopy every 10 years. The most recent national estimates for cancer screening rates (2010) were obtained using data from the Cancer Control Supplement to the National Health Interview Survey (NHIS). SUDAAN was used to control for complex sample design, and all estimates were age-adjusted to the 2000 standard population. Our cross-sectional analysis considers estimates for the total population and for demographic groups including sex, race/ethnicity, education, income, marital status, functional status, usual source of care, and other selected risk factors. Not surprisingly, non-Hispanic whites, married persons, and persons with the highest levels of education and income had the highest levels of CRC screening among subgroups by race/ethnicity, marital status, education, and income, respectively. However, some risk factors yielded interesting results; former smokers (66.3%) had a higher CRC screening rate than never (59.3%) and current (46.1%) smokers, for example. This work highlights the need to identify root causes and potential solutions for eliminating these disparities and improving CRC screening rates overall.

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ARE SYMPTOMS OF ANXIETY AND DEPRESSION ASSOCIATED WITH COLORECTAL SCREENING PERCEPTIONS AND BEHAVIORS AMONG OLDER ADULTS IN PRIMARY CARE? Hind Beydoun*, Suraj Khanal, May Beydoun, Alan Zonderman, Ravinder Mohan, Agatha Parks-Savage (Graduate Program in Public Health, Eastern Virginia Medical School, Norfolk, VA United States)

Despite the existence of colorectal cancer (CRC) screening guidelines, population-based studies have consistently shown under-utilization of CRC screening procedures among older adults in the United States. We examined whether symptoms of anxiety and depression are associated with CRC screening perceptions and behaviors among older adults in a primary care setting. A cross-sectional study was conducted using a sample of 143 family medicine patients who completed an 88-item anonymous self-administered questionnaire covering symptoms of anxiety and depression as well as CRC screening perceptions (defined based on the Health Belief Model) and behaviors (defined as ever use or adherence to CRC testing). Moderate-to-clinically significant anxiety and depressive symptoms were, respectively, prevalent in 47% and 42% of participants. Perceived benefits and barriers were the only Health Belief Model constructs associated with anxiety. Perceived barriers were positively associated with anxiety symptoms after adjustment for confounders, including age, gender, race/ethnicity, marital status, education, smoking history, body mass index and self-rated health. By contrast, perceived benefits were negatively associated with anxiety symptoms only in the unadjusted model. Neither anxiety nor depression were associated with ever use or adherence to CRC testing. Symptoms of anxiety, but not depression, may potentially influence CRC screening perceptions, with implications for behavioral interventions targeting CRC testing.

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PAST BLOOD ALCOHOL CONCENTRATION AND INJURY IN TRAUMA CENTER: PROPENSITY SCORING. Hind Beydoun*, Alison Teel, Chris Crowser, Suraj Khanal, Bruce Lo (Graduate Program in Public Health, Eastern Virginia Medical School, Norfolk, VA United States)

Evidence linking alcohol use to injury outcomes remains inconclusive, with pre-hospital and police department-based studies showing negative effects whereas hospital-based studies show no effect or better outcomes. We examined the relationship of Blood Alcohol Concentration (BAC) with injury characteristics and outcomes among trauma patients admitted to a major teaching hospital. In an effort to mitigate selection and confounding bias, propensity scoring methodology was applied whereby trauma patients were 'randomly' assigned to high and low BAC groups. Electronic medical records were retrospectively reviewed for a period of eight months. Of 1057 patients whose BAC was determined, 667 had BAC $\leq$ 0.08 g/dL and 390 had BAC > 0.08 g/dl. Injury characteristics were defined as injury type, injury location and trauma level. Injury outcomes were defined as hospitalization, length of hospital stay and in-hospital death. Adjusted odds ratios (aOR) and their 95% confidence intervals (CI) were calculated using multivariate logistic regression models whereby propensity scoring was applied. **Results**: A positive relationship was observed between BAC and unintentional injury (aOR=1.08; 95% CI:1.01, 1.17). Whereas injuries of the extremities were less likely to occur in patients with high BAC (aOR=0.88, 95% CI: 0.80, 0.98), head injury was positively associated with high BAC (aOR=1.27, 95% CI:1.14, 1.42). Also, level I trauma patients had nearly 60% greater odds of having a high BAC than level II trauma patients. A high alcohol level in the blood appears to be predictive of more unintentional injury, head injury and level I trauma activation and of less injuries in extremities.

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MENTHOL CIGARETTES, TIME TO FIRST CIGARETTE, AND SMOKING CESSATION. Edward Sanders*, Ruth Dempsey, Rolf Wietkunat (Edward Sanders Scientific Consulting, Peseux, Switzerland)

There has been a great deal of recent scientific inquiry focused on determining if smokers of menthol cigarettes are more likely to be dependent and less likely to quit smoking as compared to smokers of non-menthol cigarettes. These two issues were recently qualitatively reviewed in an FDA report (2013). The present work describes a meta-analysis of published studies comparing menthol and non-menthol smokers with respect to time to first cigarette (TTFC), a key measure of smoking dependence, and successful smoking cessation. For 18 non-overlapping studies on TTFC, menthol smokers displayed a small but statistically significant shorter TTFC (fixed effect (FE) odds ratio (OR), 1.06, 95% confidence interval (CI), 1.02-1.09). A larger difference was noted for 8 small (clinical) studies (N<1000) (FE OR, 1.77, 95% CI, 1.49-2.10) compared to 10 large (population) studies (N>1000) (FE OR 1.03, 95% CI, 1.00-1.07). For smoking cessation studies, meta-analysis of 25 published estimates indicated a small and statistically non-significant decreased likelihood for menthol smokers to quit (FE OR 0.98, 95% CI, 0.95-1.01). Interestingly, there was a greater likelihood for Caucasian menthol smokers to quit (FE OR 1.26, 95% CI, 1.21-1.30, N=8), whereas the opposite was true for African American menthol smokers (FE OR 0.93, 95% CI, 0.87-0.99, N=12). As was the case for TTFC, 15 clinical estimates, which are generally small (N<1086), indicated an increased difficulty of menthol smokers to quit (FE OR 0.71, 95% CI, 0.63-0.79) compared to 10 population estimates (N>1343) (FE OR 1.00, 95% CI, 0.97-1.04). Overall, the published data support a small decrease in likelihood for African American menthol smokers to quit smoking in contrast to a greater likelihood for Caucasian menthol smokers to quit. The potential role of residual confounding with respect to these results will be discussed.

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PRIOR NONMEDICAL USE OF PRESCRIPTION OPIOIDS AND ONSET OF HEROIN USE AMONG ADOLESCENTS AND YOUNG ADULTS. J. Santaella*, S.S. Martins, B.D.L. Marshall, M. Cerdá (Columbia University, New York, NY United States)

In the United States the estimated number of past-year heroin users aged 12 and older increased 53.5% between 2007 and 2011 – more than users of any other illegal drug. Such an increase may be partly driven by the transition of nonmedical users of prescription opioids (NMUPO) to heroin use. As a first step to informing secondary prevention programs for NMUPO, research is required to identify peak at-risk ages for transition from NMUPO to heroin use, as well as to identify social groups that may be particularly at risk for experiencing this transition. We examined whether the risk of heroin use initiation in adolescence and young adulthood was associated with a prior history of NMUPO, and tested whether the relationship between NMUPO and heroin use initiation varied by age, race/ethnicity, or income. To test these aims, we used data on National Survey on Drug Use and Health (NSDUH) respondents aged 12-21 assessed between years 2004 and 2011 (n=223,534). Associations were estimated using discrete-time hazard regression models adjusted for race/ethnicity, previous onset of any substance use (other than prescription opioids and heroin), sex, age at survey, income, urbanicity and year of survey. Analyses were based on Taylor series approximations to account for the sampling design. In multivariable models, a prior history of NMUPO was independently and positively associated with an over five-fold increased hazard of heroin use initiation (AHR=5.55, 95%CI: 4.54, 6.80). The relationship between NMUPO and transitioning to heroin varied by age: the relationship was strongest in late adolescence (ages 17-19). However, this association did not vary by race/ethnicity or income group. Results suggest that prior use of NMUPO is a particularly strong predictor of heroin use onset, and late adolescence is a peak period of risk for transitioning from NMUPO to heroin use.

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USING PRESCRIPTION DRUG MONITORING DATA TO IDENTIFY CHRONIC OPIOID ANALGESIC USE IN NEW YORK CITY, 2008–2012. Ellenie Tuazon*, Denise Paone (New York City Department of Health and Mental Hygiene, Long Island City, NY United States)

During the last decade, shifts in the management of chronic pain have led to a dramatic increase in opioid analgesic prescriptions. Chronic opioid analgesic use may involve high morphine equivalent dose prescriptions, conferring greater risk of overdose specifically when doses are above 100. Prescription monitoring program data can be used as an epidemiologic tool to identify demographic and prescription characteristics associated with chronic opioid analgesic use and identify at-risk populations. We conducted a retrospective analysis of opioid analgesic prescriptions filled by New York City residents over a five year period (2008–2012) using New York State Prescription Monitoring Program data. Chronic use was defined as three or more consecutive months of a 28 to 30-day supply opioid analgesic prescription without evidence of opioid analgesic use in the 3 months preceding the chronic use period. Covariates included morphine equivalent dose, gender, age, and residence. Bivariate and multivariate analyses were conducted to examine the association of demographic and prescription characteristics with chronic opioid analgesic use. During 2008–12, approximately 6.5 million opioid analgesic prescriptions were filled by 2.2 million New York City residents; 99,110 had at least one period of chronic use. Chronic users were more likely to be male (Odds Ratio (OR)=1.24, 95% confidence intervals (CI)=1.24–1.25), aged 45 to 54 (OR=3.14, 95% CI=3.01–3.28), and residents of the Bronx (OR=1.94, 95% CI=1.89–1.99) or Staten Island (OR=1.85, 95% CI=1.79–1.91). Chronic users were 6-times more likely to have filled high dose prescriptions with morphine equivalent dose above 100 (OR=6.69, 95% CI=6.57–6.81). Prescription monitoring program data can identify patterns of opioid analgesic use. Analysis can enhance the understanding of chronic opioid analgesic prescribing, and risks of opioid analgesic use, such as overdose.

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VOLATILE SUBSTANCE MISUSE DEATHS IN WASHINGTON STATE, 2003-2012. Eric Ossiander* (Washington State Department of Health, Olympia, WA United States)

Context: Volatile substance misuse (VSM - also known as huffing or sniffing) is common among teens. It is thought to be associated with some deaths, but because the *International Classification of Diseases* does not have codes for VSM, the deaths are difficult to tabulate, and until now, counting them has usually required reviewing medical examiner files. **Methods**: We used the textual cause-of-death entries on death certificates to count VSM-associated deaths occurring in Washington State between 2003 and 2012. We extracted records that contained words suggesting either a method of inhalation or a substance commonly used for VSM, and manually reviewed those records to identify all deaths on which the inhalation of a volatile substance was mentioned. We conducted a descriptive analysis of those deaths. Findings: We found 56 VSM-associated deaths. Forty-nine deaths had an underlying cause of drug poisoning or drug use, 3 were caused by disease, and 4 were caused by another type of injury. Almost all deaths were among adults age 20 and over (50, 91%), whites (52, 93%), and males (49, 88%). Eleven different chemicals were associated with deaths, but 1 of them, difluoroethane, was associated with more than half (31, 55%). There was a temporal increase in the number of deaths during the period of study, with 31 (55%) of the deaths occurring during 2010-2012. **Conclusion**: The textual cause-of-death data from death certificates can be used to tabulate VSM-associated deaths. Although survey data indicates that VSM is common among teens and rare in adults, in Washington State during 2003-2012, almost all VSM deaths were among adults. Our data suggest VSM deaths are increasing in number.

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GENDER DIFFERENCES IN CIGARETTE SMOKING: A CROSS-SECTIONAL STUDY AMONG CAMBODIAN AMERICAN ADULTS. Robert Friis*, Che Wankie*, Claire Garrido-Ortega, Alan Safer, Mohammed Forouzesh, Paula Griego, Kirsten Trefflich, Kimthai kuoch (California State University Long Beach, Long Beach, CA United States)

Smoking is the number one cause of preventable death in the United States accounting for about 440,000 deaths each year in the United States. In Cambodia, the prevalence of tobacco use among adults is 2011 was 19.5% (male = 39.1%, female = 3.4%). In addition, the prevalence of cigarette smoking among adults aged 20 years and older was about 54% for males and 6% for females, according to the Cambodian National Institute of Statistics. Even though the prevalence of cigarette smoking may be low among females in comparison to males, about 12.7% of females use smokeless tobacco. In this updated analysis, a stratified random cross-sectional study of 1,414 adult Cambodian Americans residing in Long Beach, CA and aged 18 years and older was examined to determine smoking prevalence. The prevalence of current smokers was 13.0%; the sex-specific prevalence of smoking was 24.3% for men and 5.4% for women, $\chi2(1, N = 1,414) = 107.3$, $p < 0.001$. The mean age was 46.9 years (Standard Deviation = 18.9 years). Multiple logistic regression was employed to identify predictors of current smoking. The odds of being a current smoker were Significant predictors of current smoking were 6.81times (95% Confidence Interval = 4.58, 10.12) higher among men than among women. Other significant covariates were age, education status, marital status, health status, and place of birth. Even though the prevalence of Cambodian Americans may be low in comparison to Cambodians in Cambodia, this prevalence is still high in comparison to other ethnic groups in the United States. Findings from this study highlight the need for intervention programs tailored to younger, unmarried Cambodian American men who have less education and are in fair or poor health.

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LIFE COURSE TRAJECTORIES OF PAAN CHEWING AND ORAL CANCER RISK. Sreenath Madathil*, Lawrence Joseph, Marie Claude Rousseau, Belinda Nicoalu (Faculty of Dentistry, McGill University, Montreal Canada)

The association between paan chewing and oral cancer risk is well documented. However, no study has investigated this association with a life course perspective. The objective of this study was to estimate the extent to which life course trajectories of paan chewing are associated with the risk of developing oral cancer in a South Indian population. In a hospital-based case-control study, the HeNCe Life study-India, incident cases (N=350) of oral squamous cell carcinoma were recruited from 2 major public hospitals in Kozhikode, India. Non-cancer controls (N=371), frequency matched by age and sex, were recruited from different outpatient clinics of the same hospitals. Data on sociodemographic and behavioural factors were collected using a life course questionnaire and a life-grid technique. We used this paan chewing history to calculate the average intensity of use (quids/day) for two life periods (= 30 years, above 30 years). A binary variable for each period was then computed (low, high) and their combination generated 4 life course trajectories. Unconditional logistic regression was used to estimate the odds ratios (OR) and 95% confidence intervals (CI), adjusting for potential confounders. The most prevalent trajectory among cases was of high exposure during both life periods (34.4%), whereas most of the controls were never chewers (82.3%). Using subjects who never chewed in their life time as a reference, the OR for subjects in the high/high intensity trajectory was 19.6 (95% CI: 10.3 – 37.2), 5.9 (2.5-14.1) for low/high trajectory; 8.4 (4.4-16.3) for high/low trajectory; and OR=6.2 (3.4-11.4) for low exposure in both periods. Our estimates suggest very high risk of oral cancer from paan chewing which appears to increase with higher doses. Further work should estimate whether decreased risk is associated with quitting the habit, and to establish lag times for decreased risk for quitters.

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ASSOCIATION OF URINARY 11-DEHYDRO-THROMBOXANE B2 LEVELS IN SMOKING, SMOKING CESSATION AND TOBACCO HEATED SYSTEM USE. Angela Gonzalez Zuloeta*, Sandrine Pouly, Guillaume de la Bourdonnaye, Gizelle Baker, Frank Luedicke (Philip Morris Products SA, Neuchatel Switzerland)

Smoking has been associated with cardiovascular disease and there is evidence that this might be mediated by the increased production of thromboxane. Whether metabolites of thromboxane, such as 11-dehydro-thromboxane B2 (TXB2), could be used as a biomarker of risk in the assessment of candidate modified risk tobacco products (MRTPs) is not clear. The aim of this literature review and meta-analysis (MA) was to determine the association of smoking status and TXB2 levels. Additionally we evaluated the effect of smoking cessation and the use of a tobacco heated system (THS) currently in development, to urinary levels of 11-dehydro-thromboxane B2. We searched PubMed and found 14 studies on smoking status and TXB2 levels and 3 studies on smoking cessation and TXB2 levels. Results of two studies on THS use and TXB2 levels were also reported. Because of differences in methods of adjustment used in studies we performed 2 MA of TXB2 levels in smokers vs. nonsmokers. The first MA using µg/24h included 4 studies and showed that the pooled mean difference (MD) of TXB2 was significantly increased in smokers (MD= 0.31, 95%CI: 0.27-0.34, p<0.00001) with no significant heterogeneity (I2 = 40%, p=0.17). The second MA performed in µg/mg creatinine included three studies and showed the same effect (MD=0.45, 95%CI: 0.32-0.58, p<0.00001; I2 = 0%, p=0.56). No MA could be performed for smoking cessation or THS use due to different follow up time or insufficient data. However, in all studies retrieved, TXB2 levels decreased significantly both after smoking cessation (as early as 3 days after) and switching to THS use (as early as 5 days after switching). The above analyses show that TBX2 levels in urine are consistently higher in smokers compared to nonsmokers, smoking cessation or when switching from smoking conventional cigarettes to using a THS product, making it a promising biomarker for MRTP assessment.

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NEIGHBORHOOD GREEN SPACE AND SUBSTANCE USE - A LONGITUDINAL COHORT STUDY IN SOUTHERN CALIFORNIA. Diana Younan*, Jiu-Chiuan Chen, Laura Baker, Catherine Tuvblad, Meredith Franklin, Frederick Lurmann (University of Southern California, Los Angeles, CA United States)

Background: Neighborhood green space has been associated with better mental health in unban-dwelling population, but its putatively protective effects against addictive behaviors in children and adolescents remain unclear. **Methods**: We used longitudinal data on self-reported uses of cigarette, alcohol and marijuana collected between age 9-21 among N=1,569 subjects enrolled in the University of Southern California (USC) Risk Factors for Antisocial Behavior (RFAB) Study. RFAB participants were twin pairs born 1990-1995 living in Los Angeles County and surrounding areas. The current analyses included only eligible participants who had at least 2 waves of assessment (at least ~2 years apart) without reporting substance use at baseline. We used the Normalized Difference Vegetation Index (NDVI) as a surrogate measure of neighborhood greennees, obtained from the Global Land Cover Facility and derived from MODerate-resolution Imaging Spectroradiometer (MODIS). ArcGIS software was used to merge NDVI data to each subject's geocoded residential location during the mid-year of 2006. We used generalized estimated equation to estimate the NDVI effect on addictive behaviors, controlling for within family correlation and adjusting for gender, race, age, socioeconomic status, and neighborhood conditions at baseline. **Results**: Compared to individuals living in neighborhoods with low green space (in the lowest quartile), those living in neighborhood with more green space were significantly less likely to use alcohol after adjusting for covariates (RR=-0.5072, p=0.0069). Green space was also protective of cigarette and marijuana use, however, the effect estimates were not statistically significant, which may be subject to the non-differential misclassification of neighborhood greenness. **Conclusion**s: These preliminary results suggest the hypothesized effects of neighborhood green space, in protecting adolescents from addictive behaviors. Further analyses will refine the multi-seasonal NDVI data to reduce the possibility of exposure measurement errors.

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AUDIT-C ALCOHOL MISUSE SCREENING SCORE AND MAJOR BLEEDING IN WARFARIN THERAPY: AN EVALUATION OF MAIN EFFECTS AND INTERACTION WITH CYP2C9 GENETIC STATUS. Joshua Roth*, Katharine Bradley, Ken Thummel, David Veenstra, Denise Boudreau (Group Health Research Institute, Seattle, WA United States)

Background: Warfarin (Coumadin®) is an anticoagulant that is highly effective at reducing thrombotic event risk and is used by >1 million Americans annually. However, major bleeding adverse events are relatively common and create a barrier to appropriate prescribing. Alcohol use and CYP2C9 genetic variants both impact hepatic metabolism of warfarin and are risk factors for major bleeding. However, no studies to date have analyzed the interaction of these two risk factors among warfarin users. Objective: Assess the association between AUDIT-C alcohol misuse screening score and major bleeding risk among warfarin users in a community setting, and explore interaction by CYP2C9*2/*3 genetic status. **Methods**: We used a case-control design and recruited patients from Group Health, an integrated healthcare system in Washington. Cases had a major bleeding event while receiving warfarin. Controls received warfarin on a randomly assigned index date and had no major bleeding in the prior year. We identified major bleeding with a standard ICD-9 algorithm, validated events with chart review, obtained AUDIT-C scores from a mailed survey, and tested for CYP2C9 status using a mailed buccal swab. We used logistic regression to estimate major bleeding odds ratios (OR) for patients with moderate-severe alcohol misuse (AUDIT-C scores ≥5) relative to those with scores <5, and stratified by CYP2C9 variant/wild type status. **Results**: In 265 cases and 305 controls with 3.4 and 3.7 mean years of warfarin use, moderate-severe alcohol misuse was associated with increased risk of major bleeding (OR=2.10, 1.08-4.07). In stratified analyses, the association was stronger in CYP2C9 variants (OR=5.60, 1.70-18.30) relative to wild-type (OR=2.16, 0.97-4.81) patients (interaction p=0.39). **Conclusion**s: Our results demonstrate a strong association between AUDIT-C score and major bleeding risk in warfarin patients in a community setting, and particularly among CYP2C9 variants. These findings can inform clinical management of warfarin major bleeding risk in the context of alcohol use.

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USING MATCHED SAMPLING METHODS TO EVALUATE WHETHER A C17T POLYMORPHISM IN THE MU OPIATE RECEPTOR IS ASSOCIATED WITH QUANTITATIVE MEASURES OF DRUG USE IN AFRICAN-AMERICAN WOMEN. Allison Grossman*, Janet Rosenbaum, Howard Crystal (State University of New York - Downstate Medical Center, Brooklyn, NY United States)

Past research has found that a C17T polymorphism in the mu opiate receptor predicts substance abuse. One recent study using data from the Women's Interagency HIV Study used multivariate regression to reduce confounding; it found a relationship between the TT genotype and Kreek-McHugh-Schluger Kellogg (KMSK) scores for alcohol, tobacco, cocaine, and opiate use. Regression leaves residual confounding where assumptions are not satisfied; preprocessing data with matched sampling before regression analyses can reduce confounding more than regression alone. We re-examined the same hypothesis in the same data using full matching on potential confounders of the relationship between the TT genotype and substance use that are unlikely to be intermediate variables: HIV status, age, educational attainment, and annual income. We used full matching prior to ordered logistic regression, which can minimize confounding and preserve sample size better than propensity score matching. Prior to full matching, our analysis replicated the previous study: compared with the CC/CT genotypes, the TT genotype predicted higher alcohol, tobacco, and cocaine KMSK scores and marginally predicted higher opiate scores. After full matching, the TT genotype predicted higher scores for tobacco (odds ratio [OR] = 2.02, 95% confidence interval [CI]: 1.08, 3.80) and marginally predicted higher alcohol score (OR = 1.83, 95% CI: 0.97, 3.45), but not cocaine (OR = 1.33, 95% CI: 0.70, 2.56) or opiate (OR = 1.05, 95% CI: 0.50, 2.20) scores. Analyses of rare genetic predictors of substance use should consider statistical methods to reduce confounding, such as matched sampling, rather than standard regression analyses.

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UNHEALTHY ALCOHOL USE AMONG HIV-INFECTED MEN WHO HAVE SEX WITH MEN: A COHORT STUDY OF U.S. VETERANS. Brandon Marshall*, Jennifer Edelman, David Fiellin, Julie Gaither, Christopher Kahler, Stephen Maisto, Don Operario, Amy Justice (Brown University School of Public Health, Providence, RI United States)

We used longitudinal data from the Veterans Aging Cohort Study (VACS) to evaluate the sociodemographic, substance use, and behavioral factors associated with hazardous alcohol consumption and binge drinking among sexually active, HIV-infected men who have sex with men (MSM). Hazardous alcohol use was defined as scoring ≥4 on the AUDIT-C, and binge drinking was defined as consuming 6 or more drinks on at least one occasion in the past year, based on responses to AUDIT item 3. Generalized estimating equations were used to model these time-varying outcomes over an 8-year study period (2002-2010). Among 939 participants, the mean age was 45.4 (SD = 9.1), 529 (57.6%) were black, and 205 (21.8%) had a lifetime alcohol-related diagnosis (ICD-9 code for abuse or dependence) prior to enrollment. Baseline hazardous and binge drinking were reported by 321 (34.2%) and 348 (37.1%), respectively. The proportion reporting these outcomes decreased over the study period (trend test, both $p < 0.001$), and by the final year of follow-up, hazardous alcohol use and binge drinking were reported by 24.0% and 24.9%, respectively. In a multivariable model, hazardous drinkers were more likely to: earn less than $6,000 in annual income, have a baseline alcohol-related diagnosis, use cannabis, and use cocaine. In a separate model, binge drinkers were more likely to: earn less than $6,000 in annual income, have a baseline alcohol-related diagnosis, and report significantly higher levels of depressive symptomatology, as measured by the PHQ-9. Unhealthy alcohol use was commonly reported by HIV-infected MSM, although the prevalence of hazardous and binge drinking decreased over time. Although further research is required to elucidate temporal relationships, financial inability to meet basic needs, substance use, and depression may be targets for intervention to help address unhealthy alcohol use in this population.

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HEAVY DRINKING PATTERNS AMONG HIV NEGATIVE MEN WHO HAVE SEX WITH MEN: A GROUP-BASED TRAJECTORY MODELING ANALYSIS. Brandon Marshall*, Christopher Kahler, Jean Shoveller, Kenneth Mayer, Nickolas Zaller, Jacob van den Berg, Don Operario (Brown University School of Public Health, Providence, RI United States)

The objective of this study was to examine the prevalence and patterns of distinct heavy drinking trajectories among men who have sex with men (MSM). We analysed data from 4,075 HIV negative MSM (aged 16 to 88 years) participating in Project EXPLORE, a behavioral trial conducted in 6 US cities over 48 months, to examine heavy alcohol use trajectories. Heavy drinking was defined as the number of days in the past 6 months in which 5 or more alcohol drinks were consumed. Group-based trajectory models (a specialized application of finite mixture modeling) were constructed to identify heavy drinking trajectories. Multinomial logistic regression was used to determine correlates of membership in each group. The proportion of participants in each of the 5 identified drinking trajectories was: non-heavy drinkers (31.9%); infrequent heavy drinkers (i.e., <10 heavy drinking days per 6 month period, 54.3%); regular heavy drinkers (an average of 30-45 heavy drinking days per 6 month period, 8.4%); drinkers who increased their heavy alcohol consumption (average 33 days in the past six months at baseline to 77 days at end of follow-up, 3.6%); and very frequent heavy drinkers (>100 days per 6 month period, 1.7%). Compared to non-heavy drinkers, participants in the regular and very frequent drinking trajectories were more likely to use alcohol during most or all sexual encounters. Younger age, white race, lower educational attainment, depressive symptomatology, and baseline stimulant use were also associated with membership in heavier drinking trajectories. Compared to non-heavy drinkers, participants who increased their heavy drinking over follow-up were more likely to report a history of childhood sexual abuse. Interventions to reduce heavy drinking among MSM might address the adverse impact of depression and traumatic life events on the initiation and continuation of frequent heavy drinking in this population.

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A LONGITUDINAL ASSESSMENT OF RISK FACTORS FOR ALCOHOL RELAPSE AMONG CURRENT AND FORMER U.S. SERVICE MEMBER. Amber Seelig*, Emily Williams, Melissa Frasco, Isabel Jacobson, Charles Maynard, Alyson Littman, Nancy Crum-Cianflone, Edward Boyko (Va Puget Sound Health Care System, Seattle, WA United States)

Many military service members experience unique, stressful, and traumatic events such as combat exposure that may present as risk factors for relapse to problem drinking. The incidence and predictors of relapse, though, have not been assessed in this population. We examined if military and nonmilitary factors predicted relapse among U.S. military service members with remittent problem drinking. Millennium Cohort Study participants who reported problem drinking at baseline (2001–2003) and were remittent at first follow-up (2004–2006) were included. Relapse to problem drinking was defined as endorsement at the second follow-up (2007–2008) of > one of five alcohol-related problems from the validated Patient Health Questionnaire during the last 12 months. Logistic regression was used to estimate relative odds of relapse by demographic, military service, behavioral, and health exposures of interest. Among 6,911 military personnel with remittent problem drinking, the cumulative incidence of relapse was 15%. In the mutually-adjusted multivariable model, the following were significantly associated with odds of relapse: National Guard/Reserve compared to active duty (Odds Ratio, 1.7; 95% Confidence Interval: 1.5–2.0); separation from the military during follow-up (1.5; 1.2–1.8); deployment with combat experience (1.3; 1.1–1.6 compared with nondeployers); current smoking (1.3; 1.1–1.5); having any mental health disorder (1.4; 1.2–1.6); trouble sleeping (1.3; 1.2–1.5); and multiple deployments (0.7; 0.6–0.9). The 3-year risk of relapse to problem drinking in this population was high and associated with both military and nonmilitary exposures and characteristics. Targeted intervention to prevent problem drinking relapse may be indicated for military personnel in particular subgroups, such as Reservists, newly transitioned veterans, those with mental health symptoms, and combat deployers.

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SMOKING INITIATION AND RELAPSE AMONG OLDER AND YOUNGER U.S. SERVICE MEMBERS AND VETERANS. Edward Boyko, Daniel Trone, Arthur Peterson, Isabel Jacobson, Alyson Littman, Charles Maynard, Amber Seelig*, Nancy Crum-Cianflone, Jonathan Bricker (VA Puget Sound Health Care System, Seattle, WA United States)

According to recent reports, approximately 25% of the military use tobacco, while 19% of nonmilitary use tobacco. To examine this tobacco use disparity, we prospectively tested whether features of military service, including combat deployment, were related to the risk of smoking initiation and relapse among participants of the Millennium Cohort Study (2001–2008). Subjects were recruited in two panels (P1: 2001–2003, P2: 2004–2006), where P2 included younger individuals who recently entered the military, compared with P1. The adoption of smoking was assessed among never-smoking ("initiation") and former-smoking participants ("relapse"). Exposures, assessed at baseline and during follow-up via self-administered questionnaires and military records, included military, demographic, lifestyle, and health measures. Complimentary log-log regression models mutually adjusting for all factors estimated the relative risk (RR) of initiation or relapse. Combat deployment predicted a higher risk of smoking initiation (P1: RR, 1.4; 95% Confidence Interval [CI] [1.3, 1.6]; P2: 1.3; 95% CI [1.0, 1.5]) and relapse (P1 only: 1.5; 95% CI [1.4, 1.6]). Compared with Air Force, Army service predicted higher risk of both outcomes in both panels (initiation P1: 1.42; 95% CI [1.27, 1.60]; P2: 1.3; 95% CI [1.1, 1.6]; relapse P1: 1.2; 95% CI [1.1, 1.3]; P2: 1.6; 95% CI [1.1, 2.2]). Mental health disorders (initiation P1: 1.3; 95% CI [1.1, 1.6]; P2: 1.4; 95% CI [1.1, 1.8]; relapse P1: 1.2; 95% CI [1.1, 1.3]), major life stressors (initiation P1: 1.4; 95% CI [1.1, 1.9]; relapse P1: 1.4; 95% CI [1.2, 1.7]), and other military and nonmilitary characteristics independently predicted both initiation and relapse. Combat deployment and mental disorders may be valuable factors for identifying soldiers in need of intervention to prevent smoking initiation and relapse, and thereby reducing tobacco use disparities.

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ASSOCIATIONS BETWEEN THE USE OF ANTIDEPRESSANTS AND OTHER MEDICATIONS. Arielle Sloan, Ray Merrill* (Brigham Young University, Provo, UT United States)

Purpose: The purpose of this study was to use a pharmacy claims database to identify associations between and the timing of antidepressant and other medication use by age and sex. Material/**Methods**: A retrospective cohort study was conducted of the 70,519 members of the Deseret Mutual Benefit Administrators (DMBA) insurance company who were continuously covered from the years 2001–2011. **Results**: During 2009–2011, 13.3% of males and 21.6% of females had at least one pharmacy claim for antidepressants. Those prescribed one of 25 different drug classifications were more likely than the general population to have used antidepressants the previous year. For all of the drug classifications, the use of antidepressants was significantly more common the same year and the year after the drug was first prescribed. The positive association between antidepressant use and other selected drug classifications generally depended on age rather than sex, with the positive association more pronounced in the youngest age group. **Conclusion**: The positive association between antidepressant use and other selected drug classifications suggests that depression may both lead to and result from many chronic diseases. This association is strongest among younger individuals, so this age group proves a valuable target for public health interventions.

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CAN WE REDUCE ALCOHOL-ATTRIBUTABLE VIOLENCE BY FOCUSING ON COMMUNITY SOCIAL NORMS? Katherine Keyes*, Magdalena Cerda, Melissa Tracy, Daniel Chen, Sandro Galea (Columbia University, New York, NY United States)

Alcohol is involved in more than half of homicides in New York City (NYC) as well as the US more broadly. Neighborhood drinking norms are associated with risky alcohol use and such norms vary by NYC neighborhood. Given the potential malleability of drinking norms, we assessed whether a hypothetical intervention to increase social sanctions would influence alcohol-related violence and homicide. An agent-based model was calibrated using 60,000 agents with demographics representing NYC in 2000, arranged on a grid with dimensions approximately matching the 59 Community Districts in NYC. In each time step, agents could interact. A variety of NYC and US-representative population-based epidemiologic data sources, as well as peer-reviewed research, were used as calibration sources to inform agent behavior, community district social norms, and relations between community district characteristics, agent alcohol consumption and violence. Results indicated that with no intervention, the median prevalence of violent victimization per year was 3.4% (95% C.I. 3.39-3.43); the median alcohol-related violent victimization was 1.4%, and the median homicide rate per 100,000 was 3.1 Increasingly restrictive neighborhood alcohol norms were associated with reduced alcohol use as well as any violent victimization (after a 25% increase, the percentage was 3.3% [95% C.I. 3.33-3.38]; after 50%, 3.2% [95% C.I. 3.21-3.26]; after 100%, 3.1% [95% C.I. 3.08-3.11]). Increasing restrictive neighborhood alcohol norms were associated with reduced alcohol-related violent victimization only after at least a 50% increase in the restrictiveness of the norm. There was no effect of social norm interventions on alcohol-related homicide. In conclusion, increasing the unacceptability of drinking by neighborhood may reduce overall and alcohol-related violence, but based on this model, not alcohol-related homicide.

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PSYCHOSOCIAL FACTORS IN ALCOHOL DEPENDENCE AND PROBLEM DRINKING. Lauren Cole*, Ariane Rung, Edward Trapido, Edward Peters (Louisiana State University Health Sciences Center School of Public Health, New Orleans, LA United States)

Alcohol abuse is a disorder with genetic origins accounting for 40-60% of the population variance in risk. However, the psychosocial environment is also responsible for a large proportion of risk. We examined whether two features of the psychosocial environment, low social support and low self-efficacy, influence current alcohol drinkers to develop alcohol dependence or problematic drinking. We utilized the Women and Their Children's Health Study, which has enrolled and interviewed 2,500 women residing in seven coastal Louisiana parishes affected by the Deepwater Horizon Oil Spill. We used logistic regression to estimate the association between psychosocial factors and alcohol dependence (defined by the CAGE questionnaire), as well as problem drinking (defined as more than 7 drinks per week). We considered age, race and depression as confounders a priori; and evaluated oil spill exposure, income, education, current employment and marital status as potential confounders. After restricting the cohort to current drinkers, 716 women were included in the analysis. The mean age was 43.9 years, with 62.8% of the population White and 30.2% Black. Approximately 7% of the women were defined as alcohol dependent and 16.7% were problem drinkers. We observed a significant association between low self-efficacy and alcohol dependence (OR=2.15; 95% CI=1.09-4.24); however, low social support was not associated with alcohol dependence (OR=0.76; 95% CI=0.37-1.57). When evaluating problem drinking, women with low social support were more likely to be problem drinkers compared to those with high social support (OR=1.60; 95% CI=1.002-2.57); no significant association was observed for the relationship between self-efficacy and problem drinking (OR=0.92; 95% CI=0.60-1.41). In conclusion, our data suggest that while self-efficacy may lead to alcohol dependence, problem drinking is more likely influenced by social support.

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SUBTYPES OF INDIVIDUALS IN REMISSION FROM ALCOHOL DEPENDENCE IN A NATIONALLY REPRESENTATIVE SAMPLE. June H. Kim*, Silvia Martins, Deborah Hasin (Columbia University, New York, NY United States)

Background: We aimed to derive diagnostic subtypes based upon DSM-5 alcohol use disorders (AUD) criteria of individuals in remission from alcohol dependence using data from the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC). **Methods**: Latent class analysis of the eleven DSM-5 diagnostic criteria for AUD occurring since the last interview at Wave 2 among 2,394 individuals who had met criteria for lifetime alcohol dependence but who had been in remission for at least the year prior to Wave 1. Classes were validated with antecedent (parental drinking problems), concurrent (average number of drinks per drinking day), and predictive measures (recurrent alcohol dependence at Wave 2). **Results**: The best-fitting model was a 3 -class model, which held after restricting the sample to both abstinent and non-abstinent individuals. For the full sample, the 1st class (79.2%) was defined by low probabilities of all AUD symptoms. The 2nd class (17.2%) was primarily characterized by drinking in larger amounts and in hazardous situations. The 3rd class (3.6%) appreciably differed from the 2nd class through high probabilities of craving, continued use despite problems, and neglecting major role obligations. Although the three classes did not significantly differ by age of first drink or first onset of dependence, the 3rd class was significantly more likely to have 1) parental drinking problems, 2) an average of ten or more drinks per drinking day, and 3) recurrent DSM-IV alcohol dependence. **Conclusion**: Alcohol dependence is a chronic relapsing condition, yet individuals vary tremendously in their risk for relapse. ***Results*** here indicate that the presence of certain patterns of AUD criteria may help distinguish individuals in remission from alcohol dependence with the highest risk of relapse and the greatest need for treatment.

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ACCESSIBILITY TO CIGARETTES AND EXPOSURE TO TOBACCO PROMOTIONAL ADVERTISEMENTS AMONG YOUTH: RESULTS FROM THE GLOBAL YOUTH TOBACCO SURVEY IN YEMEN, 2008. Raed Bahelah* (Florida International University, Miami, FL United States)

BACKGROUND Tobacco smoking is the main risk factor for the leading causes of death worldwide. In the Middle East, Yemen has the third highest rate of adult tobacco smoking (45%) after Tunisia (60%) and Lebanon (58%). The aim of the current study is to investigate the exposure of youth to tobacco promotional advertisements and accessibility to tobacco products in Yemen. **METHODS** The current analysis is based on data from the latest global youth tobacco survey conducted in Yemen in 2008. Complex samples tool in SPSS 21.0 was used to perform all the analyses. Prevalence ratios with 95% confidence intervals (CIs) were calculated. **RESULTS** A total of 1,219 students aged 13 -15 years enrolled in 7-9 school grades were surveyed. Approximately 18% (14.9-21.8%) of boys and 10% (7.5-13.2%) of girls were ever cigarette smokers, while 4.3% (2.9-6.4%) of boys and 1.2% (0.5-2.9%) of girls were current cigarette smokers. More boys than girls were exposed to ads on billboards [70.8% (66.8-74.5%) and 57.9% (53.3-62.3%) respectively], and offered free cigarettes by a tobacco representative [21.3% (18-25.1%) and 13.4% (10.5-16.9%) respectively]. Approximately 2 in 3 students exposed to ads on newspapers/magazines [66.4% (62.2-70.3%) and 60.9% (56.4-65.3%) respectively], and 1 in 4 students had an object with cigarette/tobacco logo [28.5% (24.8-32.6%) boys and 21.5% (18-25.5%) girls]. Among smokers, 7.7% (3.7-15.1%) boys and 12.9% (5.8-26.2%) girls bought cigarettes from a store and 12.3% (7.1-20.4%) boys and 14.9% (6.8-29.6%) girls were not denied purchase of cigarettes because of their age. Smoking at home was reported by 13.5% (7.4-23.5%) boys and 14.5% (6.6-28.9%) girls. **CONCLUSION** Exposure and accessibility to tobacco products among Yemeni youth is high. Effective control policies to limit access and prohibit tobacco ads are urgently required

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ALCOHOL CONSUMPTION AND CONTROL POLICIES IN THE EASTERN MEDITERRANEAN. Raed Bahelah* (Florida International University, Miami, FL United States)

Introduction The World Health Organization Regional Office for the Eastern Mediterranean has declared alcohol consumption a "potential major public health problem" within the region. Alcohol was reported to be the substance most commonly used by youth under 20 in seven EMR countries: Afghanistan, Iran, Pakistan, Somalia, Lebanon, Jordan, and Morocco. **Materials and Methodology:** The WHO Global Information System on Alcohol and Health database was the main source for the data obtained in this review supplied with different WHO alcohol reports, literature review on the epidemiology and policy of alcohol in the region. **Results** The prevalence of alcohol consumption among the general population is heterogeneous and ranging from 0.5% in Egypt to 35.6% in Lebanon with alcohol dependence rates of 0.2% in Egypt to 7.3% in Iran. Among those who drink, 6-11 liters of pure alcohol are consumed per adult drinker per year. Lifetime alcohol consumption among university students is high and ranges from 16.6% in Jordan, 70.8% in Lebanon, 9.6% - 45.7% in Iran, and 10% - 82.4% in Turkey. Alcohol dependence is higher among this age group as well. Approximately 9% of Lebanese university students were alcohol dependent. Most countries in the region have no written national alcohol policy. Additionally, no country has integrated alcohol into substance use program and only one country has integrated alcohol into mental health program. **Conclusion** and Policy Implications As compared to other regions in the world, the Eastern Mediterranean has the lowest rates of alcohol consumption. Nevertheless, the exact epidemiology and drinking patterns are not well known. Quality research is required to collect accurate information about alcohol epidemiology for the establishment of evidence-based policy guidelines

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THE LONG-TERM SOCIAL AND ECONOMIC CONSEQUENCES OF PERSISTENT CANNABIS DEPENDENCE. Magdalena Cerdá*, Terri Moffitt, Madeline Meier, Avshalom Caspi (Columbia University, New York, NY United States)

The benefit and harm associated with cannabis use is subject to fierce debate. In a context of increasing legalization of cannabis use, understanding the consequences of use is particularly timely. This study aimed to examine the association between persistent cannabis dependence at ages 18-38 and social class decline, as well as relationship, financial and employment problems at age 38. Study participants were members of the Dunedin Study, a prospective study of a birth cohort of 1,037 individuals followed from birth (1972/1973) to age 38. Cannabis dependence was measured at ages 18, 21, 26, 32, and 38. Social class was measured at ages 11-15 and age 38; relationship, financial and employment problems were assessed at age 38. Study participants with more persistent cannabis dependence experienced greater social class decline: for example, given the same childhood social class, participants diagnosed with cannabis dependence at 1, 2, and 3+ waves were 0.65, 0.74, and 1.29 rungs lower (on a 6 point scale) at age 38 than those who did not use cannabis. Persistent cannabis dependence was also associated with relationship, financial and employment problems across multiple domains, independent of childhood psychopathology, self-control, socioeconomic status, and differences in adult family structure. The associations were not explained by comorbidity of cannabis dependence with alcohol dependence or with early onset of cannabis dependence, and outcomes for cannabis-dependent and alcohol-dependent groups were similar. Persistent cannabis dependence entails an important economic burden on the social welfare and criminal justice systems. Our study underscores the need to provide not only direct treatment to individuals dependent on cannabis, but to also address a broad range of social and economic concerns that could have long-lasting consequences for persistent cannabis users and their families' well-being.

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RACIAL/ETHNIC DIFFERENCES IN ASSOCIATIONS BETWEEN YOUNG MATERNAL AGE, AND PRETERM BIRTH AND INFANT MORTALITY IN THE U.S. Jean Y. Ko*, William M. Callaghan, Karon Abe, Sherry L. Farr (Centers for Disease Control and Prevention, Atlanta, GA United States)

Purpose: To determine if race/ethnicity modifies the associations between young maternal age and preterm birth (PTB) and infant mortality (IM). **Methods**: Using 2000-2010 U.S. period-linked birth and infant death files, late, moderate, and early PTB (34-36, 28-33, and <28 weeks gestation, respectively) and IM rates among live-singleton births to non-Hispanic white (NHW), non-Hispanic black (NHB), and Hispanic teens (15-17 and 18-19) were compared to women 20-25 years old. After confirming our a priori hypothesis (observing a statistically significant interaction between age and race, $p<0.0001$), 6 logistic regression models generated race/ethnicity-specific odds ratios (aOR) for the association between age and PTB and IM, adjusted for birth year, education, marital status, parity, prenatal care, and smoking status. **Results**: Within the three racial/ethnic groups, odds of PTB (e.g., early PTB, NHW 15-17 years, aOR: 1.37, 95%CI:[1.31, 1.43]; and NHW 18-19 years, aOR: 1.13, 95%CI:[1.09, 1.16]) and IM (e.g., NHW 15-17 years, aOR: 1.34, 95%CI:[1.28, 1.39] and NHW 18-19 years, aOR:1.21, 95%CI: [1.17, 1.24]) were higher among 15-17 and 18-19 year olds, compared to 20-25 year olds. However, the associations between age and PTB and IM were weakest among NHB (early PTB: 15-17 years, aOR: 1.05, 95%CI: [1.01, 1.09]; 18-19 years, aOR:0.95, 95%CI: [0.92, 0.98]; IM: 15-17 years, aOR: 1.07, 95%CI:[1.02, 1.12] and 18-19 years, aOR: 1.04, 95% CI: [1.01, 1.08]). **Conclusion**: Young maternal age is associated with PTB and IM; however, the relationship magnitude differs by race/ethnicity. Future analyses on PTB and IM among young women should examine possible reasons for effect modification by race/ethnicity.

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SELF-POISONING AND CLANDESTINE ABORTION IN BAMAKO, MALI. Hinde Hami*, Tidiane Diallo, Ababacar Maïga, Abdelrhani Mokhtari, Rachida Soulaymani-Bencheikh, Abdelmajid Soulaymani (Laboratory of Genetics and Biometry, Faculty of Science, Ibn Tofail University, Kenitra Morocco)

Introduction: Every year, about 5.5 million women in Africa undergo an induced abortion. Because most abortions are illegal, these procedures are performed under clandestine conditions. As a result, different regions face a serious public health problem that threatens women's lives and endangers their reproductive health. The aim of this study is to determine the profile of women hospitalized for complications of clandestine abortion as a result of self-poisoning in Bamako, capital of Mali. **Methods**: This is a retrospective analysis of voluntary abortion cases, recorded between 2000 and 2010 in two University Hospitals (CHU) and six Health Reference Centers (HRC) in Bamako. **Results**: A total of 176 cases of self-poisoning were recorded between 2000 and 2010, constituting 16 cases on average per year. The average age of women experiencing induced abortion was 20 years. Most victims were adolescents and young adults aged 15-24 years (80.6%) and only 10% of whom were married. According to data available, the drugs were widely used by victims to terminate pregnancy (96% of cases), particularly chloroquine. The poisoning symptoms were varied, depending on involved toxins, the ingested quantity and the delay before treatment. Among the cases for whom the evolution was known, 10 of them died. For other cases, the outcome was favorable with or without sequelae. **Conclusion**s: Many practitioners know abortions are illegal and refuse to perform them. Therefore women perform abortion in unsafe conditions. This can lead to complications and many women end up in hospitals. Some of them even die due to these complications.

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SLEEP-DISORDERED BREATHING AND INSOMNIA MEASURES IN A POPULATION-BASED COHORT OF MIDLIFE WOMEN. Anna G. Mirer*, Paul E. Peppard, Mari Palta, Amanda Rasumuson, Terry Young (University of Wisconsin, Madison, WI United States)

Introduction. Several studies of sleep clinic patients have suggested that women with sleep-disordered breathing (SDB) are less likely than men to present with the cardinal symptoms of SDB, such as snoring or excessive daytime sleepiness, and may instead present with symptoms of insomnia, such as long sleep latency, short sleep duration, or poor sleep efficiency. Population-based studies have been lacking, however, and thus it is unclear whether the co-occurrence of SDB and insomnia could be explained by a referral bias in which women with insomnia symptoms are more likely to seek care for sleepiness, or to be referred to sleep specialists. This analysis uses objective longitudinal data on sleep health from a population-based sample, to investigate whether women with SDB have worse insomnia symptomology than women without SDB. **Methods**. The Sleep in Midlife Women Study includes 1950 in-home sleep studies (median 7 per subject), on 239 female participants recruited from the Wisconsin Sleep Cohort Study around the time of perimenopause. Measures include polysomnographically-assessed total sleep time (minutes), sleep efficiency (% of time in bed asleep), sleep latency (minutes from lights out to sleep), and the apnea-hypopnea index (breathing events/hour). Linear models regressed insomnia outcomes on apnea-hypopnea index, adjusting for age, menopausal stage, Zung depression score, BMI, alcohol use and smoking. Robust standard errors accounted for intrasubject correlation. **Results**. Apnea-hypopnea index was not associated with total sleep time (-0.28 [-1.02, 0.45]), sleep efficiency (-0.08 [-0.19, 0.02]), or sleep latency (0.02 [-0.10, 0.13]). **Conclusion**. In our population-based sample, there was no evidence that women with SDB had worse insomnia symptoms than those without SDB. Our findings do not support the theory that SDB and insomnia co-occur in women more often than would be expected by chance.

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THE EFFECT OF PUBLICLY FUNDED, SCHOOL-BASED HUMAN PAPILLOMAVIRUS (HPV) VACCINATION ON CLINICAL INDICATORS OF SEXUAL ACTIVITY: THE ONTARIO GRADE 8 HPV VACCINE COHORT STUDY. Leah Smith*, Jay Kaufman, Erin Strumpf, Linda Levesque (McGill University, Montreal Canada)

The human papillomavirus (HPV) vaccine continues to be controversial, partly because we lack information on its potential unintended effects. Our aim was to assess the impact of Ontario's Grade 8 HPV Immunization Program on clinical indicators of sexual activity among adolescent girls. Using population-based administrative health and immunization databases, we identified a cohort of all girls in grade 8 in 2005/06-2006/07 (program ineligible) and 2007/08-2008/09 (program eligible). Exposure (three HPV vaccine doses) was ascertained in grades 8-9 and indicators of sexual activity (non-HPV-related sexually transmitted infections and pregnancy) from grade 10 to March 31 of grade 12. Using a quasi-experimental, instrumental variable-based approach (the Regression Discontinuity Design), we employed one- and two-stage local linear regression and log-binomial regression to estimate absolute and relative changes in incidence rates attributable to program eligibility and HPV vaccination. The cohort comprised 221,014 girls (51% ineligible, 49% eligible). Baseline covariates and follow-up time (4.6 years) were similar between groups. 1.0% of ineligible girls were exposed, as were 50.6% of eligible girls. We identified indicators of sexual activity among 6.9% of cohort members and found neither program eligibility nor vaccination had a statistically significant impact on this incidence, whether on the absolute scale *cumulative incidence difference (CID)=0.69 cases per 1000, 95% confidence interval (CI): -4.1, 5.5 and CID=1.7 cases per 1000, 95% CI -10.1, 13.5, respectively* or relative scale *cumulative incidence ratio (CIR)=1.01, 95% CI 0.94, 1.07; CIR=0.99, 95% CI 0.84, 1.16*. Our study fails to discern an effect of HPV vaccination on indicators of sexual activity among Ontario females, suggesting fears of increased sexual activity following vaccination are unwarranted and should not be a barrier to uptake.

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BLADDER ANTIMUSCARINICS USE BY OLDER WOMEN ENROLLED IN THE NATIONAL ALZHEIMER'S COORDINATING CENTER COHORT. Daniela Moga*, Erin Abner, Gregory Jicha (Department of Pharmacy Practice and Science, College of Pharmacy and Department of Epidemiology, College of Public Health, University of Kentucky, Lexington, KY United States)

OBJECTIVES: Cognitive impairment and urinary incontinence (UI) in women, a prevalent combination, creates a complex situation in which medication for one condition (i.e., UI) can reduce treatment effectiveness, or worsen the other condition. We evaluated bladder antimuscarinics (BAM) use by levels of cognitive function in women enrolled in the National Alzheimer's Coordinating Center (NACC) cohort. **METHODS**: We used data from the NACC Uniform Data Set (2005–2013) for patients 65+ with complete medication information. We identified BAM use and determined prevalence and incidence of use by cognitive status, treatment discontinuation, and concomitant use of other drugs. We used logistic regression to calculate odds ratios (OR) and 95% confidence intervals (CI) to evaluate factors associated with BAM use. **RESULTS**: 13,072 (45%) of the enrollees were women 65+. At enrollment, 2,674 (20%) reported active UI and 17% (N=452) were treated with BAM. 3% (N=343) of those not reporting symptoms were also treated. Of those reporting UI who were not treated at enrollment, 156 (6%) reported BAM use at later visits. 449 women (3%) started BAM treatment after UDS enrollment. Of those treated and reporting cognitive impairment, about 33% reported concomitant use of cognition enhancing drugs. Of those treated (prevalent and incident), 52% did not report BAM use at later annual interviews. Of those that discontinued and had subsequent visits, 63% also reported UI at follow-up. Higher anticholinergic load (OR=3.24, 95% CI: 2.43-4.32) and mild cognitive impairment (OR=1.29, 95% CI: 1.04 -1.60) were significantly associated with BAM use. **CONCLUSION**: Although UI symptoms are prevalent among older women, treatment is not curative and discontinuation occurs at high rates. The prescribing practice of combining BAM with anticholinergic drugs and/or with cognition enhancing drugs raises questions about safety and effectiveness.

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A PREGNANCY AND POSTPARTUM LIFESTYLE INTERVENTION IN WOMEN WITH GESTATIONAL DIABETES IMPROVES FASTING GLUCOSE LEVELS. Samantha Ehrlich*, Monique Hedderson, Juanran Feng, Yvonne Crites, Charles Quesenberry, Assiamira Ferrara (Kaiser Permanente Northern California, Oakland, CA United States)

Lifestyle intervention initiated shortly after the diagnosis of gestational diabetes (GDM) and continued postpartum may improve glucose metabolism. The DEBI (Diet Exercise and Breastfeeding Intervention) randomized trial tested a lifestyle intervention for prenatal and postpartum weight management for women with GDM against usual care within Kaiser Permanente Northern California (n= 96 women randomized to the intervention, n=101 to usual care). The intervention started in pregnancy, soon after the GDM diagnosis, with the aim of reducing excessive pregnancy weight gain, and continued postpartum, promoting weight loss through the reduction of dietary fat, increasing physical activity and breastfeeding. To estimate the lifestyle intervention's effect on fasting plasma glucose (FPG) levels in the postpartum period, analyses were conducted among 81 women in the intervention condition (84%) and 90 in usual care (89%) with data on FPG measured at baseline (pregnancy) and postpartum (at 6 weeks and 12 months postpartum). A linear mixed effects model adjusted for pregnancy FPG, age and race-ethnicity estimated the condition difference in the mean change in FPG from pregnancy to 6 weeks and 12 months postpartum. No condition difference in the mean change in FPG from pregnancy to 6 weeks postpartum was detected [condition difference (95% CI) in the mean change in FPG (mg/dl) from pregnancy to 6 weeks postpartum: 1.0 (-1.7, 3.7), P= 0.47]. At 12 months postpartum, the lifestyle intervention was significantly associated with an attenuated increase in FPG as compared to usual care [condition difference (95% CI) in the mean change in FPG (mg/dl) from pregnancy to 12 months postpartum: -3.8 (-7.1, -0.4), P= 0.03]. These findings suggest that a lifestyle intervention promoting prenatal and postpartum weight management improves late postpartum glycaemia and may reduce the risk of diabetes in this high risk population.

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SOCIOECONOMIC PATTERNING OF POOR SLEEP QUALITY AMONG EMPLOYED MOTHERS: THE ROLE OF UNPAID FAMILY WORK. Bonnie Janzen*, Laurie Hellsten (University of Saskatchewan, Saskatoon Canada)

Research suggests that paid work stress contributes to socioeconomic inequalities in sleep quality. However, little is known about the potential role of unpaid family work in relation to socioeconomic inequalities in sleep. To address this gap, 512 employed mothers, between the ages of 20 and 54 years and residing in Saskatchewan, Canada, participated in an on-line survey in Spring 2012. In addition to demographics and self-report measures of sleep problems and work quality (ie. job control and demands), participants completed a recently developed 28-item scale (with documented evidence of validity and reliability) designed to assess five psychosocial dimensions of unpaid family work: psychological demands, equity, autonomy, social resources and rewards. Logistic regression analyses were used to investigate: 1) differences in sleep quality by education; 2) whether unpaid/paid work quality was associated with sleep quality and education; and 3) how much of the education difference in sleep quality could be explained by these variables. Compared to university educated women, poor sleep quality (age adjusted) was more common among high school (OR=2.16; 95% CI 1.26-3.70) and college graduates (OR=1.76; 95% CI 1.02-3.05). Four variables were associated with both lower education and poorer sleep quality: unpaid work rewards, equity in the division of family work, and family-to-work positive spillover; paid work variables did not meet the criteria for mediation. Differences in sleep quality between university and high school graduates was attenuated but still statistically significant following adjustments for potential mediators (OR=1.91; 95% CI 1.10-3.33). Results suggest that the quality of unpaid family work may contribute to understanding educational differences in sleep quality among employed mothers. Longitudinal research and continued measurement refinement are needed to advance the field.

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THE SOCIOECONOMIC PATTERNING OF RURAL WOMEN'S HEALTH IN A CANADIAN PROVINCE. Bonnie Janzen*, Chandima Karunanayake, Louise Hagel, Rhonda Bryce, Jim Dosman, Punam Pahwa, and The Saskatchewan Rural Health Study Research Group (College of Medicine, Saskatoon Canada)

Recent research has moved beyond the question "Does socioeconomic position (SEP) affect health?" to address "in what context and for whom, does SEP affect health?" However, research examining SEP diversity in the health status of Canadians in rural settings, particularly women, is rare. Assuming the SEP-health relationship is similar among rural-dwelling women is inappropriate, given that access to the material and psychosocial resources thought to underlie the gradient varies considerably by gender and between (and within) urban and rural Canada. We use baseline data from the Saskatchewan Rural Health Study, an ongoing prospective cohort study examining the health of rural people in Saskatchewan, Canada. Thirty-nine of 298 rural municipalities and 16 of 145 towns were randomly selected from four quadrants of the province and data were collected through self-administered, mailed questionnaires. Of the 11,004 eligible addresses, responses were obtained from 4,624 (42%) households. Analyses were restricted to 4,186 adult women. Associations between five outcomes (self-rated health, lung disease, diabetes, asthma, heart attack) and four indicators of SEP (income, education, financial strain, occupation) were assessed, with age, marital status, and place (quadrant, farm/non-farm) as the main confounders/effect modifiers of interest. Analyses involved multilevel logistic regression modeling, with individuals nested within households; generalized estimating equations were utilized to account for household clustering. Except for occupation, SEP was associated with outcomes in the expected direction. Age and quadrant often acted as effect modifiers: 1) the gradient was attenuated in older compared to younger women; and 2) associations between low SEP and health were stronger in the southeast compared to other regions. Study limitations are discussed, as are implications for the follow-up study phase.

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BACTERIAL VAGINOSIS AND THE RISK OF TRICHOMONAS VAGINALIS ACQUISITION AMONG HIV-UNINFECTED WOMEN. Sufia Dadabhai*, Newton I. Kumwenda, Bonus Makanani, Shu Chen, Frank Taulo, Taha Taha (Johns Hopkins Bloomberg School of Public Health, Baltimore United States)

Introduction: Trichomonas vaginalis (TV) has been associated with adverse pregnancy outcomes and HIV acquisition. Susceptibility to TV may be mediated by transient conditions in vaginal microbiota. **Methods**: We analyzed data and repeat genital tract samples from HIV-negative women in a clinical trial of bacterial vaginosis (BV) treatment in Blantyre, Malawi (2003-5). We excluded HIV seroconverters, women with pregnancies or undefined TV event. Analysis time for incident TV started at first negative TV result to next TV+ result. TV was detected by saline microscopy. BV was characterized by Gram stain/Nugent score (BV=7-10; intermediate=4-6; normal=0-3 [reference group]). Behaviors (# of partners, frequency of sex, douching, and contraception) were collected at 3-monthly visits and treated as time-varying covariates. We used Cox proportional hazard ratios [HR] to estimate the association between BV at baseline and TV acquisition. Findings: The analysis included 703 women (83.5% of cohort). BV at baseline was confirmed in 317 (45.5%) women. 68.5% of women had 3+ consecutive visits with no TV detected. There were 52 cases of incident TV for a rate of 8.85/100 person years. Among women in the BV treatment arm, incidence was 8.07 for BV+ women and 5.38 for BV- women. Among placebo women, incidence was 15.57 for BV+ women and 8.03 for BV- women. Trial arm (HR 0.58, 95%CI 0.33-1.01), BV at baseline (HR 1.80, 95%CI 1.04-3.12) and injectable contraception compared to no reliable contraception (HR 0.58, 95%CI 0.33,-1.01) were retained in the adjusted HR (aHR) model. Only BV infection was consistently associated with incident TV (aHR 1.77, 95%CI 1.02, 3.07). Sensitivity analyses excluding baseline TV did not affect the finding. **Conclusion**s: Results are consistent with recent literature on vaginal co-infections. If a true relationship exists, then strengthening natural vaginal microbiota could reduce TV morbidity.

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EFFECTS OF THE SAVA SYNDEMIC-RELATED FACTORS ON VIRAL SUPPRESSION AMONG HIV-POSITIVE WOMEN OF COLOR RECEIVING HIV CARE. Lynne Messer*, Kristen Sullivan, E. Byrd Quinlivan, Arthur Blank, Niko Verdecias (Portland State University, Portland, OR United States)

Background: The combination of substance use, violence, HIV/AIDS and related health and psychosocial factors create an excess burden in marginalized communities (the SAVA syndemic). We examine the relationships between SAVA syndemic-related factors and viral suppression among HIV-positive women of color (WoC) receiving HIV clinical care. **Methods**: Data are from the cross-site evaluation of the HRSA-funded SPNS initiative designed to engage and retain WoC in HIV care. A standardized multi-site baseline survey was employed and matched with chart abstraction data. Women were included if they had a viral load test within 90 days of the baseline survey (implying the receipt of some level of HIV care). GEEs were used to explore associations between the psychosocial/health variables on viral suppression (y/n) while accounting for covariates and clustering of women by site. Models included the dichotomous predictor variables frequent mental distress (≥14 days of symptoms/month), substance use, binge alcohol use, sexual risk-taking, and intimate partner violence, controlling for demographic variables. **Results**: Data for 563 HIV+ WoC were analyzed and just under half (n=260) were virally suppressed. Higher values on the SAVA score (0 to 6) were associated with reduced risk of viral suppression; risk ratio (RR) = 0.88, 95% confidence interval (95% CI): 0.81, 0.96. The observed association was slightly attenuated following adjustment for covariates, but not null. **Results** from models including SAVA-variable interactions indicate several of the relationships are on the multiplicative scale ($p<0.10$). **Conclusion**s: SAVA-related factors, in isolation and as part of a syndemic scale, were negatively associated with viral suppression. The presence of synergistic effects suggest that the syndemic approach may be a viable framework for predicting HIV clinical outcomes among this population.

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ROBOTIC VS. LAPAROSCOPIC HYSTERECTOMY FOR BENIGN CONDITIONS. Rebecca Guth*, Liana Merz (BJC HealthCare, St. Louis, MO United States)

Background: Several reviews using data from observational studies have compared robotic to laparoscopic hysterectomy for benign conditions, but none used data from controlled trials. **Methods**: PubMed, Cochrane, and Google were systematically searched for controlled trials comparing robotic to laparoscopic hysterectomy for benign conditions. The primary outcome was operative time. Secondary outcomes were estimated blood loss, length of stay (LOS), conversions to laparotomy, and complications (including transfusions). Study quality was assessed using standardized criteria. When feasible, random effects meta-analysis was conducted. Heterogeneity was assessed using the I^2 statistic. **Results**: 3 controlled trials of low to moderate quality that included a total of 252 patients were identified. Only 2 studies were randomized. Operative time favored laparoscopic hysterectomy, but not significantly [weighted mean difference (WMD) 20.6 minutes, 95% confidence interval (CI) -30.5, 71.7]; studies had significant heterogeneity (I^2=96%). In subgroup analysis of the two randomized trials, operative time was significantly shorter for laparoscopic hysterectomy (WMD=45 minutes, 95% CI 8.3, 81.8; I^2=68%). Occurrence of complications were also not significantly different [odds ratio=1.37, 95% CI 0.57, 3.26; I^2=0%). The remaining outcomes were not reported by all studies or could not be combined in meta-analysis. Only 1 study reported an increased LOS with laparoscopic surgery; the remaining 2 reported no difference. Differences in blood loss (2 studies) were not reported to be different. Only 1 laparoscopic patient (3 studies) converted to laparotomy. **Conclusion**s: Based on 3 controlled trials, robotic surgery may have slightly longer operative times, but does not appear to be different from laparoscopic surgery for other outcomes. Higher quality trials that evaluate long-term patient-centered outcomes are needed.

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RELATIONSHIP BETWEEN SCHOOL DROPOUT AND TEEN PREGNANCY AMONG RURAL SOUTH AFRICAN YOUNG WOMEN. Molly Rosenberg*, Audrey Pettifor, Harsha Thirumurthy, Michael Emch, Afolabi Sulaimon, Kathleen Kahn, Stephen Tollman (University of North Carolina, Chapel Hill, NC United States)

Background: School enrollment may be protective against teen pregnancy. Risky sexual activity may be less likely to occur during periods of school enrollment because of the structured and supervised environment provided, the educational attainment obtained, and safer peer networks encountered while enrolled. **Methods**: Using longitudinal census data from Agincourt, South Africa, we reconstructed the school enrollment status between 2000-2012 for 15,457 young women aged 12 -18 and linked them to the estimated conception date for each pregnancy during this same period. Our primary analysis examined the effect of time-varying school enrollment on teen pregnancy using a Cox proportional hazard model, adjusting for: age; calendar year; household SES; household size; and gender, educational attainment, and employment of household head. A secondary analysis compared the incidence of pregnancy among school enrollees by calendar time: school term versus school holiday. **Results**: In general, we found that school enrollment was protective against teen pregnancy [adjusted hazard ratio (95% confidence interval): 0.57 (0.50, 0.65)] and that this association was robust to potential misclassification of school enrollment. The effect was stronger for younger than older participants. For those enrolled in school, pregnancy was less likely to occur during school term than during school holiday [incidence rate ratio (95% confidence interval): 0.90 (0.78, 1.04)]. **Conclusion**s: Young women who drop out of school may be at high risk for teen pregnancy. Preventive interventions designed to keep young women in school or targeted to provide recent school drop-outs with sexual health information may help reduce the incidence of teen pregnancy.

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DEPRESSIVE SYMPTOMS, ANXIETY SYMPTOMS AND BODY MASS INDEX INFLUENCE ON THE ASSOCIATION BETWEEN MENOPAUSAL STATUS AND INSOMNIA IN MIDDLE-AGED WOMEN: A MULTICENTER LATIN AMERICA ANALYSIS. Edward Mezones-Holguin*, Adrian V Hernandez, Vicente Benites-Zapata, Juan E Blümel, Peter Chedraui, Alvaro Monterrosa, Charles Huamani (Instituto Nacional de Salud and Universidad Peruana de Ciencias Aplicadas, Lima Peru)

Introduction: Insomnia is a common condition in middle-aged women, which would be associated with perimenopausal and postmenopausal status. However, it has not been explored in depth the influence of other conditions such as psychological and anthropometric factors. **Methods**: We carried out a cross-sectional study on women aged 40-59 years living in 11 Latin American countries. To evaluate insomnia we used the Atenas Insomnia Scale (AIS). Also women filled out the Goldberg Anxiety and Depression Scales as part of a self-administered questionnaire. Binary Logistic Regression Models were performed for evaluating the association with insomnia. **Results**: 6079 women were included in the analysis. Age average was 49.8±5.4 years, 56% were married. 11.7% were premenopausal, 30.7% perimenopausal and 57.6% posmenopausal.13.7% used hormone replacement therapy. Depressive symptoms and anxiety symptoms were 46.5% and 59.7%, respectively. 40.9% were overweight and 18.5% were obese. 43.6% had insomnia. In crude analysis, postmenopausal status (OR: 1.34 CI95%: 1.14–1.59) was associated with insomnia. Also depressive and anxiety symptoms, overweight and obesity, were associated with insomnia. However, when model was adjusted for depressive symptoms, anxiety symptoms and BMI categories, postmenopausal status was not associated with insomnia (OR: 1.18 CI95%: 0.98–1.42). **Conclusion**s: The evaluation of insomnia in middle-aged Latin American women requires including mental and anthropometric spheres. Longitudinal analyses are needed to elucidate the causal role of menopause in the origin of insomnia.

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PREGNANCY HYPERGLYCEMIA AND RISK OF PRENATAL AND POSTPARTUM DEPRESSIVE SYMPTOMS. Tianyi Huang*, Tamarra James-Todd, Karen Ertel, Sheryl Rifas-Shiman, Janet Rich-Edwards, Emily Oken, Matthew Gillman (Brigham and Women's Hospital/Harvard Medical School, Boston, MA United States)

Background: Glucose dysregulation in pregnancy may affect maternal depressive symptoms during the prenatal and postpartum periods. **Methods**: At 9.3-36.0 weeks' gestation (mean: 27.7), we measured blood glucose levels of 1,227 women participating in Project Viva after a 50-gram nonfasting glucose challenge test. Using the Edinburgh Postnatal Depression Scale (EPDS), we assessed depressive symptoms at 16.4-37.0 weeks' gestation and again at 6 months postpartum. We used logistic regression, adjusted for sociodemographic, anthropometric and lifestyle factors, to estimate the risk of prenatal and postpartum depressive symptoms (EPDS = 13 on 0-30 scale) in relation to continuous glucose levels. **Results**: 106 (8.6%) and 96 (7.8%) women showed prenatal and postpartum depressive symptoms, respectively. Mean glucose level was 113.0 mg/dL (SD: 26.7). In age-adjusted models, each SD increment in glucose level was associated with higher odds of prenatal depressive symptoms (OR=1.32, 95% CI 1.09-1.59). After adjusting for additional covariates, the association was somewhat attenuated (OR=1.27, 95% CI 1.02-1.58). Glucose level during pregnancy was not associated with prevalent postpartum depressive symptoms (OR=1.01, 95% CI 0.80-1.26 per SD glucose increase). **Conclusion**: Pregnancy hyperglycemia was cross-sectionally associated with higher risk of prenatal depressive symptoms, but not with postpartum depressive symptoms. Psychosocial and biological factors underlying the observed association between hyperglycemia and prenatal depression require further investigations.

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ADVANCES AND CHALLENGES IN E-EPI. Tim Lash*, Ellen Mikkelson (Emory University, Atlanta, GA United States)

Modern technologies such as the Internet, text messaging, smart phones and tablets are an integrated part of daily life for many people. Epidemiologic research is preferably based on data from large populations which often are troublesome to recruit and to maintain in studies. Collecting valid and complex data is time consuming and expensive. E-epi has the potential to overcome some of these methodological obstacles, however challenges also exist. The symposium will cover the following issues: 1) Boston University Pregnancy Study Online (PRESTO) – including data collection in collaboration with a commercial website "Fertility Friend", 2) Combining Internet-based and paper-based data collection in a validation study of a food frequency questionnaire developed for Web use in the Soon Parents Study, 3) Web-based cognitive assessment in the United Kingdom Biobank and 4) The Swedish Karma study on 70 0000 women where data on lifestyle factors and risk factors for breast cancer from web-questionnaires are stored electronically and can be viewed and analyzed instantly. The symposium include projects from four countries (USA, Denmark, Sweden and United Kingdom) that vary in terms of internet use, ethical responsibilities and access to registry data, including the potential to link self-reported and registry-based data. These differences will be reflected in the symposium when the presenters stress advantages and challenges in the use of e-epi. Attendees are invited to engage in a panel discussion at the end of the symposium.

Speakers:

- Boston University Pregnancy Study Online (PRESTO) - combined data collection - data collected in PRESTO and data collected from a commercial web-site "Fertility Friend".) Lauren Wise, Boston University
- Combining Internet-based and paper-based data collection. A validation study of a FFQ developed for Web use in the Soon Parents study Ellen M. Mikkelsen, Aarhus University Hospital
- Web-based cognitive assessment in the United Kingdom Biobank (including information about the platform used to collect data) John Gallacher, Cardiff University School of Medicine
- The Karma study - A population-based study of 70 000 women using an interactive web-based questionnaire for assessing lifestyle factors and risk factors for breast cancer Katarina Bälter, Karolinska Institutet

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MISSING INFORMATION IN EPIDEMIOLOGIC RESEARCH: ARE WE MISSING THE POINT (AND INTERVAL ESTIMATES)? Enrique Schisterman, Stephen Cole* (University of North Carolina, Chapel Hill, Chapel Hill United States)

Missing information is fundamental to inferences in population-health research. All errors (random and systematic) may be cast as being due to missing information. Therefore, better widespread understanding of the principles of missing information will improve the conduct of population-health research. More narrowly defined "missing data" is ubiquitous in epidemiologic research, and provides a backdrop against which one can sharpen their understanding of missing information principles. The speakers in this symposium will: 1) review an existing missing data framework in the context of an epidemiologic example; 2) illustrate the use of parametric methods (e.g., multiple imputation) to account for missing data in the example; 3) illustrate the use of semiparametric methods (e.g., inverse-probability weighting) to account for missing data in the example; and 4) discuss tradeoffs between proposed approaches and some future directions for our field.

Speakers:

- Stephen R. Cole (UNC)*
- Neil Perkins (NICHD, NIH)
- Eric Tchetgen Tchetgen (Harvard)
- Discussant: Enrique F. Schisterman (NICHD, NIH)*

*cochairs

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EXPOSURES AND INTERVENTIONS: TOWARD A MORE CONSEQUENTIAL EPIDEMIOLOGY. Daniel Westreich*, Jennifer Ahern (University of North Carolina, Chapel Hill, Chapel Hill United States)

Much of epidemiology focuses on questions of whether a particular exposure causes a particular outcome, and to this end estimates measures of effect for the extremes of exposure distributions (for example, the "average treatment effect": the difference in outcome if the whole population were exposed, versus the whole population unexposed). But epidemiology can also address questions of effects of specific interventions on an exposure. For example, consider smoking and all-cause mortality. Epidemiologic approaches can estimate how much population average risk changes for all-cause mortality, estimating the potential outcomes of a single population under all-exposed and all-unexposed smoking patterns. Such a comparison might estimate that (for example) a twenty-year risk difference for all-cause mortality associated with smoking was 10%. But this risk difference, alone, would not give us a sense of the likely impact of a large-scale public health intervention targeted at promoting smoking cessation among current smokers in the same population over the same time period. The always-versus-never comparison would be of limited use in helping to plan interventions or serving as inputs to cost-effectiveness modeling exercises. In last year's presidential address at SER, Dr. Sandro Galea called for a more 'consequentialist' approach to epidemiology. In this symposium, we will discuss conceptual models for exposure and interventional effects; give a worked example of this approach to epidemiologic estimation; discuss statistical approaches to consequentialist epidemiology; address how this approach and methods can help epidemiologists to interface with their peers in the cost-effectiveness modeling world; and address how these approaches contribute to the emerging discipline of implementation science.

Speakers:

- Exposures and interventions: a framework
  Daniel Westreich, UNC-Chapel Hill
- Early childhood adversity and psychopathology - an illustration of the utility of population intervention parameters
  Jennifer Ahern , UC Berkeley
- Estimation approaches for interventional effects
  Jess Edwards, UNC-Chapel Hill

Discussants:

- The consequences of consequentialism -Sandro Galea, Columbia University
- It's all applied -Howard Frumkin, University of Washington

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EXPOSOME. Nansi Boghossian*, Edwina Yeung (Division of Intramural Population Health Research NICHD, Rockville, MD)

In 2005, Christopher P. Wild coined the term 'exposome' which represents the totality of environmental exposures from both external (air, water, diet, stress, infection, etc.) and internal sources (the microbiome, inflammation, etc.) from conception onwards. Measurement of environmental exposures however, despite its importance, still lags behind measurement of genetic factors. The aim of this symposium is to discuss emerging technologies and biomarkers that can be used to collect individual exposure data that will help us carry our epidemiologic studies to the next level. Examples of proof-of-concept studies and bioinformatics tools will also be presented. This synthesis should challenge epidemiologists into thinking of new methodologies to develop their future studies.

Speakers:

- The blood exposome and its role in disease etiology
  Stephen M. Rappaport, PhD, University of California, Berkeley
- Gene expression profiling of airway epithelium as a tool to assess physiological responses to inhaled environmental exposures
  Marc Lenburg, PhD, Boston University School of Medicine
- Environment-wide Association Studies (EWAS) for a more complete view of exposures in disease
  Chirag Patel, PhD, Harvard Medical School
- Lessons learned for developing an "Exposome" for children's cohort studies: challenges and successes in applying new methods for assessment, integration, and analytics
  Elaine M. Faustman, PhD, University of Washington

E01

QUANTIFYING LEAD-TIME BIAS IN RISK-FACTOR STUDIES OF CANCER THROUGH SIMULATION. Rick Jansen*, Bruce H Alexander, Kristin E Anderson, Timothy R Church (Mayo Clinic, Rochester, MN)

Purpose: Lead-time is inherent in early detection and creates bias in observational studies of screening efficacy, but it's potential to bias effect estimates in risk-factor studies is not always recognized. We describe a form of this bias that conventional analyses cannot address and develop a model to quantify it. **Methods**: Surveillance Epidemiology and End Results (SEER) data form the basis for estimates of age-specific preclinical incidence and log-normal distributions describe the preclinical duration distribution. Simulations assume a joint null hypothesis of no effect of either the risk factor or screening on the preclinical incidence of cancer, and then quantify the bias as the risk-factor odds ratio (OR) from this null study. This bias can be used as a factor to adjust observed OR in the actual study. **Results**: Results showed that for this particular study design, as average preclinical duration increased, the bias in the total-physical-activity OR monotonically increased from 1 % to 22% above the null, but the smoking OR monotonically decreased from 1% above the null to 5% below the null. **Conclusion**: The finding of nontrivial bias in fixed risk-factor effect estimates demonstrates the importance of quantitatively evaluating it in susceptible studies.

E02

SYNTHETIC LIKELIHOOD APPROACH FOR QUANTIFYING MULTI-SCALE EPIDEMIC PROCESSES FROM LARGE AND COMPLEX DATA SETS. Corentin Barbu*, K Sethuraman, J Manne, J E Quintanilla Calderon, M Z Levy (University of Pennsylvania, Pittsburgh PA United States)

Adequate planning of epidemic control strategies often relies on correct estimation of the frequency of agent dispersal at multiple scales, including rare long range events. Stochastic models are well suited to handle such complex processes but tend to present intractable likelihoods, making parameter estimation difficult. A recent solution, the synthetic likelihood approach, aims to represent data through summary statistics that follow well-known multivariate distributions to compute a usable likelihood. Building on the original proof of concept on stochastic time-series, we expanded the idea to spatio-temporal processes. We further propose that the synthetic likelihood approach can be used to infer the relative frequency of dispersal at different scales from spatial patterns present in cross-sectional data. In a Bayesian framework, this information can be combined with repeated observations at a smaller scale to infer the frequency of medium and large scale dispersal events. We explored the feasibility of this approach by quantifying the frequency of dispersal of Triatoma infestans, the main vector of Chagas disease south of the equator, at multiple scales. We jointly analyzed infestation data from 400 households observed twice two years apart and cross-sectional infestation data from 40,000 additional households collected during vector control operations in Arequipa, Peru. We found that our estimates of dispersal frequencies are compatible with genetic diversity patterns observed using microsatellite markers. This experimental validation together with rigorous statistical coverage checks demonstrates the validity of the approach to characterize multi-scale epidemic.

E03

BROKEN WINDOWS BY WAY OF MICROSOFT WINDOWS: ECOMETRICS AND VALIDITY OF A NEIGHBORHOOD PHYSICAL DISORDER MEASURE CONSTRUCTED BY VIRTUAL STREET AUDIT. Stephen J Mooney*, Michael DM Bader, Gina S Lovasi, Kathryn M Neckerman, Andrew G Rundle, Julien O Teitler (Columbia University, New York NY United States)

BACKGROUND: Physical characteristics of neighborhoods, including physical disorder (or 'broken windows'), have been difficult to measure objectively and reliably in multiple locales, limiting the use of such measures in neighborhood health research. Google Street View provides a novel source of imagery for virtual street audits to assess neighborhood physical characteristics efficiently. We evaluated the ecometric properties of a neighborhood physical disorder measure constructed from virtual street audit data. **METHODS**: Eleven trained auditors assessed nine previously validated items developed to capture physical disorder (e.g. litter, graffiti, abandoned buildings, etc.) on 1,826 block faces using Google Street View imagery from four US cities (San Jose, California; Detroit, Michigan; New York, New York; and Philadelphia, Pennsylvania). We constructed a 2-parameter Item Response Theory scale to estimate latent levels of disorder on each audited block face and used a geostatistical method known as kriging to interpolate a physical disorder level with confidence estimates for any point in each city. **RESULTS**: Kappa scores for audit items ranged from 0.34 to 0.80, indicating fair to substantial agreement. Internal consistency reliability of the resulting scale was 0.93. The final interpolated measure of disorder demonstrated convergent validity with US Census data: it was positively correlated with unemployment and housing vacancy and negatively correlated with owner-occupied housing. **DISCUSSION**: These results illustrate a novel method to combine observed street audits items to construct a valid, reliable, and spatially flexible measure of neighborhood physical disorder.

L01

IS SOCIAL MOBILITY ACROSS THE LIFE-COURSE ASSOCIATED WITH LOW BIRTHWEIGHT? THE LIFE-COURSE INFLUENCES ON FETAL ENVIRONMENT (LIFE) STUDY. Theresa Osypuk*, Rebecca Kehm, Jaime Slaughter-Acey, Dawn Misra (University of Minnesota School of Public Health, Minneapolis MN United States)

A body of evidence has established a strong social gradient for birth outcomes, where higher adult socioeconomic position (SEP) is associated with lower risk of low birthweight (LBW). However, some demographic subgroups exhibit weaker health gradients than native-born white Americans, and few epidemiologic studies have incorporated the life course trajectory of a woman's SEP to understand its impact on birth outcomes, especially among black women. We tested whether social mobility (in other words, improving SEP) from childhood to adulthood was associated with lower risk of LBW in a cohort study of black women. Data derive from the LIFE cohort study among black women in the Detroit Michigan metro area (71% response rate, N=1411), collected 2009–2011. LBW was defined as birthweight <2500g at birth. Self-reported ordinal subjective SEP was measured by survey referring to 2 (separate) timepoints by this item: "How would you describe your family's financial situation [today/while you were growing up]?" Answers ranged on a 5- point Likert scale from "very poor" to "well-to-do". We operationalized social mobility as the difference between the adulthood versus childhood measures of SEP. Higher values on the difference measure indicated social mobility (improved SEP) from childhood to adulthood. Covariates included age and childhood SEP, although unadjusted results were similar. Adjusted Poisson regression results found that one standard deviation of improved social mobility across the life course was associated with 24% significantly lower risk of LBW (Risk Ratio=0.76, 95%CI: 0.58-0.99). Alternate measures of social mobility using variables referring to age-specific periods in childhood generated similar results. These results suggest that social mobility from childhood to adulthood may play a role in patterning exposures across a woman's life course that influence birth outcomes among black women.

L02

DIABETES AND MAMMOGRAPHIC BREAST DENSITY AMONG WHITE AND BLACK WOMEN. Maureen Sanderson*, Heather O'Hara, Nia Foderingham, William Dupont, Xiao-Ou Shu, Neeraja Peterson, Alecia Fair, Mary Kay Fadden (Meharry Medical College, Nashville TN United States)

Diabetes, independent of obesity, has been identified as a weak risk factor for breast cancer (relative risk [RR]~1.2), while high mammographic breast density has been identified as a strong risk factor (RR~4-6). The very few studies of the association between diabetes and high breast density, defined here as the percentage of fibroglandular tissue in the breast, have been mixed. We conducted a study of women recruited at a historically black medical school to investigate the relationship between diabetes and mammographic breast density. A total of 479 women completed in-person interviews, body measurements and full-field digital mammograms on a Hologic™ workstation from December 2011 through February 2014. Average percent breast density for the left and right breasts combined was estimated using Quantra™, an automated algorithm for volumetric assessment of breast tissue. After adjustment for race, age, and body mass index, premenopausal women without a self- reported history of diabetes had a greater mean (μ) percent breast density (μ 17.0, standard error [SE] 1.80) than diabetic women (μ 15.0, SE 1.83) (p=0.06); however, there was no association among postmenopausal women. When we stratified by race, the diabetes and percent breast density relation was present in white women (non- diabetic μ 16.4, SE 2.05; diabetic μ 13.3, SE 2.16; p=0.05), but not in black women (non-diabetic μ 16.6, SE 0.84; diabetic μ 15.8, SE 1.34; p=0.55). We were unable to examine a potential effect of metformin on decreasing breast density due to its low use. Confirmation of our findings in larger studies may assist in clarifying the role of the insulin signaling pathway in high breast density.

L03

BLACK CARBON EXPOSURE IS ASSOCIATED WITH HIGHER RATES OF BONE LOSS IN MEN. Diddier Prada*, Andrea Baccarelli, Teresa Curto, Andrea Araujo, Shona Fang, Elena Colicino, Joel Schwartz, Mary Bouxsein, Michael Holick, Joseph Zmuda, Benedetta Bartali (Harvard School of Public Health, Boston MA United States)

Bone loss is increasingly recognized as a major public health problem, contributing to fractures and inability to live independently in older people. Air pollution increases systemic oxidative damage, induces inflammation, and affects vitamin D metabolism – all recognized risk factors for bone loss. However, whether air pollution exposure accelerates bone loss has not yet been investigated. We examined the association of exposure to particulate air pollution from vehicular traffic, as traced by ambient black carbon (BC), on longitudinal changes in bone mineral density (BMD) in 692 men participating in the BACH/Bone survey. BC levels of exposure at baseline (1-year average) were estimated using a validated spatiotemporal land-use model. Multivariable linear regression models were used to determine associations between BC and BMD changes over 8 years. For 1-unit (μg/m3) increase in BC concentration, femoral neck BMD decreased 0.73%/year (95%CI -1.3 to -0.19; p=0.009) and ultradistal radius BMD decreased 0.58%/year (95%CI -1.12 to -0.03; p=0.04) after adjustment for potential confounders, including age, race, height, smoking, household income, physical activity, caffeine consumption, weight and serum 25(OH)D. Air pollution from traffic is associated with increased bone loss in adult men. If confirmed, these findings may have important public health implications for prevention of age-related bone loss and its sequelae.

L04

MEDICATIONS AS A SOURCE OF PARABEN EXPOSURE IN WOMEN AND MEN OF REPRODUCTIVE AGE. Laura Dodge*, Paige Williams, Katherine Kelley, Michelle Williams, Sonia Hernandez-Diaz, Stacey Missmer, Russ Hauser (Harvard School of Public Health, Boston MA United States)

BACKGROUND: Parabens are used as antimicrobial excipients in some pharmaceutical products. Limited evidence suggests that parabens may adversely affect female and male reproductive health. **OBJECTIVES**: Determine whether use of paraben-containing medications contribute to high urinary paraben concentrations. **METHODS**: Women and men at a fertility clinic were enrolled in a prospective study of environmental determinants of fertility. They provided multiple urine samples during the course of their treatment and self-reported use of medications and personal care products in the previous 24 hours. Specific gravity-adjusted urinary concentrations of methyl, propyl, and butyl paraben were measured at the Centers for Disease Control and Prevention. Within an individual, urinary concentrations were compared on days that the participant did ("exposed samples") and did not ("unexposed samples") report using a paraben-containing medication. Time elapsed between medication use and the urine sample was also examined. **RESULTS**: Among 250 participants who reported any medication use during the study period, 11 participants contributed 12 exposed and 45 unexposed urine samples. Adjusted for multiple samples within individuals, use of a paraben-containing medication within seven hours of the urine sample (provided on the day of medication use) was associated with 9-fold increases in the mean adjusted propyl (P=0.047) and methyl (P=0.10) paraben concentrations and a 1.7-fold increase in the mean adjusted butyl paraben concentrations (P=0.55). The magnitudes of these differences decreased slightly after adjusting for the number of personal care products used. **CONCLUSION**: Parabens are used in a range of pharmaceutical products, and their use as excipients contributed to up to 9-fold higher urinary concentrations within hours of use. Further investigation into the reproductive health implications of these exposures is warranted.

L05

HEALTH CHARACTERISTICS OF CAREGIVERS. Willi Horner-Johnson, Elena Andresen*, Konrad Dobbertin, Erin Bouldin (Oregon Health & Science University, Portland OR United States)

Background Many American adults provide care for a family member or friend with a disability or health condition. While these caregiving relationships are critically important, they may have adverse impacts on the health of caregivers. The purpose of this study was to examine health status and health risks among people providing care. **Methods** Data came from the Caregiving Module administered as part of our state's Behavioral Risk Factor Surveillance System survey in 2012. We calculated weighted frequencies using Stata 12.1 to account for the complex survey design. **Results** Eighteen percent of respondents (n=594) said they provided regular care or assistance for a family member or friend. Of those, 23.1% (95% confidence interval [CI]: 18.7, 28.2) reported fair or poor health, compared to 16.2% (95% CI: 14.2, 18.4) of non-caregivers. The proportions of caregivers and non-caregivers reporting frequent mental distress (>14 days of poor mental health in the past month) were 17.8% (95% CI: 13.6, 23.0) and 9.9% (95% CI: 8.2, 11.9) respectively. Households with caregivers were more likely to experience food insecurity (24.9% [95% CI: 19.4, 31.3] vs. 15.5% [95% CI: 12.6, 18.9]) and hunger (12.1% [95% CI: 8.2, 17.4] vs. 4.6% [95% CI: 3.0, 7.2]), and caregivers were somewhat, but not significantly, more likely to be obese (30.5% [95% CI: 25.2, 36.4] vs. 26.0% [95% CI: 23.4, 28.8]). When asked about the greatest difficulty they faced, the issue most frequently identified by caregivers was that caregiving creates or aggravates health problems. **Conclusion**s Caregiving is associated with increased health risks, which may be attributable to financial burdens and stress related to caregiving. These stressors can impact both providers and recipients of care. Our findings speak to the need for additional support and health promotion efforts for family caregivers.

L06

CHANGES IN FAT MASS, LEAN MASS AND MUSCLE STRENGTH WITH AGING: DO RACIAL/ETHNIC DIFFERENCES EXIST? Benedetta Bartali*, Nicholas Dagincourt, Teresa Curto, Nancy Maserejian, Andre Araujo (New England Research Institutes, Watertown MA United States)

Background: Declines in lean mass (LM) and muscle strength (MS), the two components of sarcopenia, are recognized risk factors for frailty and disability. However, when the declines start occurring during the aging process, and whether rates of decline differ by race/ethnicity is unclear. **Methods**: Fat mass (FM) and LM were measured by dual-energy x-ray absoroptiometry, and MS by hand dynamometer at baseline and 8-y follow-up in 692 black, Hispanic, and white men aged 30-80y participating to the population-based longitudinal Boston Area Community Health/Bone Survey. Multivariable linear regression models were used to determine the marginal mean in change in FM, LM and MS, according to racial/ethnic and age groups. **Results**: There was a significant difference in change in FM, LM and MS across age groups. In particular, the annualized mean change in LM was +0.24 kg (95% CI: 0.13-0.36) and +0.16 kg (95% CI: 0.09-0.23) in the younger age groups (<40 and 40-49 y, respectively), with a statistically significant decline observed after the age of 60 years (-0.09 kg; 95 already % CI: -0.18-0.01). MS linearly declined with aging (p-trend=0.001), with significant declines observed even in men aged 50-59 years old (-0.33 kg; 95% CI:-0.56;-0.10). The interaction between race/ethnicity and age in relation to change in FM, LM, or MS was not significant. **Conclusion**s: There are not racial differences in age-related changes in LM and MS. MS declines with aging already in men in their 50s and precedes LM decline in men. Intervention strategies to prevent sarcopenia are already needed in middle-aged men, when interventions are more likely to be cost-effective and functional declines may be still reversible.

L07

PREVENTING LOSS OF INDEPENDENCE THROUGH EXERCISE (PLIE): A NOVEL INTEGRATIVE EXERCISE PROGRAM FOR INDIVIDUALS WITH DEMENTIA. Deborah Barnes*, Kristine Yaffe, Margaret Chesney, Wolf Mehling (University of California, San Francisco, San Francisco CA United States)

Background: The goal of this study was to pilot-test a novel, integrative group exercise program for individuals with mild-to-moderate dementia called Preventing Loss of Independence through Exercise (PLIÉ), which focuses on training procedural memory for basic functional movements (e.g., sit-to-stand) while increasing mindful body awareness and facilitating social connection. **Methods**: We performed a 36-week cross-over pilot clinical trial to compare PLIÉ with usual care (UC) at an adult day program for individuals with dementia in San Francisco, CA. Physical performance, cognitive function, quality of life and caregiver burden were assessed by blinded interviewers at baseline, 18 weeks (cross-over) and 36 weeks. Our primary outcomes were effect sizes based on between-group comparisons of change from baseline to 18 weeks; secondary outcomes were within-group comparisons of change before and after cross-over. **Results**: Twelve individuals enrolled (7 PLIÉ, 5 UC) and 2 withdrew (1 PLIÉ, 18 weeks; 1 UC, 36 weeks). Participants were 82% women (mean age, 84 ± 4 years); caregivers were 82% daughters (mean age, 56 ± 13 years). Effect sizes were not statistically significant but suggested potentially clinically meaningful (=0.25 SDs) improvement with PLIÉ versus UC for physical performance (Cohen's D: 0.34 SDs), cognitive function (0.76 SDs) and quality of life (0.83 SDs) as well as for caregiver measures of participant's quality of life (0.33 SDs) and caregiver burden (0.49 SDs). Results were similar when within-group comparisons were made before and after cross-over. **Conclusion**s: PLIÉ is a novel, integrative exercise program that shows promise for improving physical function, cognitive function, quality of life and caregiver burden in individuals with mild-to-moderate dementia. Larger randomized, controlled trials are warranted, and a second pilot study is currently underway.

L08

HOW DOES A MULTIFACETED QUALITY IMPROVEMENT PROJECT AFFECT HEALTH WORKER JOB SATISFACTION? A LONGITUDINAL SURVEY OF HEALTH WORKERS IN 24 PRIMARY CARE CLINICS IN RURAL TANZANIA. Elysia Larson*, Angela Kimweri, Festo Mazuguni, Margaret Kruk (Columbia University, New York NY United States)

Background: Quality-improvement interventions have potential for increasing both health workers' ability to perform their jobs well, as well as their workload. It is important to understand how complex interventions may affect the attitudes of those providing care. This analysis assesses associations between a quality improvement intervention and changes in health worker job satisfaction. **Methods**: 24 primary health clinics in rural Tanzania participated in a maternal health quality improvement study. 12 clinics were randomly chosen to receive the intervention. Health workers were given a job satisfaction survey before the intervention began, then again one and two years later (February-March 2013 and 2014.) Respondents were asked if they strongly agreed that they were generally satisfied with their job. We used principal components analysis (PCA) to combine 17 questions that asked about the work environment, to construct a composite indicator of job satisfaction. We used difference in differences regressions to assess changes in job satisfaction over time between intervention and comparison groups. **Results**: From baseline to year one there was a significant increase in job satisfaction in health workers in intervention facilities compared to those in control facilities when assessing general satisfaction (ordinary least squares coefficient (OLS): 0.34, 95% confidence interval (CI): 0.06, 0.63), but not for the composite satisfaction score (OLS: 0.94, 95% CI: -0.49, 2.37). There were no significant changes from the end of the first year to the end of the second year for general satisfaction (OLS: 0.62, 95% CI: -0.94, 1.67) nor the composite satisfaction score (OLS: 0.02, 95% CI: -0.24, 0.28). **Discussion**: Although there is a gain in health worker satisfaction immediately after the intervention was implemented, this was not maintained for the following year. When assessing the affects of interventions on health workers, it is necessary to consider both potential immediate and lasting effects.

L09

HOW MUCH OF SOCIOECONOMIC DIFFERENCES IN BREAST CANCER PATIENT SURVIVAL CAN BE EXPLAINED BY DIFFERENCES IN STAGE AT DIAGNOSIS AND TREATMENT? Ruoran Li*, Rhian Daniel, Bernard Rachet (London School of Hygiene & Tropical Medicine, London United Kingdom)

Socioeconomic inequalities in breast cancer survival persist in England. The main contributing factors could be presentation at more advanced stages and differential access to treatment. Information on 36,793 women diagnosed with breast cancer during 2000-2007 was routinely collected by an English population-based cancer registry. Surgical treatment information from Hospital Episode Statistics was dichotomised into "major" versus "minor or no procedures". A deprivation category was allocated according to each patient's area of residence at diagnosis. G-computation procedures were used to estimate the proportion of the effect of deprivation on short-term survival mediated by stage and by treatment. Single stochastic imputation was incorporated in the g-computation procedures to handle missing stage (8%). Net survival differed between the most affluent and most deprived patients at one year (97% vs 94%), and at five years (86% vs 76%) after diagnosis. Adverse stage distribution was associated with more deprived patients ($p<0.001$). The more advanced the stage at diagnosis, the less likely the patient was to receive major surgical treatment ($p<0.001$). The most deprived patients were almost three times more likely to die within six months after diagnosis than the most affluent (Odds Ratio: 2.77, 95% CI 2.17–3.53). One third of this short-term excess mortality was mediated by adverse stage distribution whilst none was mediated through differential surgical treatment. Based on virtually all breast cancer patients, our results showed the effect of different contributory factors on the unequal short-term survival between deprivation groups in these patients. Effort to advance the diagnoses is important, but would reduce the socio-economic inequalities in cancer survival only by a third. We did not have reliable information on comorbidity, which could be another mediator on the causal pathway.

L10

ELEMENTS IN AUTOPSY LUNG TISSUE FROM WORLD TRADE CENTER HEALTH REGISTRY REGISTRANTS. I-Hsin Lin*, Jason Graham, Mianhua Zhong, Elizabeth Halzack, James Ross, Steven Chillrud, Hannah Jordan, Yongzhao Shao, Lung-Chi Chen, Michael Marmor (Department of Population Health, New York University School of Medicine, New York NY United States)

The destruction of the World Trade Center (WTC) towers in New York City on September 11, 2001 released a complex mixture of dust, gas and fumes into the environment. Studies of health effects of exposure to WTC contaminants have been hampered by a lack of information on relative levels of exposure among individuals. We studied trace elements in autopsy-derived tissues to develop biomarkers of WTC exposure. We collected 33 lung tissue samples from 20 deceased World Trade Center Health Registry (WTCHR) enrollees who happened to undergo autopsy by the Office of the Chief Medical Examiner (OCME) of the City of New York in 2008-09. Lung samples were visually determined to be from peripheral (n = 18) or central (n = 15) lung. Tissue samples were dried, weighed, homogenized and acid-digested. Inductively coupled magnetic sector plasma mass spectrometry (ICP-MS) then was used to measure concentrations (ppm) of 34 major and trace elements known to be enriched in WTC dust. Self-reported exposure history assessed at WTCHR enrollment was categorized as high vs. none, low, or intermediate. The non-parametric Wilcoxon test indicated significantly higher concentrations of Al (median = 37.1 high vs. 15.7 low, p = 0.01), Cs (0.06 vs. 0.03, p = 0.01), Ti (3.91 vs. 1.67, p = 0.02), and Pb (0.23 vs. 0.16, p = 0.04) in peripheral lung among the 5 individuals with high self-reported WTC exposure compared to 13 reporting lower exposure. No significant differences were observed in samples from the central lung. These data support the hypothesis that WTC-specific trace elements remained in peripheral lung tissue 7-8 years after the terrorist attacks of 2001 and have the potential to serve as biomarkers of WTC exposure. Our ongoing study will further investigate concentrations of WTC-related trace elements in larger numbers of subjects and other organs (kidney, liver) as we continue to seek signatures of WTC exposure.

L11

SEXUAL AND PHYSICAL ABUSE AND GYNECOLOGICAL DISORDERS: THE ENDOMETRIOSIS—NATURAL HISTORY, DIAGNOSIS AND OUTCOMES (ENDO) STUDY (2007–2009). Karen Schliep*, Sunni Mumford, Uba Backonja, Zhen Chen, Erica Johnstone, Howard Sharp, Joseph Stanford, C. Matthew Peterson, Germaine Buck Louis (Division of Intramural Population Health Research, Eunice Kennedy Shriver National Institute of Child Health and Human Development, Rockville MD United States)

A lack of understanding regarding the relationship between sexual and physical abuse and pathogenesis of endometriosis and other gynecological disorders served as the impetus for our study. 473 women, aged 18 –44, undergoing laparoscopy regardless of indication were enrolled in the ENDO Study. Prior to surgery, participants completed a computer-assisted personal interview, including standardized measurement of abuse history. Among the total population, 209 (43%) women experienced some form of sexual abuse; 73 (15%) had been hit, kicked, or beaten; and 31 (7%) had their lives seriously threatened. We found that women with a postoperative diagnosis of a normal pelvis compared to endometriosis or other gynecological disorder were significantly more likely (via chi-squared test) to report having been threatened or forced to have sex when they did not want to (34.5% vs. 20.5%, P=0.005; and 28.2% vs. 17.8%, P=0.03, respectively) and more likely to report physical abuse or having had their lives threatened (20.4% vs. 13.2%, P=0.07; 11.3% vs. 4.5%, respectively P=0.006). After adjusting for female age, study site, and household income, women who had been sexually threatened or physically abused had a decreased odds of an endometriosis diagnosis (adjusted odds ratio (aOR)=0.61, 95% confidence interval (CI): 0.38, 0.96 and aOR=0.44, 95% CI: 0.24, 0.81, respectively) compared to women without endometriosis. Our findings demonstrate that while abuse may not be indicative of gynecological disease the prevalence of past abuse is high and thus, gynecologists should include screening for abuse history so that appropriate clinical follow-up can be implemented as needed.

L12

RISK OF MYOCARDIAL INFARCTION IN OLDER MEN RECEIVING TESTOSTERONE THERAPY. Jacques Baillargeon*, Randall Urban, Yong-Fang Kuo (University of Texas Medical Branch, Galveston TX United States)

BACKGROUND: Testosterone therapy for older men has increased substantially over the past decade. Research on the effects of testosterone therapy on cardiovascular outcomes has yielded inconsistent results. OBJECTIVE: To examine the risk of myocardial infarction (MI) in a population-based cohort of older men receiving intramuscular testosterone. **METHODS**: Using a 5% national sample of Medicare beneficiaries, we identified 6,355 patients treated with at least one injection of testosterone between January 1, 1997 and December 31, 2005. We matched this cohort to 19,065 testosterone nonusers at a 1:3 ratio based on a composite MI prognostic index score. Patients were followed until December 31, 2005, or until they lost coverage from Medicare Parts A and B, enrolled in a health maintenance organization, experienced a myocardial infarction or died. **RESULTS**: In a Cox regression analysis adjusting for demographic and clinical characteristics, receipt of testosterone therapy was not associated with an increased risk of MI (HR=0.85, 95% CI, 0.70-1.03). In this analysis, there was an interaction between receipt of testosterone and quartile of risk of MI (p=0.023). For men in the highest and second highest quartiles of the MI prognostic score, testosterone therapy was associated with a reduced risk of MI (fourth quartile, HR=0.71, 95% CI, 0.53-0.94; third quartile, HR=0.76, 95% CI, 0.58-0.99), while there was no difference in risk for the first (HR=1.22, 95% CI, 0.88-1.67) and second quartiles (HR=0.94, 95% CI, 0.68-1.29). **CONCLUSIONS**: Older men who were treated with intramuscular testosterone did not appear to have an increased risk of MI. For men with higher MI risk, testosterone use was modestly protective against MI.

L13

THE RELATIONSHIPS BETWEEN COPD, FREQUENT MENTAL DISTRESS, AND SHORT SLEEP DURATION AMONG U.S. ADULTS IN 7 STATES, 2011-2012. Yong Liu*, Daniel Chapman, Earl Ford, Timothy Cunningham, Anne Wheaton, Janet Croft (Centers for Disease Control & Prevention, Atlanta GA United States)

Introduction: Numerous laboratory studies suggest that chronic obstructive pulmonary disease (COPD) adversely affects sleep quality and leads to psychological distress and poor sleep. Poor sleep, in turn, could exacerbate the severity of COPD. However, little research has previously addressed the relationships among COPD, psychological distress, and poor sleep using a large community-based population. **Methods**: Data from 47,376 respondents aged =18 years in 7 states in the 2011 and 2012 Behavioral Risk Factor Surveillance System were analyzed to assess the relationships among self-reported physician-diagnosed COPD, frequent mental distress (FMD, mental health was not good = 14 days during the past 30 days), and short sleep duration (=6 hours per 24 hours). Age-adjusted prevalence ratio (APR) and 95% confidence intervals (CI) were generated with SAS-callable SUDAAN to account for the complex sampling design. **Results**: Among respondents, 34.9% reported short sleep duration, 11.3% had FMD, and 6.2% had COPD. Adults with COPD were more likely to report short sleep duration than those without COPD (43.9% vs. 34.3%, respectively, p<0.001). Similarly, adults with FMD were more likely to report short sleep duration than those without FMD (54.2% vs. 32.3%, respectively, p<0.001). Furthermore, among those without FMD, the likelihood of reporting short sleep duration was significantly higher among those with COPD than those without COPD (APR=1.31, 95% CI=1.17-1.46). However, among respondents with FMD, there was no different by COPD status (APR=1.04, 95% CI=0.88-1.23). **Conclusion**s: Our results suggest that FMD may be an important mediator between COPD and short sleep duration although further research is needed.

L14

LONGITUDINAL ASSOCIATIONS OF SLEEP CURTAILMENT WITH METABOLIC RISK IN MID-CHILDHOOD. Elizabeth Cespedes*, Sheryl Rifas-Shiman, Susan Redline, Matthew Gillman, Michelle-Marie Peña, Elsie Taveras (Harvard School of Public Health, Departments of Nutrition and Epidemiology, Boston MA United States)

Objective: To examine associations of chronic sleep curtailment with mid-childhood cardio-metabolic health. **Methods**: We studied 652 children in the prospective cohort Project Viva. At 6 months and yearly from 1-7 years, mothers reported children's sleep duration in a usual day. The main exposure was a sleep curtailment score, reflecting whether sleep duration met age- specific threshold recommendations between 6 months to 7 years. The score ranged from 0 (maximal sleep curtailment) to 13 (no curtailed sleep). The main outcome was a mid-childhood metabolic risk score, derived as the mean of 5 sex and cohort -specific z-scores for waist circumference, systolic blood pressure, HDL cholesterol (scaled inversely), and log-transformed triglycerides and HOMA-IR, with higher scores indicating higher risk. We used multiple imputations for missing data. **Results**: The mean (standard deviation [SD]) sleep score was 10.0 (2.8); 5.0% scored 0-4 indicating repeated sleep curtailment, 13.9% scored 5-7, 14.1% scored 8-9, 28.7% scored 10-11, and 38.3% scored 12- 13. Mean (SD) metabolic risk score was -0.03 (0.6), ranging from -1.8 to 2.6. Adjusting for maternal age, education, pre-pregnancy BMI, parity and household income and child age, sex and race/ethnicity, the difference in metabolic risk score for children with most versus least curtailed sleep (sleep score 0-4 versus 12-13) was 0.28 units higher; 95% Confidence Interval (CI): 0.01, 0.56. Waist circumference contributed most to this difference: 0.50 cm (95% CI: 0.10, 0.90). Further adjustment for mid-childhood BMI-z score attenuated metabolic risk score to 0.07 units (-0.15, 0.29) and waist circumference to 0.08 cm (95% CI: -0.15, 0.32). **Conclusion**s: Chronic sleep curtailment from infancy to school age was associated with mid-childhood metabolic risk. This association was explained by mid-childhood adiposity.

L15

THE IMPACT OF THE JUVENILE JUSTICE PROCESS ON RECIDIVISM AMONG YOUNG OFFENDERS IN IOWA. Maisha Frederick*, Corinne Peek-Asa, Marizen Ramirez (University of Iowa, Injury Prevention Research Center, Iowa City IA United States)

In 2011, 1 in 13 violent arrests involved juveniles of which the majority was referred to court. Although the justice system provides a potential intervention point for youth offenders, how youth are processed may differentially impact recidivism. Cases processed through the system may be dismissed (no contact with the system), informally processed (met with a court officer), or formally processed (court appearance). The aim of this study is to assess if first-time youth offenders 12–16.5 years formally or informally processed through the Iowa juvenile justice system will be more likely to recidivate compared to youth offenders who were dismissed. A retrospective cohort study using data from the Iowa Criminal and Juvenile Justice Planning Agency from 2010–2012 was conducted. Time at first arrest to subsequent arrest or end of the follow-up period was accrued for each youth. Extended Cox Model was used to compare time to subsequent arrest between youth who were exposed to the justice system (e.g., formally processed or informal agreement) to those dismissed (e.g., formally processed vs. dismissed) while controlling for potential confounders. We report hazard ratios and 95% confidence intervals. Of 5,580 first-time offenders, 373 (7%) were formally processed, 2,649 (47%) were informally processed and 2,558 (46%) were dismissed. Youth offenders who received an informal agreement had 0.58 (95% CI: 0.54–0.63) lower hazards of reoffending compared to youth offenders who were dismissed. Youth offenders who were formally processed had 0.73 (95% CI: 0.62–0.86) lower hazard compared to youth who were dismissed. Youth offenders who received an informal agreement or were formally processed had longer times to re-arrest compared to youth who were dismissed. This has important policy and pragmatic implications on improving how young offenders are processed through the juvenile justice system in Iowa.

L16

DO CHANGES IN FAT AND LEAN MASS CONTRIBUTE TO DECLINE IN MUSCLE STRENGTH? THE BACH/BONE SURVEY. Benedetta Bartali*, Nicholas Dagincourt, Teresa Curto, Andre Araujo (New England Research Institutes, Watertown MA United States)

Background: Decline in muscle strength is a risk factor for dependence and disability in older persons. The role of changes in body composition on muscle strength decline is unclear. The aim of this study was to examine the relationship between changes in lean and fat mass on decline in muscle strength in a racially diverse population of men. **Methods**: This study included 692 black, Hispanic, and white men aged 30-80y participating to the baseline and 8-y follow-up assessments of the population-based longitudinal Boston Area Community Health/ Bone Survey. Fat and lean mass were measured by dual-energy x-ray absorptiometry, and muscle strength by hand dynamometer. Multivariable linear regression models were used to determine the marginal mean change in muscle strength according to decline in fat or lean mass. **Results**: There was a significant difference in change in muscle strength in men who declined in fat mass during 8-y follow-up compared to those who did not decline (p=.009; mean change for no decline= -.06; 95%CI:-.24,0.12; mean change for decline: -.47, 95%CI:-.72,-.22). Differences in muscle strength were not statistically significant for decline in lean mass (p=.26; mean change for no decline=-.17; 95% CI: -.38, .04; mean change for decline=-.34; 95% CI: -.55,-.12). The results did not substantially change after mutual adjustment for fat mass and lean mass at baseline. **Conclusion**s: In men, decline in fat mass contributes to decline in muscle strength independently of lean mass. These results suggest that adipose tissue-related factors (e.g. endocrine function) may play a role on muscle strength decline in middle-aged and older men.

L17

PRIMARY CAUSES OF UNDER-5 MORTALITY IN SOUTH AFRICA: RESULTS FROM THE 2ND NATIONAL BURDEN OF DISEASE STUDY. Victoria Pillay-van Wyk*, Rob Dorrington, William Msemburi, Nadine Nannan, Pamela Groenewald, Debbie Bradshaw, South African National Burden of Disease Team (Burden of Disease Research Unit, Medical Research Council, South Africa)

Background Estimating child mortality in South Africa (SA) is challenging due to incomplete vital registration. The 2nd National Burden of Disease study conducted in SA generated mortality estimates using vital registration data (VR) adjusted for incompleteness of reporting and misspecification of cause of death. This paper reports under-5 mortality in SA for the three years 2000, 2005 and 2010. **Methods** All-cause VR numbers of deaths were corrected for incompleteness by comparing uncorrected VR rates with derived census and survey data rates; and constraining the trend in completeness of reporting over time. A regression approach was used to identify misclassified AIDS deaths, and garbage codes were proportionally redistributed by age, sex, and population group. Injury deaths were estimated from other data sources using multivariate analysis. Under-5 mortality rates (U5MR) were calculated using abridged life tables and alternate mid-year population estimates. **Results** Completeness of child deaths from VR increased from 58% in 2000 to 74% in 2005 and 78% in 2010. U5MR per 1000 live births is calculated at 67.1 for 2000, 78.3 for 2005 and 51.9 for 2010. Over a-third of the deaths reported to diarrheal disease and lower respiratory infections (LRI) were misclassified AIDS deaths. The top 3 causes of death remained the same for the reported years, i.e. AIDS, diarrheal disease and LRI. However the magnitude of AIDS deaths changed from 36% in 2000 to 46% in 2005 to 26% in 2010. **Discussion** AIDS remains the leading cause of child deaths in 2010; even after a decline in the proportion of deaths since 2005. Diarrheal disease and LRI persist as the 2nd and 3rd leading causes of death highlighting the socio-economic and health service challenges that still exist in SA. Uncertainty arising from discreet estimation methods remains a challenge. Even so it has been possible to use routinely collected data to provide insight into child health trends in SA.

L18

SINGLE-NUCLEOTIDE POLYMORPHISMS IN MNSOD, GSTP1, GSTM1, GPX1, GPX3, AND CAT GENES AND A BLOOD MARKER OF OXIDATIVE STRESS: THE WEB STUDY. Albina Minlikeeva*, Peter G. Shields, Maurizio Trevisan, Richard W. Browne, Heather M. Ochs-Balcom, Catalin Marian, Jo L. Freudenheim (Department of Epidemiology and Environmental Health, the University at Buffalo, Buffalo NY United States)

OBJECTIVES: There is accumulating evidence that oxidative stress is an important contributor to carcinogenesis. We hypothesized that single nucleotide polymorphisms (SNPs) in genes involved in maintaining antioxidant/oxidant balance may influence oxidative stress. **METHOD**: We examined the association between SNPs in MnSOD, GSTP1, GSTM1, GPX1, GPX3, and CAT genes and a blood biomarker of oxidative damage, thiobarbituric acid-reactive substances (TBARS), in healthy white women randomly selected from the population of Western New York, controls from the WEB study of breast cancer. We genotyped the following SNPs: MnSOD_rs4880, GSTP1_rs1695, GPX1_rs1050450, GPX3_A13870C_rs1946234, and CAT_rs1001179. For GSTM1, we determined the presence of deletion. We used unconditional logistic regression model adjusted for age to examine the association of the variants with the highest compared to lowest tertile of TBARS. **RESULTS**: For MnSOD, the CT genotype was associated with lower TBARS compared to TT, odds ratio (OR)=0.43, 95% confidence interval (CI)=0.28-0.65, for postmenopausal women; there was no association among premenopausal women. There was an association for MnSOD among all women in the group with the highest intake of vitamins C or E. Having at least one C-allele for GPX3 was associated with higher TBARS compared to the AA genotype among post- but not premenopausal women with high vitamin C intake, OR=2.18 (95% CI=1.10-4.31). SNPs in the other genes examined (GSTP1, GSTM1, GPX1, and CAT) were not associated with TBARS. **CONCLUSIONS**: Our findings suggest that oxidative stress may be associated with genetic variation in MnSOD and GPX3 genes, particularly among postmenopausal women.

L20

RACIAL RESIDENTIAL SEGREGATION, QUALITY OF PRENATAL CARE, AND ADVERSE BIRTH OUTCOMES IN THE UNITED STATES. Katherine Theall*, Rachael Ruiz, Monisha Shah, Marva Lewis (Tulane University, New Orleans LA United States)

Background: Previous research demonstrates a possible link between experienced racial discrimination and poor birth outcomes through qualitative and modest quantitative research. Despite targeted political and public health efforts, racial disparities and poor birth outcomes are still apparent. **Methods**: In a secondary analysis using National 2004-2008 data from the U.S. Pregnancy Risk Assessment Monitoring System (PRAMS), we examined the impact of racial residential segregation and quality of prenatal care on adverse birth outcomes among Black and White non-Hispanic women (N=102,714) from 33 states, modification across education and socioeconomic position and how quality of care may mediate the relation between segregation and birth outcomes. **Results**: Racial disparities among mothers were evident. Black mothers experienced greater poor birth outcomes across all socioeconomic levels. While racial residential segregation was significantly associated with poor birth outcomes, these differences varied significantly across racial and socioeconomic groups, with the strongest impact for Black women with lower education. These differences were strongest when maternal education and race were considered; compared to maternal Medicaid status at the time of delivery, further highlighting the need to take a life course perspective when considering factors that may impact birth outcomes. Perceived access to care, as a marker of adequate care and potential racial discrimination, also played a role in birth outcomes in adjusted models but did not mediate the effect of segregation. **Conclusion**s: Improved measures of potential racial discrimination during pregnancy and a more thorough understanding of the impact of and pathways from racial residential segregation to birth outcomes are needed.

L21

THE EPIDEMIOLOGY OF CO-OCCURING ALCOHOL USE AND PSYCHIATRIC DISORDERS AMONG ARMY NATIONAL GUARD SOLDIERS. David Fink*, M. Shayne Gallaway, Israel Liberzon, Marijo Tamburrino, Philip Chan, Greg Cohen, Sandro Galea, Joseph Calabrese (Columbia University, New York NY United States)

Alcohol misuse represents a significant public health concern among US military service members. There is a paucity of research on alcohol use disorders (AUD) among the reserve component and little is known about the temporality of co-occurring DSM-IV alcohol use and psychiatric disorders in this population. Period and lifetime prevalence of co-occurring DSM- IV alcohol use and psychiatric disorders and the temporality of onset were assessed in a representative sample of Ohio Army National Guard soldiers aged 17 to 60 years. Participants were assessed annually for four years using structured clinical interviews between 2008 and 2012. General estimating equations with dichotomous predictor variables were used to estimate odds ratios between co-occurring alcohol use and psychiatric disorders. An annualized rate of 13.5% persons per-year were diagnosed with any alcohol use disorder between 2010 and 2012. Persons with AUD frequently had co-occurring mood and anxiety disorders. Although about half of persons with co-occurring mood or anxiety and AUD initiated the psychiatric disorder prior to the AUD and half initiated the psychiatric disorder after the AUD, the large majority of AUD initiated during a narrow age interval (16-23 years). Our observation that initiation for most AUD occurred within a narrow period of time, and the knowledge that AUD development can only occur in the presence of exposure to an external factor (i.e., alcohol), suggests that focused primary prevention during and after enlistment may have the greatest potential to positively affect population mental health burden.

L22

CAUSAL DIAGRAMS OF TOTAL GESTATIONAL WEIGHT GAIN AND THE UTILITY OF WEIGHT-GAIN-FOR-GESTATIONAL-AGE Z-SCORE. Stefanie Hinkle*, Nansi Boghossian, Lindsey Sjaarda, Aijun Ye, Katherine Grantz, Enrique Schisterman (Eunice Kennedy Shriver National Institute of Child Health and Human Development, Rockville MD United States)

Gestational weight gain (GWG), defined as the difference in maternal weight at delivery and prepregnancy weight, is widely recognized as an important predictor of pregnancy and long-term maternal and child health outcomes. The Institute of Medicine provides recommendations for the total amount of weight women should gain with the goal of optimizing outcomes. Total GWG, a summary measure of a woman's total accumulation of weight gain throughout pregnancy, is inherently correlated with the length of gestation. As such, studies examining the association between total GWG and preterm birth, or other outcomes that are also associated with gestational age (e.g. neonatal mortality, birthweight, child development) are potentially biased as noted in prior GWG literature. Recently weight-gain-for-gestational-age Z-scores (GWG Z-scores) have been proposed to estimate an unbiased relation between GWG and pregnancy outcomes independent of pregnancy duration. Using direct acyclic graphs (DAGs) and a simulation study, we examine if the GWG Z-score can be used in place of total GWG to achieve an unbiased and efficient estimate given various causal scenarios. Because gestational age at delivery was used in the transformation to create the GWG Z-score, the DAG demonstrates an arrow between both gestational age and total GWG and the Z-score; this results in a zero balance effect between the three variables and a potentially unfaithful DAG. We suggest that length of gestation is a proxy for time at risk and not a confounder and thus models examining the total effect of GWG on preterm birth adjusting for length of gestation will achieve a similar but more efficient estimate as to models using the GWG Z-score. We alternatively propose utilization of a time to event distribution to assess the total effect of GWG on pregnancy outcomes and compare the potential degree of bias across models.

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ASSOCIATION OF HYPERTENSION AND OBESITY WITH RENAL CELLS CARCINOMA RISK: A REPORT FROM THE SHANGHAI MEN'S AND WOMEN'S HEALTH STUDIES. Tian Shen*, Loren Lipworth, Yong-Bing Xiang, Hui Cai, Hong-Lan Li, Yu-Tang Gao, Wei Zheng, Xiao-Ou Shu (Vanderbilt University, Nashville TN United States)

Background and objectives Epidemiological studies, primarily conducted in Western populations, have consistently shown that hypertension and obesity are associated with an increased risk of renal cell carcinoma (RCC). To our knowledge few studies have examined these associations among Asians, despite rapid increases in the prevalence of both obesity and hypertension and the incidence of RCC in Asia. **Methods** We conducted a case-control study nested in two prospective cohorts, the Shanghai Women's Health Study (1996-2000) and Shanghai Men's Health Study (2001-2006). A total of 280 incident RCC cases identified in the cohorts through December 31, 2011, and 2684 controls matched by sex, age at baseline (±2 years), time of recruitment (±30 days) and menopausal status (for women), were included in the analyses. Information on demographic, lifestyle, medical and other factors, including hypertension status, was reported by participants at cohort recruitment. Measured current weight and height were used to calculate body mass index (BMI) at enrollment. Conditional logistic regression was used to estimate odds ratios (ORs) and 95% confidence intervals (CIs) for RCC risk associated with hypertension and obesity. **Results** After adjustment for education, cigarette smoking, alcohol drinking, and family history of cancer, a significant increase in RCC risk was observed among those who had hypertension (OR=1.54, 95% CI: 1.17, 2.03). Using BMI of 18.5-25 kg/m2 as the referent, no increased risk for RCC was observed among those who were overweight (25=BMI<30, OR=1.13, 95% CI: 0.85, 1.47) or obese (BMI=30, OR=0.96, 95% CI: 0.51, 1.82). **Conclusion** Our results suggest that hypertension is a strong risk factor for RCC in Shanghai, China. Further research is needed to explain why the consistent and strong association between obesity and RCC observed in European and American populations is not apparent in this Chinese population.

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FOLLOW-UP OF CANCER INCIDENCE AMONG FARMERS EXPOSED TO THE ORGANOPHOSPHATE INSECTICIDE DIAZINON. Rena Jones*, Francesco Barone-Adesi, Stella Koutros, Aaron Blair, Michael Alavanja, Jane Hoppin, Laura Beane-Freeman (National Cancer Institute, Bethesda MD United States)

Diazinon, an organophosphate insecticide with genotoxic properties, has been linked to increased risk of certain cancers (lymphoma and lung cancer) in the Agricultural Health Study (AHS) cohort and in case-control studies. We updated both exposure and cancer information from a prior AHS analysis to further assess the relationship between diazinon and cancer risk. Male pesticide applicators (primarily farmers) in Iowa (IA) and North Carolina (NC) reported diazinon use at enrollment (1993-1997) and at a follow-up interview 5 years later; cancer incidence was assessed through 2010 (NC)/2011 (IA). We used 2 exposure metrics: lifetime exposure (LT) days and intensity-weighted lifetime exposure (IW) days (accounting for factors impacting exposure) as tertiles, and examined the impact of temporal variability in diazinon usage on risks. We used Poisson models adjusted for age, smoking, state, and cancer- specific risk factors to estimate HRs and 95%CI for major solid tumor sites and lymphohematopoietic malignancies. There were 674 incident cancers among 5,123 applicators using diazinon and 2,228 among the 17,698 reporting no use. Previously observed lung cancer risks persisted; compared to those with no exposure, risks were higher among men in the top tertile of LT days (HR;95%CI=1.60; 1.1-2.3), an association also apparent in analyses restricted to non- smokers. We found non-significantly elevated kidney cancer risks in the top tertile of LT days (1.7; 0.9-3.4), but associations were weaker for IW days (1.3; 0.6-2.8). There were elevated risks for specific non-Hodgkin lymphoma subtypes, including lymphocytic leukemias and follicular lymphoma. We found no patterns in cancer risks corresponding to trends in exposure. These results are consistent with prior reports of associations between diazinon and lung cancer and certain lymphoma subtypes, and newly suggest a potential link with kidney cancer.

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ASSOCIATIONS OF RRINARY BISPHENOL A CONCENTRATIONS WITH THYROID VOLUMES AND THYROID NODULES IN CHINESE CHILDREN. Na Wang*, Qi Zhao, Chaowei Fu, Hong Fang, Xin Feng, Meifang Su, Hexing Wang, Ying Zhou, Qingwu Jiang (Department of Epidemiology, School of Public Health, Fudan University, Shanghai China)

BACKGROUND: Exposure to endocrine disrupting chemicals such as bisphenol A (BPA) is prevalent among children and adolescents, but little is known regrading their potential associations with thyroid gland volume and thyroid nodules. **METHODS**: We determined urinary concentrations of BPA in 718 children 8-10 years of age from three primary schools selected in Shanghai, Jiangsu Province and Zhejiang Province, respectively. All participants also underwent a physical examination and thyroid ultrasound. First morning urine samples and household salt samples were collected for iodine analysis. Urinary creatinine were also measured and BPA concentrations were adjusted for urinary dilution by creatinine levels. BPA concentrations and thyroid volumes were logarithmically transformed and then used in the multivariable linear regression models. We also categorized BPA concentrations by quintiles and odds ratios and 95% confidence intervals (95% CI) were calculated using categorical logistic regression models. **RESULTS**: The detection frequency of BPA was 99.86% (717/718) and the median value of BPA concentrations was 1.20μg/L. After adjusting for age, sex, qualified iodized salt consumption (yes/no). urinary iodine level, and BMI (quintiles), BPA was negatively associated with thyroid volume (ß=-0.33, $p<0.001$). We identified 59 children with solitary thyroid nodules and 71 children with multiple thyroid nodules, accounted for 6.67% and 8.03% of all participants, respectively. Urinary BPA level was also associated with multiple thyroid nodules (OR=0.79; 95% CI: 0.64, 0.99), but not solitary thyroid nodules (OR=0.99; 95% CI: 0.80, 1.22). **CONCLUSION**: Urinary BPA level was negatively with thyroid volume and prevalence of multiple thyroid nodules in Chinese school-age children. More detailed studies are needed to explore the potential mechanisms and clinical implications of these associations.

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VENOMOUS SNAKE BITES IN SIKASSO DURING THE PAST DECADE. Sanou Khô Coulibaly, Hinde Hami*, Ababacar Maïga, Abdelrhani Mokhtari, Abdelmajid Soulaymani (Laboratory of Genetics and Biometry, Faculty of Science, Ibn Tofail University, Kenitra Morocco)

Introduction: Snake bite is a significant cause of morbidity and mortality in many regions of the world. The aim of this study is to determine the epidemiological features of snake bites in Sikasso in the south of Mali. **Methods**: This is a retrospective study of snake bites cases, recorded between 2000 and 2009 in the Sikasso regional hospital and the Kléla Center for Community Health. **Results**: There were 379 snake bites cases recorded during the period of study; 173 (45.6%) in the Sikasso regional hospital and 206 (54.4%) in the Kléla Center for Community Health. Of these, 84% were males with a male-female ratio of 5.2 and 4.5% were under the age of 15 years. The average age of the patients was 35±12.9 years (range 3-75 years). According to the results, 56.2% of all bites were occurred on the lower limb, 43.5% on the upper limb and 0.4% on the face. Nearly three-quarters of the cases (72.4%) were occurred in the fields and pastures and 21.4% during walks. Snakes belong to the Viperidae family (Echis ocellatus and Bitis arietans) and the Elapidae family (Naja nigricolis). The median delay in presentation to hospital was 4 hours. More than half of the patients (53.6%) received traditional remedies prior to admission. The average length of stay in hospital was 38 hours, with a range of 1 hour to 7 days. Among the 138 patients for whom the outcome was known, 33 of them died. **Conclusion**s: Concerted action is needed to ensure adequate supplies of effective antivenom to develop systems that deliver high quality health care.

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