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001

RELATIONSHIP BETWEEN MEDITATION AND WAKING SALIVARY CORTISOL SECRETION AMONG LONG-TERM MBSR MEDITATORS. Sara Wagner Robb, Alyson Haslam, Jennifer L. Gay, Lauren Middleton, Mike Healy, James Hebert, Michael Wirth (University of Georgia)

Although participation in meditation and mindfulness programs has been shown to alleviate symptoms of stress, inconsistency in results exists. Additionally, a potential relationship between long-term meditation practice and stress reduction remains virtually unexplored. The purpose of this study was to characterize stress using salivary waking cortisol in a group of long-term meditators with training in the Mindfulness-Based Stress Reduction (MBSR) program. Four salivary cortisol samples were collected upon waking from a national sample of MBSR meditators (n=84). The waking cortisol rhythm was summarized using cortisol area under the curve (AUC) with respect to increased secretion (cortisol AUCI), above baseline (cortisol AUCD), and cortisol AUC above ground (cortisol AUCG); data on meditation duration and depth, self-reported stress, and other covariates were collected via self-reported questionnaire. Generalized linear models were performed to generate adjusted least squares means of cortisol concentrations as a function of meditation duration and depth, after adjusting for confounding variables. Participants had slightly lower baseline cortisol as compared to the general population. Individuals in the highest quartile of years meditating (>26 years) had a significantly elevated concentration of AUCG and AUCD ($p=0.01$, $p<0.01$, respectively) as compared to individuals in the lowest quartile of years meditating (≤10 years). Data also suggested a threshold effect of the impact of meditation on AUC values for individuals classified in the highest two quartiles of years meditating. This relationship was more pronounced among individuals waking at or before 6:30 AM. Overall, an increasing number of years of meditation practice was related to an increased waking cortisol response. Long-term meditators may have structural alterations in important brain regions related to cortisol secretion, which may explain these findings and warrants additional exploration.

002

PARENTAL INCARCERATION AND RISKY SEXUAL BEHAVIOR: EVIDENCE FROM THE NLSY97. Erika Braithwaite, Arijit Nandi (McGill University)

The United States now houses over 2.2 million people in jails and prisons. Over 80% of incarcerated individuals are parents of minors and emerging evidence suggests that parental incarceration is harmful to children's emotional and physical development. Our goal was to examine the effect of parental incarceration on risky sexual behavior in adulthood. The NLSY 1997 is comprised of 4753 adolescents aged 12 to 14 at baseline who were followed annually for 15 years. The exposure of interest was having a parent incarcerated before age 21. Respondents self-reported risky sexual behavior, which included past month sexual intercourse with a stranger and sexual intercourse with an intravenous drug (IV) user. We estimated the propensity of having an incarcerated parent, conditional on potential confounders (age, gender, race, parental education, parents' child-rearing style and home and environment risk factors) and used nearest-neighbor matching to achieve balanced distributions of covariates. All regression models were conducted within the matched sample. We could not conclude that parental incarceration was associated with high-risk sexual behavior. The odds of reporting having sex with a stranger were 30% higher among the exposed (OR = 1.31, 95%CI = 0.61, 2.81). The odds of reporting having sexual intercourse with a stranger were 47% lower among those with an incarcerated parent (OR = 0.52, 95%CI = 0.09, 2.97). These findings suggest that parental incarceration has little influence on risky sexual behaviors.

003

SMOKING STATUS AND OBESITY PREVALENCE AMONG US CANCER SURVIVORS: ESTIMATES FROM THE NATIONAL HEALTH INTERVIEW SURVEY, 2008-2012. Meredith Shoemaker, Mary White, Nikki Hawkins, Nikki Hayes (Division of Cancer Prevention and Control, National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention, Atlanta, GA)

Cancer survivors are living longer after their cancer diagnosis due to improvements in early detection and treatment. Among survivors, smoking increases the risk of all-cause mortality, cancer-specific mortality, and secondary cancers related to smoking, while quitting improves cancer prognosis. Weight gain is associated with smoking cessation and is reported as a barrier to quitting. This study examines the relationship between body weight and smoking status among male and female cancer survivors in the US. Data were obtained from the responses of adult cancer survivors (n=9,753) participating in the National Health Interview Survey (2008-2012). Weighted smoking status prevalence estimates were calculated for men and women stratified by age and age at diagnosis. Cross-tabulations of smoking and weight status were produced for each sex and linear contrasts were preformed. The most commonly reported smoking status was never smoking (46.6%, 95% CI 45.3 – 47.8) though 16.7% of cancer survivors reported current smoking (95% CI 15.8 - 17.6). Prevalence of current smoking decreased with age. Women had higher rates of current smoking than men (18.4% vs 14.2%, $p<.001$), particularly in younger age categories. Male survivors who currently smoked had lower obesity prevalence rates (22.1%) than males who previously smoked (28.5%, $p<.05$) or never smoked (29.4%, $p<.01$). Among female survivors, 31.0% were obese and no significant differences were seen in obesity prevalence by smoking status for all ages combined. Among male and female survivors age 35-49 and 65-74, those who currently smoked were significantly less likely to be obese than those who previously or never smoked. These findings highlight the importance of targeting smoking interventions to younger survivors and to women who currently smoke. Additionally, they underscore the need for tobacco use assessment and cessation support incorporating weight management support as part of cancer survivorship care planning.

004

MEDIA USE AS A POTENTIAL CORRELATE OF SEXUAL RISK BEHAVIORS AMONG U.S. HIGH SCHOOL STUDENTS, 2013. Zewditu Demissie, Nicole Liddon, Heather B. Clayton (CDC/Division of Adolescent and School Health)

Background: Media use has been identified as a potential correlate of a variety of adolescent risk behaviors. This study examined the association between media use and sexual risk behaviors among high school students in the United States. **Methods:** We used data from the 2013 National Youth Risk Behavior Survey, a cross-sectional survey conducted among a nationally representative sample of 13,633 students in grades 9–12. Logistic regression models were used to estimate adjusted prevalence ratios (PRs) and 95% confidence intervals (CIs) for associations between media use (TV watching or video game/computer use or both) and sexual risk behaviors, including lifetime and current (past 3 months) sexual activity, age at first sexual intercourse, lifetime number of partners, and alcohol or drug use and condom use during last sexual intercourse. **Results:** While no association between media use and lifetime sexual activity was found, students with high use (>2 hours/day) of either TV or video games/computers, but not both were less likely than students with low use (≤2 hours/day) of both media types to be currently sexually active. Students with high use of both media types were more likely than students with low use of both media types to have had sex before age 13 (PR: 1.61; 95% CI: 1.30, 1.98) and to have had sex with ≥4 people during their lifetime (1.21; 1.05, 1.39). Among currently sexually active students, those with high use of both media types were more likely during their last sexual intercourse to have drunk alcohol or used drugs (1.32; 1.09, 1.60) and less likely to have used a condom (0.89; 0.81, 0.97) as compared to students with low use of both media types. **Conclusions:** Limiting students' media use may help reduce risky sexual behaviors. Parents, schools, healthcare providers, and industry each can play a role in helping students limit media use and increasing media literacy with the goal of reducing the sexual risk behaviors of adolescents.

005-S/P

LIGHT AND INTERMITTENT SMOKERS IN THE U.S.—SMOKING, BEHAVIORAL, AND MENTAL HEALTH CHARACTERISTICS. Carolyn Reyes-Guzman*, Neil Caporaso, Ruth Pfeiffer (National Cancer Institute (NCI) - Division of Cancer Epidemiology and Genetics (DCEG)

Background: Light and intermittent smokers (LITS) have been the fastest growing segment of smokers in the U.S. during the past two decades. National survey data indicate the prevalence of nondaily smokers ranges from about 20% to nearly 40%. Defining the characteristics and health consequences for this behavior is a critical priority. In this work we address the heterogeneity question in LITS. **Methods:** We analyzed demographic and behavioral data from three U.S. population-based surveys: 2012 NHIS, 2012 NSDUH, and 2011-2012 NHANES. These surveys were pooled to increase sample power, and common characteristics were compared across surveys. Demographic characteristics such as age, gender, race/ethnicity, marital status, income and education were examined in relation to their association with light and/or intermittent smoking. In the multivariate models, smoking behavior, drug use, and mental health indicators were also evaluated. **Results:** Variations were observed by smoking status (light (<=10 CPD) intermittent, light daily, heavier (>10 CPD) intermittent, heavier daily, former and never smoking), according to demographic, smoking behaviors, other behaviors (e.g. drug use), and mental health characteristics using both bivariate analyses and multinomial regression. **Conclusion:** These findings provide evidence that LITS have specific smoking, drug use, and mental health patterns that distinguish them across each category of smoking. Hence, smoking cessation and prevention interventions should be targeted accordingly.

006-S/P

PROTECTIVE FACTORS ASSOCIATED WITH BULLYING VICTIMIZATION AND PSYCHIATRIC DISTRESS AMONG ADOLESCENTS IN SELECTED ENVIRONMENTS. Natalie A. Dayton*, Ray M. Merrill (Brigham Young University Department of Health Science)

Objectives. We explored the influence of prosocial environments as protective factors against bullying victimization and psychological distress among adolescents. **Methods.** We conducted a cross-sectional analysis of data from adolescents (N=23,631) participating in the 2013 Utah Prevention Needs Assessment. Prosocial environment variables included school participation, school discipline, family, peer and community scales. Bullying victimization and psychological distress scales were created. **Results.** Bullying victimization was greater among females, those in earlier grades, whites, and adolescents whose parents have a lower education, who do not live with their parents, and who do not attend religious services weekly. Physical bullying decreased with school grade, while cyberbullying increased from grades 6 through 10. Psychological distress was positively associated with physical bullying, cyberbullying, and missed school days. Prosocial environment scales were significantly associated with bullying victimization. Family and school environments were most protective against physical bullying and cyberbullying. **Conclusions.** Our findings confirm the importance of understanding contextual factors associated with bullying victimization and behavioral patterns among adolescents. Greater attention to designing interventions in family and school domains may offer greater protection against bullying victimization and psychological distress.

007-S/P

URBANICITY AND BICYCLE HELMET USE; FINDINGS FROM THE SURVEY OF THE HEALTH OF WISCONSIN. Shoshannah Eggers*, Kristen Malecki, Ronald Gangnon (University of Wisconsin, Madison, WI United States)

Although bicycle helmet use reduces bicycle related injury and mortality, many bicycle users do not wear helmets. Previous studies show that helmet use varies by age, gender, income, education level and urbanicity, however very little has been done in the U.S. in this area since the 1990s. The purpose of this study is to examine self-reported bicycle helmet use patterns, particularly by urbanicity, in the Survey of the Health of Wisconsin, a recent population-based sample in the U.S. Participants were adults aged 21-74 years and living in the state of Wisconsin at the time of survey, between the years 2008-2013. Of those participants, 2974 reported on bicycle and helmet use. Data were analyzed by survey weighted logistic regression. Analysis shows that 40% of the population report never riding a bicycle. Bicycle use was significantly associated with gender, marital status, education level, and family income level. Of those who report riding a bicycle, 19% report always wearing a bicycle helmet while riding, and 51% report never wearing a helmet. Level of helmet use was associated with gender, education level, and family income level. Bicycle riders who live in isolated rural areas have 2.4 (95% CI 1.7-3.4) times greater odds of never wearing a helmet vs. ever wearing a helmet than those living in urban areas, and 2.4 (95% CI 1.4-4.0) times greater odds of sometimes or rarely wearing a helmet than those living in urban areas. Residing in a rural town or suburban area vs. urban area was not significantly associated with helmet use in either comparison. The findings from this population-based sample were consistent with the findings of previous research, however helmet use in suburban areas, rural towns, and isolated rural areas have been newly examined. Future campaigns to promote helmet use in the U.S. should target residents of isolated rural areas, particularly younger adults with lower levels of education.

008-S/P

NOT ALL WHO WANDER ARE LOST: QUANTIFYING GPS ERROR FOR STUDIES OF PHYSICAL ACTIVITY IN URBAN SPACES. Stephen J Mooney*, Daniel M Sheehan, Andrew G Rundle, Garazi Zulaika, Gina S Lovasi (Columbia University Mailman School of Public Health)

Background: Global Positioning System (GPS) monitoring of study subjects is a potentially useful method for studying physical activity and mobility. Error in GPS readings caused by high building bulk has been noted in the literature but not well quantified. Similarly, the effect of street tree canopy cover on GPS error has not been studied. Urban design and tree canopy cover vary by spatial context so GPS error caused by these built environment factors is likely to hinder GPS use for understanding context-driven variation in physical activity. **Methods:** Research assistants carried multiple GPS devices on forty structured walks of about 450 meters in New York City. Half of the walks were chosen to maximize variability in tree canopy cover and the other half were chosen to maximize variability in building bulk density, a measure of urban street canyoning. Each walk was performed twice. Distances walked computed by summing distances between consecutive GPS waypoints were compared to straight line path distances along the street network. **Results:** Visual inspection of GPS-recorded points revealed that spatial scatter of GPS waypoints was greater perpendicular to the axis of the street than along the axis of travel. Lateral scatter in the GPS waypoints caused overestimates of distances traveled (median 35% overestimate). Overestimates were modestly higher on walks selected for high versus low tree canopy cover (35% vs 24% median overestimate, p=0.05). Overestimates were substantially higher on street segments selected for high versus low building bulk density (97% vs 14% median overestimate, p<0.01). **Conclusions:** Street canyoning and tree canopy cover cause overestimates of distances walked when distances between consecutive GPS waypoints are summed. Future work should investigate the use of spatial correction algorithms and spatial interpolation of GPS points to identify underlying street network routes.

009-S/P

THE EFFECTS OF LAY HEALTH ADVISOR OUTREACH PROGRAM ON CARIES PREVENTION BEHAVIORS AMONG IMMIGRANT CHILDREN IN TAIWAN. Y.C. Lin*, H.L. Huang(100,Shih-Chuan 1st Road,Kaohsiung,80708,Taiwan)

Prior to this study, no oral health promotion program for immigrant mothers and their children was conducted using Lay Health Advisor (LHA) intervention approach. The aim is to evaluate the effects of LHA outreach program on caries prevention behaviors among immigrant children 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, 29 and 24 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. Mothers in control group were asked to read the brochure by their own. Questionnaire was used to collect the data in oral health care 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. The mothers in intervention group had a >30% increase tooth brushing minutes, using modified Bass brushing technique and dental floss use . After LHA intervention, the mothers increased in helping their children brushing tooth from 79% to 100%, assisting their child brushing three minutes from 10% to 65%. Mother in LHA group always asked child brushing tooth after sugary beverages consumed from 32% to 54%, and after sweet consumes from 23% to 43%. Compare to control group, the mother in the intervention group were more likely to assist in child brushing over three times daily [Odds Ratio (OR)=11.00, 95%CI=1.37-88.64] and brushing children's teeth for three minutes (OR=2.65, 95%CI=1.08-6.50). The LHA intervention was effective on improving immigrant mothers and their children's oral hygiene behaviors.

020

LOW DOSE ASPIRIN, NON-STEROIDAL ANTI-INFLAMMATORY DRUGS, SELECTIVE COX-2 INHIBITOR PRESCRIPTIONS & BREAST CANCER RECURRENCE: A DANISH POPULATION-BASED COHORT STUDY. Deirdre Cronin-Fenton*, Uffe Heide-JÃ¸rgensen, Thomas Ahern, Timothy Lash, Peer Christiansen, Bent Ejlertsen, Henrik T. SÃ¸rensen (Dept Clinical Epidemiology, Aarhus University, Denmark)

Low dose aspirin, non-steroidal anti-inflammatory drugs (NSAID), and selective COX-2 inhibitors (sCOX-2i) may improve outcomes in breast cancer patients. We investigated the association of aspirin, NSAID, and sCOX2i use, with breast cancer recurrence (BCR). Incident early-stage breast cancer patients diagnosed 1996 through 2008 were identified in the Danish Breast Cancer Cooperative Group registry. Aspirin, NSAIDs, and sCOX2i prescriptions were ascertained from the National Prescription Registry. Follow-up began on the date of breast cancer primary surgery and continued to the first of BCR, death, emigration, or 31/12/2012. We used Cox regression models to compute the HR and corresponding 95%CI associating prescriptions with BCR, adjusting for confounders. We identified 34,188 patients with 233,130 person-years of follow-up. Median follow-up was 7.1 years; 16% developed BCR. Compared with non-use, use of aspirin, NSAIDs, and sCOX2i did not affect BCR rate (HRadjusted aspirin=1.0, 95%CI=0.90, 1.1; NSAIDs=0.99, 95%CI=0.92, 1.1; sCOX2i=1.1, 95% CI=0.98, 1.2). Findings remained near null in analyses stratified by estrogen receptor status and stage, and in analyses of specific recurrence sites. Prediagnostic low dose aspirin use was not associated with BCR. This prospective cohort study shows little effect of aspirin, NSAIDs, or sCOX2i prescriptions on breast cancer recurrence.

021

ORAL HPV DNA DETECTION AND SUBSEQUENT RISK OF HEAD AND NECK CANCERS IN TWO PROSPECTIVE COHORTS. Ilir Agalliu*, Zigui Chen, Tao Wang, Rebecca Ludvigsen, Lauren Teras, Aimee R. Kreimer, Richard B. Hayes, Susan Gapstur, Robert D. Burk (Albert Einstein College of Medicine, Bronx, NY)

Background: Alpha HPV16 in oral cavity is associated with head and neck squamous cell carcinoma (HNSCC), particularly oropharyngeal cancer. However, there have been no prospective studies of oral HPVs and HNSCC. Moreover, recent data indicate that oral cavity contains many HPV types, but their association with HNSCC is unknown. **Methods:** We examined associations between alpha, beta and gamma HPVs and HNSCC, using a nested case-control study among 120,000 participants with mouthwash in ACS CPS-II and PLCO cohorts. Incident HNSCC (n=132) were identified during an average 3.94 years follow-up. Three controls per case (n=396) were selected using incidence density sampling, with matching on age, race, gender, and time since mouthwash collection. Detection of HPV DNA in oral wash was carried out using next-generation sequencing for all HPV types, MY09/MY11 assay for alphaHPVs, and RT-PCR for HPV16. Associations of HPV types with HNSCC were assessed via conditional logistic regression, adjusting for smoking, alcohol and HPV16 for beta and gamma HPVs. **Results:** Oral HPV16 was associated with OR=7.1 (95%CI 2.2–22.6) for HNSCC. Risk was highest for oropharynx cancer (OR=22.41, 95%CI 1.8–276.7), while there was no excess for oral cavity or larynx cancers. Detection of any beta-HPV (OR=1.74, p=0.05) or gamma-HPV (OR=2.11, p=0.005) was associated with HNSCC. β1-HPV5 was associated with oropharynx (OR=7.42, p=0.05), oral cavity (OR=5.34, p=0.01) and larynx cancer (OR=2.71, p=0.05); while β2-HPV38 was associated only with oropharynx cancer (OR=7.28, p=0.02). Gamma HPV group 11 and 12 were associated with oral cancer (OR=7.47, p=0.03; and OR=6.71, p=0.01) and larynx cancer (OR=7.49, p=0.04 and OR=5.31, p=0.03). **Conclusion:** This is the first study to demonstrate that oral HPV16 detection precedes incidence of oropharynx cancers. Risks identified with gamma HPV group 11, 12 and β1-HPV5 suggest a broader role of HPVs in HNSCC etiology.

022

NON-HODGKIN'S LYMPHOMA AND 2,4 DICHLOROPHENOXYACETIC ACID: A META-ANALYSIS Ke Zu*, Christine T. Loftus, Julie E. Goodman (Gradient)

Introduction: Despite evidence from experimental studies indicating that the herbicide, 2,4-dichlorophenoxyacetic acid (2,4-D), is not carcinogenic, a number of epidemiology studies have evaluated 2,4-D and cancer. Some studies suggest that 2,4-D is associated with non-Hodgkin's lymphoma (NHL), but results were inconsistent. We conducted a meta-analysis and quantitatively summarized evidence from epidemiology studies of NHL and 2,4-D. Methods: We identified articles from PubMed, Scopus, and TOXLINE databases and review article citations. We evaluated study quality and calculated summary risk estimates using random-effects models. We conducted subgroup and sensitivity analyses and assessed presence of publication bias. Results: We identified one cohort study and eight case-control studies that met our inclusion criteria. Exposure to 2,4-D was not associated with increased risk of NHL (RR = 0.97, 95% CI = 0.77-1.22, I-squared = 28.8%). This null association was robust to subgroup analyses by study design, type of exposure, geographic location, and sex of the participants and was generally insensitive to variations in study selection. Conclusions: Overall, the epidemiology evidence does not support an association between exposure to 2,4-D and risk of NHL, and the few observed positive findings may be confounded by other factors.

023

AROMATASE INHIBITOR THERAPY AND CARDIOVASCULAR HEALTH CHANGES AMONG BLACK AND WHITE BREAST CANCER PATIENTS, Lisa Gallicchio*, Carla Calhoun, Kathy Helzlsouer

Purpose: To examine racial differences in cardiovascular health changes associated with aromatase inhibitor (AI) therapy among black and white breast cancer patients. **Methods:** Data were analyzed from 50 white and 30 black women participating in an ongoing cohort study of cardiovascular health of breast cancer patients. Prior to initiating AI therapy and at a 1-year follow-up visit, participants completed a survey, donated blood for C-reactive protein (CRP) and cholesterol measurements, and had a cardiovascular health evaluation that included a carotid intimal medial thickness (cIMT) ultrasound and the 6 minute walking test. **Results:** At both baseline and the 1-year follow-up visit, the black breast cancer patients (mean age=62y) had significantly worse cardiovascular health (measured by cIMT, CRP, and blood pressure) and more cardiovascular-related co-morbid conditions (diabetes, obesity) than their white counterparts (mean age=63y). Although BMI increased significantly and similarly among the black and white patients, there were no other statistically significant adverse changes in cardiovascular measures among either group from baseline to the 1-year visit or differences in changes between the groups. For example, mean cIMT increased 0.001mm among white patients and 0.003mm among black patients (p=0.9). Performance on both the 6 minute walking test and a grip strength test improved significantly among both groups (p<0.05). **Conclusions:** Cardiovascular disease (CVD) is a major cause of premature mortality among breast cancer survivors. Black, compared to white, breast cancer patients have a higher prevalence of cardiovascular co-morbid conditions. Although AIs do not appear to adversely affect cardiovascular health in the short term, initiating treatment with AIs is a teachable moment for CVD risk reduction, especially among patients with CVD risk factors. Enrollment in the study is ongoing. This research is supported by a Susan G. Komen for the Cure grant.

024

EFFECTS OF OVULATION-STIMULATING DRUGS ON CANCERS OTHER THAN BREAST AND GYNECOLOGIC MALIGNANCIES. Louise A. Brinton*, Kamran S. Moghissi, Bert Scoccia, Emmet J. Lamb, Britton Trabert, Shelley Niwa, David Ruggieri, Carolyn L. Westhoff(National Cancer Institute)

Although ovulation-stimulating drugs have been extensively studied in relation to breast and gynecologic cancers, their impact on other hormonally -related malignancies has received limited attention. An extended follow-up through 2010 was conducted among a cohort of 12,193 women evaluated for infertility between 1965 and 1988 at five U.S. sites. 9,892 women (81.1% of the eligible population) were followed via passive and active (questionnaires) approaches. Cox regression hazard ratios (HRs) and 95% confidence intervals (CI) were calculated for different fertility treatment parameters, adjusting for cancer risk factors and causes of infertility. During 30.0 median years of follow-up (285,332 person years), 91 colorectal cancers, 84 lung cancers, 55 thyroid cancers, and 70 melanomas were diagnosed among study subjects. Clomiphene citrate, used by 38.1% of patients, was not associated with colorectal or lung cancer risks, but was significantly related to melanoma risk and non-significantly to thyroid cancer risk (respective HRs and 95% CIs for ever vs. never use of 1.95, 1.18-3.22 and 1.57, 0.89-2.75). The highest melanoma risks were seen among those with the lowest drug exposures, but thyroid cancer risk was enhanced among the most heavily exposed patients (HR=1.96, 95% CI 0.92-4.17 for those receiving >2250 mg. of clomiphene, ptrend=0.06). Clomiphene-associated risks for thyroid cancer were somewhat higher among nulligravid than gravid women (HR=2.07, 95% CI 0.89-4.82 for those nulligravid at first visit vs. 1.28, 0.60-2.73 for gravid women), but did not differ according to distinct causes of infertility. Gonadotropins, used by only 9.7% of subjects, were not related to risk of any the assessed cancers. Our results provide support for continued monitoring of risks of both melanoma and thyroid cancer risk among patients receiving fertility drugs. Further study is especially needed for patients receiving drugs used in conjunction with in vitro fertilization (IVF).

025

TIMING OF PUBERTY AND PROSTATE CANCER RISK. Marie-Claude Rousseau*, Marie-Élise Parent (INRS-Institut Armand-Frappier)

Although prostate cancer affects older men, early-life exposures such as hormone levels might influence risk. We aimed to estimate the association between the timing of puberty and prostate cancer risk in PROtEuS (Prostate Cancer & Environment Study), a population-based case-control study conducted among residents of Montreal, Canada. Histologically confirmed prostate cancer cases (n=1933, participation rate 79%) diagnosed from 2005 to 2009 in the French language hospitals were recruited. Controls (n=1994, participation rate 57%) were selected from French language electoral lists and frequency-matched to cases by age. In-person interviews were conducted to collect information on socio-demographic, anthropometric, lifestyle, medical, and environmental factors. Participants reported the relative timing of puberty as compared with their peers (earlier, same time, later) and age at onset of puberty. Logistic regression was used to estimate odds ratios (ORs) and 95% confidence intervals (CIs) for the associations between timing of puberty and prostate cancer, adjusting for age, ancestry, and first-degree family history of prostate cancer. Analyses were further stratified by the participants' build relative to their peers at adolescence (slimmer, similar, heavier) and considered prostate cancer severity. A total of 3527 participants (1752 cases and 1775 controls) who self-responded to the interview and provided information on timing of puberty were included. There was no overall association between either the relative timing or age at puberty and prostate cancer risk. Among men who were slimmer than their peers at adolescence, those who experienced later puberty had a lower risk of prostate cancer (OR=0.47, 95% CI: 0.28-0.81). ORs were 0.45 (95% CI: 0.25-0.82) and 0.54 (95% CI: 0.23-1.23) respectively, for less and more aggressive cancers. Early-life hormonal influences may impact prostate cancer risk, are likely to be multifactorial, and should be further investigated.

026

RISK OF BREAST CANCER WITH USE OF CALCIUM CHANNEL BLOCKERS COMPARED TO ANGIOTENSIN CONVERTING ENZYME INHIBITORS AMONG POSTMENOPAUSAL WOMEN. Marsha A Raebel*, Nikki M Carroll, Kristin Goddard, Heather Tavel, Chan Zeng, Denise M Boudreau, T Craig Cheetham, David H Smith, Heather Spencer Feigelson (Kaiser Permanente Colorado Institute for Health Research, Denver, Colorado, USA)

Background: Controversy is long-standing on the association between calcium channel blocker (CCB) use and breast cancer. Most previous studies had small sample size or determined CCB use from self-report. **Methods:** We linked robust tumor, clinical, and administrative data from 3 Kaiser Permanente (KP) regions to estimate risk of incident invasive breast cancer in 165,807 hypertensive women aged 55 and older with new use of CCB or angiotensin converting enzyme inhibitors (ACEi). We constructed a retrospective cohort of KP enrollees (1997-2012) with pharmacy benefits for at least one year before cohort entry. They were followed until death, breast cancer diagnosis, disenrollment, prophylactic mastectomy, switch to the alternate class (e.g., CCB to ACEi), or study end date. New CCB or ACEi use was defined as no dispensing of either during one year look-back. Analysis included women with at least 12 months follow-up after cohort entry. Cox models were used to estimate hazard ratios (HR) and 95% confidence intervals (CI). **Results:** The cohort included 29,830 (18%) women taking CCB and 135,977 (82%) taking ACEi. Mean age in years: CCB=68, ACEi=67. Mean body mass index (BMI): CCB=29, ACEi=30. Percentage with diabetes: CCB=20%, ACEi=34%. Estrogen replacement: current CCB=28%, ACEi=23%; former CCB=28%, ACEi=32%. Mean years (SD) on CCB=2.6 (2.7), ACEi=2.9 (2.9). Unadjusted HR for CCB vs ACEi=1.11 (95%CI 1.01-1.21). After adjusting for other antihypertensives, age, BMI, KP region, race, education, cohort entry year, hysterectomy, diabetes, alcohol, estrogen, statins, and mammogram, the HR for CCB vs ACEi=1.02 (95%CI 0.93-1.12). The 95%CI for HR of all other adjusted models (e.g., using splines for age, total comorbidity, metformin, insulin) included 1.0. **Conclusion:** We found no statistically significant increase in risk of invasive breast cancer among women exposed to a CCB compared to women exposed to an ACEi.

027-S/P

HUMAN POLYOMAVIRUSES AND CUTANEOUS SQUAMOUS CELL CARCINOMA IN THE NEW HAMPSHIRE SKIN CANCER STUDY. Anala Gossai*, Tim Waterboer, Heather Nelson, Angelika Michel, Martina Willhauck-Fleckenstein, Shohreh Farzan, Anne G. Hoen, Michael Pawlita, Margaret R. Karagas (Geisel School of Medicine at Dartmouth, New Hampshire, United States)

Cutaneous squamous cell carcinoma (SCC) is a skin cancer arising from epithelial keratinocytes. Limited epidemiologic and experimental evidence raises the possibility that human polyomaviruses (PyV) may be associated with SCC. The relation between seropositivity to ten human PyVs and SCC was evaluated in a population-based case-control study from New Hampshire. A total of 253 SCC cases and 460 age and gender frequency matched controls were included. Antibody response against the VP1 antigen for each PyV was measured using a multiplex serology-based glutathione S-transferase capture of recombinantly expressed VP1 capsid proteins. Among controls, seropositivity to JC, MCV, and HPyV7 increased with age; JC and TSV seropositivity was more common for men than women; smokers were more likely to be HPyV9 seropositive and MCV seronegative; and HPyV7 seropositivity was associated with prolonged glucocorticoid use. Average number of PyVs to which SCC cases tested positive was slightly higher than controls (SCC case mean=7.5 versus control mean=7.3, P=0.05). Increased odds ratios (OR) for SCC were observed in relation to seropositivity to JC (OR=1.4, 95% CI: 1.0-1.9), KI (OR=1.2, 95% CI: 0.7-2.3), WU (OR=2.0, 95% CI: 0.6-6.5), and HPyV9 (OR=1.3, 95% CI: 0.9-1.9), compared to those who were seronegative for these viruses. Our findings suggest that PyVs are prevalent in the US population and are related to individual characteristics. Further, our study raises the possibility that PyV infection may be related to the occurrence of SCC.

028-S/P

INCIDENCE OF TESTICULAR GERM CELL TUMORS (TGCT) AMONG US HISPANIC MEN BY CENSUS REGION. Armen A. Ghazarian*, Britton Trabert, Stephen M. Schwartz, Sean F. Altekruse, Katherine A. McGlynn (National Cancer Institute)

Testicular germ cell tumors (TGCT) are the most commonly occurring cancer among men in the United States (US) between ages 15 and 44 years. In a prior report examining data from the Surveillance, Epidemiology, and End Results (SEER) 13 registries (14% of US population), we found that between 1992 and 2011, Hispanic men had the greatest annual percent change (APC) in TGCT incidence of all racial/ethnic groups. In order to assess whether the increase occurred among the broader US Hispanic population, we examined data from 39 cancer registries submitted to the North American Association of Central Cancer Registries (84% of US population). Age-adjusted incidence rates among Hispanics per 100,000 man-years were calculated for the US overall, and by Census region (West, Midwest, Northeast, South). In the period 2009-2011, TGCT incidence among Hispanics in all areas was 4.29 (95% Confidence Interval (CI)=4.15-4.45). By region, incidence was significantly higher in the West (4.79, 95% CI=4.56-5.04), than it was in the Northeast (4.03, 95% CI=3.65-4.44), Midwest (3.90, 95% CI=3.43-4.44) or South (3.88, 95% CI=3.64-4.13). Between 1998 and 2011, TGCT incidence among Hispanics increased significantly (APC: 2.31, p-value<0.0001). By region, significant increases were seen in the Northeast (APC: 3.43, p-value=0.0003), West (APC: 3.01, p-value<0.0001), and Midwest (APC: 2.95, p-value=0.0027), but not in the South (APC: 0.71, p-value=0.1054). These data indicate that the rates of TGCT among US Hispanics are higher in the West than in other regions of the country, and that rates are increasing in all regions except the South. Reasons for these differences in rates and trends are unclear, but could be related to as-yet unidentified varying exposures, place of birth, country of ancestry and/or length of residence in the US. Further investigations into this regional variation are warranted.

029-S/P

METABOLIC SYNDROME AND PROSTATE CANCER RISK IN A POPULATION-BASED CASE-CONTROL STUDY IN MONTREAL, CANADA. Audrey Blanc-Lapierre*, Andrea Spence, Pierre I. Karakiewicz, Armen Aprikian, Fred Saad, Marie-Élise (INRS-Institut Armand-Frappier, UniversitÃ© du QuÃ©bec, Laval, Canada)

Epidemiological findings on the relation between metabolic disorders and prostate cancer occurrence are conclusive for diabetes and obesity, but conflicting regarding metabolic syndrome. We investigated this relation in a large population-based case–control study conducted in Montreal, Canada. Cases were 1937 men with incident prostate cancer, aged ≤75 years, diagnosed across French hospitals in the Montreal area between 2005 and 2009. Concurrently, 1995 population controls from the same residential area and age distribution were randomly selected from electoral list of French-speaking men. Detailed lifestyle and medical histories, and anthropometric measures were collected during in-person interviews. Prevalence of MetS components (type 2 diabetes, high blood pressure, dyslipidemia and abdominal obesity) was estimated at 2 years before diagnosis for cases/ interview for controls, and at ages 20, 40, 50 and 60. Logistic regression was used to estimate ORs and 95% CI for the association between MetS and prostate cancer risk. Overall, 28.4% of subjects (24.9% of cases, 31.8% of controls) ever met MetS criteria according to the NCEP-ATPIII definition. A history of MetS (≥3 vs <3 components) was associated with a reduced risk of prostate cancer (OR=0.70; 95% CI: 0.60- 0.82) after considering potential confounders. The negative association was particularly pronounced with a young age (≤40 years) at MetS onset (OR=0.38; 95% CI: 0.16-0.89) and among men younger than age 65 a diagnosis/interview; it did not vary according to prostate cancer aggressiveness, and was only partly explained by the presence of type 2 diabetes. A risk decrease was observed with the number of MetS components, suggesting a synergistic interaction of the components. The observed negative association is in line with results from other North American populations undergoing regular prostate cancer screening, raising the issue of the impact of PSA-testing on the MetS-prostate cancer association.

030-S/P

THE EFFECTS OF FOLIC ACID TREATMENT, DIETARY FOLATE INTAKE AND SERUM FOLATE ON RISK OF PROSTATE CANCER: AN ANALYSIS OF A RANDOMIZED CONTROLLED TRIAL. Dongyu Zhang*, Baron John, Jane Figueiredo (The University of North Carolina at Chapel Hill Gillings School of Global Public Health, Department of Epidemiology)

Background: Folate plays a role in methylation reactions, including DNA synthesis and methylation, and these processes can influence carcinogenesis. Currently, there has been some research that found higher level foalte could increase the risk of prostate cancer. Our goal was to investigate if folate will affect the prostate cancer incidence through trial and observational analysis. **Methods:** We investigated 651 men in "Aspirin/Folate Polyp Prevention Study"-a large double-blinded randomized controlled trial that treated prostate cancer incidence as secondary outcome. Participants were randomly assigned to 1 mg/day folic acid or placebo. The following period began from late 1990s to the end of 2006 and resumed at 2011. In analysis, demographic and biomedical data were compared by univariate test based on assignment group. In both trial and observational analyses we used multiple Cox proportional hazards model to investigate the association between different measures of folate and prostate cancer incidence by adjusting for related confounders. **Results:** The median follow-up time was 13.2 (SD=5.1) years and 57 (8.8%) men were diagnosed with prostate cancer. The demographic and biomedical data were similarly distributed in the folic acid treatment arm (n=330) and placebo arm (n=321). It was shown that there was no significant association between folic acid supplement and prostate cancer incidence after adjustment (HR=1.57, 95% CI=0.92, 2.66). In contrast, baseline dietary folate intake showed a statistically significant inverse association with prostate cancer risk after adjustment (HR=0.58, 95% CI=0.40, 0.84). And the association between baseline serum folate and prostate cancer risk was not statistically significant after adjustment (HR=0.74, 95% CI= 0.52, 1.05). **Conclusion:** The result suggested that 1 milligram of folic acid per day wouldn't increase the risk of prostate cancer. More multiracial studies are needed to generalize our conclusion to different population.

031-S/P

AGE AT CANCER DIAGNOSIS FOR BLACKS COMPARED TO WHITES IN THE UNITED STATES. Hilary A. Robbins*, Eric A. Engels, Ruth M. Pfeiffer, Meredith S. Shiels (Division of Cancer Epidemiology & Genetics, National Cancer Institute (former) / Johns Hopkins Bloomberg School of Public Health (current))

Background: Younger ages at diagnosis for blacks compared to whites have been reported for several cancer types. However, the U.S. black population is younger than the white population. This difference in age structure may bias age-at-diagnosis comparisons that do not account for the populations at risk. **Methods:** We analyzed Surveillance, Epidemiology, and End Results data for non-Hispanic blacks and non-Hispanic whites from 18 regions for the year 2010. We calculated crude mean ages at diagnosis among cases of 29 cancer types for whites and blacks. Separately, we calculated adjusted means that corrected for differences in population structure. We obtained adjusted means by fitting linear regression models to the ages at diagnosis with statistical weights specific to age and sex. **Results:** Based on crude means, blacks were diagnosed at younger ages than whites for nearly every cancer type. However, adjustment for population structure produced a strong shift toward older ages among blacks, after which only 6 statistically significant differences of at least 3 years remained. Blacks were younger than whites at diagnosis for Kaposi sarcoma (10.2 years), male soft tissue cancer (5.6), male anal cancer (5.5), and non-Hodgkin lymphoma (3.7), but older for cervical cancer (4.7 years) and female thyroid cancer (3.3). Smaller differences (less than 3 years) were present for female breast, female colon, lung, pancreas, prostate, and uterine corpus cancers (all p≤0.001). **Conclusions:** Population age structure differences can strongly influence comparisons of the age at cancer diagnosis, and age differences between blacks and whites are small for most cancer types. Large differences for a few cancer types may be driven by etiologic and subtype heterogeneity, including the influence of HIV-infected cancer cases, as well as racial disparities in screening and early detection.

032-S/P

ASSOCIATION BETWEEN POSITIVE AIRWAY PRESSURE TREATMENT AND ALL-CAUSE MORTALITY AMONG CANCER PATIENTS WITH OBSTRUCTIVE SLEEP APNEA. Hilary Joyner*, Ruth Benca, F. Javier Nieto (University of Wisconsin, Madison)

Background: Obstructive sleep apnea (OSA) is characterized by apneas and hypopneas that can cause drops in blood oxygen levels and fragment sleep. Recent studies have shown that OSA is associated with increases in cancer incidence and mortality. However, studies examining survival after cancer diagnosis and whether or not Positive Airway Pressure (PAP) therapy reduces mortality are lacking. **Methods:** The sampling frame for this retrospective cohort study was adult patients receiving a cancer diagnosis on or after 1/1/2000 and a subsequent sleep study—either a type III home study (18%) or in-laboratory polysomnography (82%). Apnea-hypopnea index (AHI) was calculated as the average number of episodes of apnea and hypopnea per hour of sleep. The final sample included all patients with an AHI≥5/h-1, consistent with the usual clinical diagnosis of OSA (n=347, mean age=61 years, Range=[23-88]). PAP use was extracted from clinic records and coded as any use vs. no use. Smoking status and body mass index at time of sleep study and, if applicable, date of death, were extracted from clinic records. Patients were followed for a mean of 7.1 years (SD=3.4) and Cox proportional-hazards regression with age as the time scale (allowing for left truncation or late entry) was used to estimate adjusted hazards ratios (HR). **Results:** 58% of patients received PAP therapy. By the end of follow-up, 24 patients had died. Adjusting for age, sex, body mass index, AHI, and smoking, use of PAP therapy was associated with lower total mortality (HR=0.23, 95% CI=[0.08,0.64]). **Conclusions:** Among this sample of cancer patients with OSA, PAP treatment was associated with reduced all-cause mortality, adjusting for age, sex, body mass index, and smoking. Further study is needed to determine if PAP therapy reduces cancer-specific mortality and other cancer outcomes (e.g., metastasis) as well as to investigate differences in response to PAP therapy between specific cancer types.

033-S/P

RISK FACTORS FOR DEVELOPING BREAST AND OVARIAN CANCER IN HIGH RISK WOMEN. Jennifer Ferris*, Mary Beth Terry, Yuyan Liao, Saundra Buys, Mary Daly, Jeanine Genkinger (Columbia University)

Limited research has been done examining risk factors for the development of both breast and ovarian cancer. The Breast Cancer Family Registry is comprised of six sites across North America and Australia that have recruited families with a history of breast and/or ovarian cancer. Using data from the three clinic-based sites, we examined the association between oral contraceptive (OC) use, parity, and breastfeeding and risk of breast cancer only, ovarian cancer only, and both breast and ovarian cancer in high risk families. We used an unordered polytomous logistic regression with a clustered bootstrap approach to adjust for the correlated nature of the data. Potential confounders were assessed by the 10% change-of-estimate criterion and on their observed importance to breast and ovarian cancer risk. There were 2,145 breast cancer only cases, 285 ovarian cancer only cases, 104 breast and ovarian cancer cases, and 3,498 controls with no cancer. After adjusting for age, race/ethnicity, menopausal status, education, and BRCA1/2 mutation status we observed a reduced risk of ovarian cancer with ever OC use compared to never use (OR=0.35, 95% CI: 0.26, 0.51). Compared to nulliparous women, parous women who never breastfed had an increased risk of breast cancer only (OR=1.37, 95% CI: 1.12, 1.67), and breast and ovarian cancer (OR=2.45, 95% CI: 1.11, 7.06). Compared to nulliparous women, parous women who ever breastfed had an increased risk of ovarian cancer only (OR=1.62, 95% CI: 1.05, 2.83) and breast and ovarian cancer (OR=2.15, 95% CI: 1.07, 5.90); however the association with breast cancer was reduced and no longer statistically significant. These results suggest that breastfeeding may mitigate the effect of parity on risk of developing breast cancer only in high risk women. Further, they highlight the contribution of reproductive factors for the development of breast and ovarian cancer beyond the known genetic contribution.

034-S/P

FISH INTAKE AND THE RISK OF HEAD AND NECK CANCER- Kathleen M. McClain*, Patrick T. Bradshaw, Marilie D. Gammon, Andrew F. Olshan (Department of Epidemiology, University of North Carolina at Chapel Hill)

Fish intake, and other sources of ω-3 fatty acids, are promising risk reduction strategies for cancer. Previous studies have examined head and neck cancer in association with dietary patterns, and found reduced risks for fruits and vegetables and a "healthy diet" pattern. However, the specific role of fish intake has not been examined. This study investigated the association between fish/shellfish intake and risk of squamous cell carcinoma of the head and neck (SCCHN) through use of a population-based case-control sample from the Carolina Head and Neck Cancer Epidemiology Study (2002 through 2006). Controls were frequency matched to the cases on age, sex, and race; the final sample size was 1,253 cases and 1,373 controls. Demographic, lifestyle, and dietary information were collected using an in-person interviewer-administered structured questionnaire. The association was modeled using unconditional logistic regression. Subjects whose fish/shellfish intake was among the highest category had a 22% lower odds of SCCHN compared to those in the lowest category (OR: 0.78; 95% CI: 0.60, 1.02) after adjustment for the matching and other factors (income, energy intake, fruit intake, cigarette smoking, and alcohol). There was no effect measure modification by fruit or vegetable intake. To further investigate this potential risk reduction strategy for SCCHN, future studies should consider examining specific fish/shellfish, cooking practices and other ω-3 fatty acid sources.

035-S/P

ASSOCIATION BETWEEN POSTOPERATIVE COMPLICATIONS AND ADJUVANT CHEMOTHERAPY RECEIPT AMONG OLDER, US RECTAL CANCER PATIENTS. Laura Hester*, Hanna Sanoff, Jennifer Lund (Department of Epidemiology, University of North Carolina at Chapel Hill)

US guidelines for stage II/III rectal cancer recommend neoadjuvant chemoradiation therapy (NCRT) and curative resection, followed by adjuvant chemotherapy. Despite these guidelines, initiation and completion rates of postoperative chemotherapy are low among older adults. This study examines whether postoperative complications were associated with adjuvant chemotherapy receipt among a cohort of older (age 66+), non-metastatic rectal cancer patients diagnosed from 2004-2009 in the Surveillance, Epidemiology and End Results-Medicare database. Eligible individuals had continuous Medicare parts A/B coverage, received NCRT, and survived >120 days after surgery. The outcome was adjuvant chemotherapy receipt within <120 days of surgery. The exposure was the presence of any complication resulting in a hospitalization <30 days after surgery. We used a propensity score weighting approach to adjust for measured confounders including age, marital status, comorbidity, residential area characteristics, stage, and functional dependence. A standardized mortality rate (SMR)-weighted log binomial regression was used to assess the relationship between postoperative complications and adjuvant chemotherapy. Of 1348 eligible patients, 53% received adjuvant chemotherapy and 20.4% had >1 postoperative complications. Among patients with complications, the most common types were systemic and organ-specific infections (44%) and pulmonary problems (28%). Individuals without postoperative complications were more likely to receive adjuvant chemotherapy (aRR=1.31; 95% CI: 1.12, 1.53). The results suggest that postoperative complications are an important confounding factor that should be considered in studies evaluating the comparative effectiveness of adjuvant chemotherapy approaches. Future interventions focused on reducing postoperative complications may improve clinical and patient-centered outcomes

036-S/P

AMBIENT ULTRAVIOLET RADIATION AND SUBSEQUENT RISK OF DIGESTIVE CANCERS IN A COHORT OF 4.5 MILLION WHITE AND BLACK MALE U.S. VETERANS. Wayne T. Liu*, D. Michal Freedman, Emily M. Bowen, Martha S. Linet, Elizabeth K. Cahoon (National Cancer Institute)

Ultraviolet radiation (UVR), possibly through vitamin D production, has been linked to a reduced risk of colorectal cancer, but few studies have examined this association for other digestive cancers or across race. We evaluated the relationships between ambient UVR and digestive cancers (N= 95,472 cases) among whites (80%) and blacks (20%) in a cohort of 4.5 million male U.S. veterans using hospital discharge records from 1969-1996. Ambient UVR estimates were linked to zip code of residence at baseline hospitalization. Rate ratios and 95% CIs were calculated using time-dependent Poisson regression. In the overall study population, RRs were significantly reduced for the highest UVR quintile for cancers of the colon (RR=0.91, 95% CI: 0.87-0.95, p-trend<0.001) and rectum (RR=0.92, 95% CI: 0.87-0.97, p-trend< 0.001), and increased for buccal (RR=1.12, 95% CI: 1.08-1.16, p-trend<0.001), pancreatic (RR=1.07, 95% CI: 0.99-1.15, p-trend=0.01), and liver (RR=1.27, 95% CI: 1.17-1.38, p-trend<0.001) cancer after adjusting for age, year, race, number of hospital visits, COPD, diabetes, obesity, alcoholism, and hepatitis. No significant relationship was found for cancers of the esophagus, small intestine, or stomach in the overall population. In both whites and blacks, there was a significantly reduced trend in colon and rectal cancer incidence for increasing UVR. Race significantly modified the relationship between UVR and esophageal cancer such that there was a decreased risk in whites (RR=0.92 95% CI: 0.85-0.99, p-trend<0.001), but an increased risk in blacks (RR=1.17 95% CI: 1.03-1.32, p-trend=0.03, race interaction p<0.001). Our study includes a large number of cases, representing a wide range of ambient UVR, but lacks information on locations of lifetime residence and lifestyle factors. These results support an inverse relationship for UVR and colorectal cancers and serve as a starting point for examining the relationship between UVR, race, and other digestive cancers.

037-S/P

ASSOCIATIONS OF DYSLIPIDEMIA, TOTAL CHOLESTEROL LEVEL AND PAPILLARY THYROID CANCER: T-CALOS IN KOREA. Yunji Hwang* (Seoul National University)

Objectives: There are conflicting evidence and mechanisms for lipid-associated conditions and thyroid cancer. This study assessed the associations of dyslipidemia, total cholesterol level and papillary thyroid cancer (PTC). **Methods:** From the Thyroid Cancer Longitudinal Study (T-CALOS) data, we analyzed 12,055 subjects (2,411 cases and 9,644 controls) who completed the questionnaire (medical history and demographic and lifestyle factors) and had their total cholesterol level measured. Conditional and multichotomous logistic regression models were used to estimate the odds ratios (OR) and 95% confidential intervals (95%CI) adjusted for education, body mass index, drinking, smoking, thyroid disease, hypertension, pregnancy, and menopausal status. **Results:** A medical history of dyslipidemia was associated with an increased risk of PTC compared to those never diagnosed with dyslipidemia (men: OR=3.02, 95%CI=1.80-5.06; women: OR=1.43, 95%CI=1.07-1.90). The magnitude of the association was greater in those who currently had PTC (men: OR=3.27, 95%CI=1.76-6.06). Dyslipidemia with a high total cholesterol level (200+ mg/dL, men: OR=4.72, 95%CI: 2.14-10.41; women: OR=2.14, 95%CI=1.07-4.26) or hypocholesterolemia (<160 mg/dL, men: OR=3.97, 95%CI=1.44-10.97) were significant indicators of PTC risk compared to those never diagnosed with dyslipidemia or hypocholesterolemia. We observed further elevated risks in male PTC subjects with a large tumor size (<1 cm vs. 1+ cm: OR=2.82, 95%CI=1.41-5.64 vs. OR=3.62, 95%CI=1.67-7.88) and lymph node metastasis (no vs. yes: OR=2.86, 95%CI=1.28-6.38, vs. OR=3.80, 95%CI=1.89-7.67). **Conclusions:** Dyslipidemia and total cholesterol level are associated with an increased risk of PTC and thyroid tumor aggressiveness. These relationships differed by the conditions of the subjects according to dyslipidemia (completely cured, under treatment or no treatment) and management of cholesterol level after diagnosis of dyslipidemia.

038

MODELING MULTIDIMENSIONALITY AND COMPLEXITY IN DIET PATTERNS: THE DIETARY PATTERNS METHODS PROJECT. Jill Reedy*, Angela D. Liese, Amy F. Subar, Stephanie M. George, Brook E. Harmon, Marian L. Neuhouser, Carol J. Boushey, TusaRebecca E. Schap, Susan M. Krebs-Smith (National Cancer Institute)

Increased attention in nutritional epidemiology has focused on dietary patterns, rather than single nutrients or food groups, because dietary components are consumed in combination and correlated with one another. However, research has been hampered by the lack of consistency in methods used. To address these challenges and help inform the 2015 Dietary Guidelines for Americans, the Dietary Patterns Methods Project (DPMP) was initiated. DPMP investigators conducted analyses with standardized methods in the NIH-AARP Diet and Health Study (n=424,662), Multiethnic Cohort (n=156,804), and Women's Health Initiative (n=63,115), to examine the relationships between diet quality indices and all-cause, cardiovascular disease, (CVD), and cancer mortality with the use of Cox proportional hazards models. The indices included were the Healthy Eating Index-2010 (HEI), Alternative Healthy Eating Index-2010 (AHEI), Mediterranean Diet (aMED), and Dietary Approaches to Stop Hypertension (DASH) Score. A synthesis of these findings across cohorts found that higher diet quality (top quintile) was significantly and consistently associated with an 11–28% reduced risk of death due to all causes, CVD, and cancer compared with the lowest quintile, independent of known confounders. This was consistent for all index–mortality associations, with the exception of AHEI and cancer mortality in WHI. Within NIH-AARP, radar plots were used to visualize and compare the multidimensional patterns of components within each index. Multivariate models were also examined with only a subset of components for each index. Among the most optimal diets (top quintile), cluster analysis was used to investigate and describe the underlying eating behaviors. These findings indicate that these scores all reflect the core tenets of a healthy diet that may lower the risk of mortality outcomes and provide a basis to consider separate analyses to explore the multidimensionality and complexity in diet patterns further.

040

PHYSICAL ACTIVITY, BMI AND DIABETES AT AGE 60 YEARS IN PARTICIPANTS IN THE NEWCASTLE THOUSAND FAMILIES STUDY. Mark S. Pearce*, Louise Hayes, Laura Basterfield (Newcastle University, UK)

Background: The relationship between physical activity and diabetes risk is well-established. We aimed to examine the relationship between physical activity and obesity at age 50 years and age 60 years with the development of diabetes or hyperglycaemia at in a cohort of men and women aged 60 years **Methods:** A cohort of 1142 babies born in May and June 1947 to mothers living in Newcastle-upon-Tyne, UK was recruited. At age 59-61 years, 434 cohort members completed a health and lifestyle questionnaire and 355 attended a clinical assessment. Physical activity (PA) data were collected by accelerometer on 224 individuals. Diabetes and hyperglycaemia were identified using WHO 2000 definitions. **Results:** Of 262 study members with complete data and who had normal blood glucose at age 50, 29 (11%) were identified as having diabetes and 41 (16% of those without diabetes) hyperglycaemia at 60. BMI at age 50 was significantly associated with both diabetes (OR 1.17, 95% CI 1.08, 1.28; p<0.001) and hyperglycaemia (1.09, 1.02, 1.16; p=0.011) at age 60. Self-report PA at age 50 was not associated with diabetes or hyperglycaemia at 60. In contrast, objectively measured moderate and vigorous PA (MVPA) at age 60 was associated with hyperglycaemia (0.96, 0.93, 0.98; p=0.001). The relationship between MVPA and diabetes at 60 approached statistical significance (0.97, 0.94, 1.00; p=0.067). BMI at 60 was associated with both diabetes and hyperglycaemia at 60, but after adjustment for MVPA these relationships were no longer significant. **Conclusion:** Objectively measured MVPA at age 60 years was more strongly associated with hyperglycaemia and diabetes than BMI or self-report PA at 50. These findings may reflect an increase in PA associated with health advice received by individuals with raised blood glucose, or may be attributable to the more precise, objective measurement of PA in this cohort at age 60 years.

041

NEIGHBORHOOD SOCIAL AND PHYSICAL ENVIRONMENTS AND TYPE 2 DIABETES: THE JACKSON HEART STUDY. Samson Y Gebreab*, Ana V. Diez Roux, DeMarc A. Hickson, Mario Sims, Michael Griswold, Sharon K. Davis, Sharon B. Wyatt, Adolfo Correa (National Human Genome Research Institute)

We examined associations between neighborhood physical and social environments and type 2 diabetes in African Americans. We hypothesized that people living in better neighborhood environments experience a lower prevalence and risk of type 2 diabetes. We used data from 5,301 participants in the Jackson Heart Study (JHS), who enrolled at baseline (2000-2004). Diabetes status was defined according to 2010 American Diabetes Association criteria and was ascertained at baseline, exam 2 (2005-2008) and exam 3 (2009-2013). Neighborhood measures were derived from surveys of JHS participants (social cohesion, violence and problems (e.g. litter)) and GIS-based densities of resources (favorable and unfavorable food stores, and physical activity resources). Generalized estimating equations and Cox models were used to estimate the associations between neighborhood measures and prevalence and incidence of type 2 diabetes, adjusted for age, body mass index, income, education, smoking, alcohol intake, physical activity, and diet. The baseline prevalence of diabetes was 22.0% and 14.2% developed diabetes during follow-up. Measures of neighborhood social cohesion, violence and problems were associated with prevalence of type 2 diabetes in men after adjusting for risk factors (prevalence ratio (PR)= 0.76 (95% CI 0.65, 0.90), PR=1.21 (1.02, 1.43) and PR=1.37 (1.18, 1.60), respectively). Social cohesion was also associated with a lower incidence of type 2 diabetes in women after adjusting for risk factors (hazard ratio (HR)= 0.76 (0.59, 0.98)). Measures of densities of resources were not associated with prevalence of type 2 diabetes in either women or men. Density of unfavorable food stores was associated with a higher incidence of type 2 diabetes in both women and men (HR= 1.25 (1.01, 1.55) and HR=1.48 (1.15, 1.90), respectively). Our findings suggest that better neighborhood social and physical environments may be associated with a reduced risk of type 2 diabetes in African Americans.

042-S/P

THE EFFECTS OF NON-SURGICAL PERIODONTAL THERAPY WITH ORAL HYGIENE INSTRUCTION ON PERIODONTAL STATUS IN TYPE 2 DIABETIC PATIENTS. C.J. Lin*, Y.J. Hsu, Y.M. Wu, Y.C. Lin, H.L. Huang(100,Shih-Chuan 1st Road,Kaohsiung,80708,Taiwan.)

The association between the diabetes and periodontitis is bidirectional. Individuals with diabetes are at greater risk for incident and prevalent chronic periodontitis and have more severe chronic periodontitis than individuals without diabetes. Our aim is to assess the effects of non-surgical periodontal therapy with oral hygiene instruction on periodontal status in type 2 diabetic patients. The diabetic patients aged over 35, having gingival bleeding and at least 16 teeth in oral cavity were recruited from the Division of Endocrinology and Metabolism in the medical center, Taiwan. Diabetic patients who had periodontal treatment within six months, regular used antibiotic and bisphosphonates and had seriously harmful disease were excluded. Fourteen patients received non-surgical periodontal treatment including scaling, root planning and oral hygiene instruction. Repeated measures ANOVA were used to compare the periodontal status at baseline and after intervention. The results showed there was a significant decrease in probing pocket depth (PPD) by 0.13mm, clinical attachment level (CAL) by 0.19mm, bleeding on probing (BOP) by 12.99%, and surfaces with plaque by 10.40% between baseline and post-treatment (all P<.001). Compared to non-changed group, diabetic patients in combined group of brushing technique change and positive attitude (or knowledge) toward periodontal health had significantly greatest improvement on PPD change after conventional periodontal therapy; on the other hand, combined effects, including change of brushing minutes and positive attitude (or knowledge) toward periodontal health were also showed significant greatest on PPD change (P<.05). The non-surgical periodontal treatment with oral hygiene instruction for type II diabetic patients is suggested to improve their periodontal status.

043-S/P

EXPLORING TRAJECTORIES OF DIABETES DISTRESS IN ADULTS WITH TYPE 2 DIABETES; A LATENT CLASS GROWTH MODELLING APPROACH. Lipscombe, C.L*, Schmitz, N. (McGill University)

Objective. Moderate to severe diabetes distress (DD) is a common comorbidity in adults with type 2 diabetes. Cross-sectional studies find DD is both strongly and independently correlated with poor diabetes disease management, however little is known about the progression or pattern of change of DD over time. We sought to identify and describe a set of distinct longitudinal trajectories of DD. Additionally, we investigated to what degree various sample characteristics altered the probability of membership in a particular trajectory. **Methods.** We used 4 years of data derived from the Evaluation of Diabetes Treatment study (2011-2014), a longitudinal community-based survey of Canadian adults with type 2 diabetes (n=1,135). A latent class growth modeling approach was used to determine the number and shape of trajectories. **Results**. Five distinct trajectories of DD were identified. Trajectories 1 and 2 described participants with persistently low distress (61% of sample) or persistent at-risk levels of distress (22% of sample). Trajectory 3 (7.5% of sample) included participants with moderate levels of distress at baseline that decreased to sub-threshold levels by 3 years of follow-up. Trajectory 4 (6.5% of sample) consisted of participants with moderate, but increasing levels of distress. Trajectory 5 (2.4% of sample) included participants with persistently high (severe) levels of distress. A multinomial regression identified several factors associated with an increased probability of membership in trajectories 4 and 5 (vs trajectory 1) including: having more diabetes complications, low social support, being physically inactive, being a current smoker, younger age and being female. **Conclusions.** These results suggest that DD follows a dynamic process and appears to be a fairly stable condition over time for a subset of individuals. Medical health professionals might consider screening for potential risk factors of high levels of DD in this population.

044-S/P

EFFECTIVENESS OF DIABETES PREVENTION STRATEGIES IN THE US: A MODELLING STUDY. Christopher Tait*, Laura Rosell (University of Toronto)

Objective: To estimate the effectiveness of diabetes prevention strategies with a population-based risk tool using nationally-representative data on risk factors in the US. **Methods:** We used data from adult respondents to the 2013 National Health Interview Survey (N=44,870) and the validated Diabetes Population Risk Tool (DPoRT) to estimate 10-year diabetes risk across regions in the US. We then quantified the population benefit in each region resulting from targeting population groups with a weight loss and a lifestyle intervention scenario. The population benefit was defined as the absolute number of diabetes cases prevented.**Results:** The US will have an estimated 25,966,173 new diabetes cases between 2013 and 2023 representing an average risk of 10.2% (95% CI: 10.1%-10.4%). The 10-year risk of developing diabetes ranged from 10.2% (95% CI: 9.9%-10.4%) in the Midwest region to 10.5% (95% CI: 10.2%-10.7%) in the South. The highest risk group (top 20%) has a baseline risk of 26.1% (95% CI: 25.9%-26.3%) of 10 -year incident diabetes, suggesting a wide distribution of risk in the US population. A population-based intervention resulting in a 5% weight loss would result in an absolute risk reduction of 1.8% corresponding to 2.5 million diabetes cases prevented. A targeted high-risk strategy (RR reduction of 0.6), such as pharmacotherapy, applied to only those in the top decile of baseline risk, would result in 4.8 million diabetes cases prevented over 10 years. **Conclusions:** Given that diabetes risk is high in the US population, this study provides empirical evidence to suggest that prioritizing prevention strategies to the general population as well as those targeted at high risk groups may result in a significant population benefit. For the first time in the US population, it also demonstrates the utility of a population-based risk tool to estimate the population benefit of diabetes prevention strategies using self-reported risk factor surveillance data.

045-S/P

MODIFIABLE LIFESTYLE CHARACTERISTICS OF OLDER ENGLISH ADULTS WITH PREDIABETES. Eva Graham*, Genevive Gariapy Rachel J. Burns, Norbert Schmitz (Department of Epidemiology, Biostatistics, and Occupational Health, McGill University and Douglas Mental Health University Institute)

Rationale: Prediabetes is a state where blood glucose levels are higher than normal but lower than those required for a diagnosis of diabetes. Prediabetes is becoming increasingly prevalent and carries a high risk of type 2 diabetes and vascular complications compared to lower glucose levels. It is important to describe the modifiable lifestyle characteristics of people with prediabetes to develop effective programming and intervention for this group. This study describes the smoking, alcohol consumption, and physical activity habits of older English adults with prediabetes compared to both adults with normal glucose levels and adults with diabetes. **Method:** Participants were from the English Longitudinal Study of Aging (2004-2005), a representative sample of adults in England aged 50+. Statistical analyses examined differences between people with prediabetes and 1) people with normal glucose levels and 2) people with diagnosed diabetes, while adjusting for socio-demographic factors (n=4180). Ï‡2 and t-tests tested differences for each characteristic individually and multinomial logistic regression examined the adjusted associations for all characteristics. Survey weighting and cluster information was used to generalize to the older English population. **Results:** Compared to people with normal glucose levels, people with prediabetes were more likely to be current smokers (RR 2.24, 95% CI 1.81-2.78), were less likely to engage in vigorous physical activity (RR 0.75, 95% CI 0.59-0.96), and were less likely to consume alcohol almost every day (5+ times/week RR 0.50, 95% CI 0.36-0.70). Compared to people with diabetes, people with prediabetes were more likely to be current smokers (RR 1.87, 95% CI 1.27-2.75) and were more likely to engage in vigorous physical activity (RR 1.68, 95% CI 1.12-2.51). **Conclusion:** Older adults with prediabetes have unique lifestyle characteristics that should be considered when developing preventive programs and policy for this high-risk group.

046-S/P

DEPRESSIVE SYMPTOMS ARE INDEPENDENTLY ASSOCIATED WITH POOR SLEEP QUALITY (PSQ) IN ADULTS WITH LONG-STANDING TYPE 1 DIABETES (T1D). Hristina Denic*, Tina Costacou, Trevor J. Orchard (University of Pittsburgh)

PSQ has been linked to impaired glucose regulation in type 2 diabetes, whereas T1D data are limited to youth and small samples. Prior studies have also indicated an association between depressive symptoms and PSQ. Our aim was to assess whether subjective sleep quality in adults with long-standing, childhood onset T1D is related to glycemic control and depressive symptomatology. Subjective PSQ was assessed by the Pittsburgh Sleep Quality Index during the 25-yr exam of the prospective Epidemiology of Diabetes Complications study of childhood onset T1D (n=190, mean age, 52 and diabetes duration, 43 yrs). Multivariable logistic regression was used to assess associations of glycemic control (HbA1c at yr 25 and as a time-weighted updated mean over the 25 yrs) and depressive symptoms (Beck Depression Inventory (BDI) score at yr 25 and updated mean over the 25 yrs) with PSQ independently of risk factors including sex, antidepressant use, lipids, etc. A median of 11/13 possible BDI measurements per person over 25 yrs were available. The prevalence of PSQ was 50% in women and 30% in men (p=0.005). No significant association between glycemic control (at 25 yrs, p=0.67; overtime, p=0.68) and PSQ was found. However, BDI was independently associated with PSQ both at 25 yrs (OR 1.17, 95% CI 1.10, 1.25) and as an updated mean score over the 25-yr follow up (OR 1.25, 95% CI 1.14, 1.36). In an exploratory analysis excluding individuals who reported sleep disturbances in two sleep-related BDI items at baseline (1986-88), as an attempt to evaluate whether BDI symptoms may have preceded PSQ, the association between the updated mean BDI score and PSQ remained (OR 1.56, 95% CI 1.15, 2.12). These findings suggest a similar PSQ prevalence in long-standing T1D and the general population. While no association was observed with glycemic control, our results also suggest that PSQ may, in part, reflect long standing depressive symptomatology in T1D although we cannot rule out preexisting PSQ.

047-S/P

TRENDS IN HOSPITALIZATIONS FOR PATIENTS WITH DIABETES, 1998 TO 2011 - THE NATIONAL INPATIENT SURVEY. Philip R. Khoury*, Jane C. Khoury (Cincinnati Children's Hospital Medical Center Heart Institute, University of Cincinnati Department of Environmental Health)

Background: The rise in obesity which has occurred since the 1970s has also caused an increase in related disorders including type 2 diabetes. This disease is a significant side effect of the obesity epidemic. Objective: Examine national trends in hospitalizations for all individuals with a discharge diagnosis of diabetes (250.xx) in the Nationwide Inpatient Sample for the years 1998 through 2011. **Methods:** Patient records with a code of 250.xx in any of the first 15 diagnosis fields were considered to have a discharge diagnosis of diabetes (DIAB). Data were analyzed to look for temporal trends over the 14 years studied, including increases in DIAB, changes in DIAB by gender, and changes within 10 year age groups from 0 to 10, up to 70 to 80, and 80 +. Discharge weights were used to give accurate estimates per the sampling scheme. SASÂ® survey procedures were used to perform analyses. Data presented are nationally representative estimates of the frequency of hospital discharges. **Results:** Hospitalizations increased from 7.2 million discharge records in 1998 representing 35 million hospitalizations nationwide, to 8 million records representing 38.5 million hospitalizations in 2011. Overall, the number of DIAB hospitalizations significantly increased from 4.7 million (13.4%) of all hospitalizations in 1998, to 7.8 million (20.2%) in 2011. By gender, DIAB increased from 45% male in 1998 to 48% male in 2011. By age, there was an increase in DIAB as a proportion of all hospitalizations from 30% to 80 % in all ages from 1998 to 2011, except for age group 0-10 which is almost entirely type 1. **Limitations:** This study combined all ICD-9 codes 250.xx (excludes gestational), which therefore includes type 1 diabetes. The coding of type 1 versus type 2 is not always specified, or specified correctly, and therefore we decided to include all ICD-9 codes 250.xx.

048-S/P

TYPE 2 DIABETES AND COGNITIVE FUNCTION IN MIDDLE-AGED MEXICAN-AMERICANS: THE ROLE OF PARENTAL HISTORY OF TYPE 2 DIABETES. Tu My To*, Anne Lee, Allison E. Aiello, Mary N. Haan (University of California, San Francisco)

Introduction: Studies have linked type 2 diabetes to late life cognitive impairment. No studies have examined the influence of parental diabetes history on offspring cognitive status. A positive parental diabetes history, combined with offspring diabetes, may pose an increased risk for cognitive impairment. **Methods:** Analyses combined data from the Sacramento Area Latino Study on Aging (SALSA, n=1789) with a sample of 351 adult offspring of SALSA participants. Associations between offspring baseline diabetes, effect modification by parental history of diabetes, and cognitive scores were assessed using multivariate linear regression with an interaction term for parental history of diabetes and adjusted for covariates. In both cohorts, type 2 diabetes was defined as use of diabetic medication, self-report of a physician diagnosis, and/or elevated fasting blood glucose or HBA1c. Cognitive function was measured by the Montreal Cognitive Assessment Test (MoCA), a 30 point global cognition test. **Results:** In the offspring cohort, 34.2% have type 2 diabetes and nearly 79% of those diabetics have a positive parental history of diabetes. In linear regression models adjusted for age, gender, and education, baseline diabetes in offspring was associated with lower cognitive test scores ($\hat{I}^2$= -1.17; 95%CI: -1.90,-0.44; p-value=0.002). Offspring with both baseline diabetes and parental history of diabetes had a significantly lower MoCA score than those with only baseline diabetes or only parental history (interaction term: $\hat{I}^2$= -2.08; 95% CI: -3.70, -0.46; p-value = 0.012). **Conclusions:** Intergenerational risk of type 2 diabetes may influence the impact of diabetes on cognitive function in offspring. Further investigation is needed into behavioral and biological mechanisms by which this may occur.

049-S/P

ASSOCIATION BETWEEN INTAKE OF FRUCTOSE-RICH SUGAR -SWEETENED BEVERAGES AND PEDIATRIC INSULIN RESISTANCE IN RELATION TO OBESITY. Wei-Ting Lin*, Sharon Tsai-Chun-Ying Lee, Hsiao-Ling Huang, Tsung-Yun Liu Chien-HungLee (National Yang-Ming University)

Insulin resistance (IR), that produces atherosclerosis and increases risks of diabetes and cardiovascular disease in adult life, is attainable in childhood, and may continue into adulthood. Intake of sugar-sweetened beverages (SSBs) and the fructose they offer has risen sharply in recent decades. Epidemiological studies have shown that SSBs intake plays a role in the epidemic of obesity, while obesity is also a predictor of IR. To evaluate the effect of fructose-rich SSBs (FR-SSB) intake on pediatric IR in relation to obesity, we assessed 1454 representative adolescents who were recruited from a cross-sectional study with a multi-stage, geographically stratified sampling scheme. Detail information on demographic, dietary, physical, anthropometric and clinical parameters was collected. Body mass index (BMI), body adiposity index, original homeostasis model assessment of IR (HOMA1-IR), updated non-linear HOMA model (HOMA2-IR) and several markers for IR have been measured. We employed survey-data modules to control for complex survey design and used multivariate regression models to adjust for covariates. Adolescents who consumed a higher level of SSBs had an elevated fasting serum IR (P for trend: 0.027). A significant dose-response association of SSBs intake with HOMA1-IR and HOMA2-IR was identified. Sensitivity analyses demonstrated similar findings. BMI-defined obesity consistently conferred a strengthened effect on adjusted HOMA1-IR and HOMA2-IR differences among slight-to-half (a 1.80 and 0.96 elevation) and heavy (a 2.32 and 1.26 elevation) FR-SSBs drinkers (all P for interaction, <0.033). Our findings highlight the effect of FR-SSBs intake on pediatric IR among obese adolescents.

050-S/P

EARLY MENARCHE AND GESTATIONAL DIABETES MELLITUS: RESULTS FROM THE NHANES 2007-2012. Yun Shen*, Hui Hu, Xiaohui Xu (Department of Epidemiology, College of Public Health and Health Professions & College of Medicine, University of Florida)

Background: Early age at menarche has been associated with increased risk of Type 2 diabetes mellitus, hyperinsulinemia, metabolic syndrome, breast cancer, and cardiovascular diseases. However, a potential relationship between early menarche and the risk of gestational diabetes mellitus (GDM) has not been well studied. **Methods:** Data from the National Health and Nutrition Examination Survey (NHANES) 2007-2012 were used to investigate the association between age at menarche and the risk of GDM among 5,919 first-time mothers. A growth mixture model was used to detect distinctive menarche initiation patterns based on self-reported age at menarche. Logistic regression models were then used to examine the associations between menarche initiation patterns and GDM after adjusting for maternal age, race/ethnicity, educational level, family income to poverty ratios, and family history of diabetes mellitus. **Results:** Among the 5,919 first-time mothers, 3.4% had self-reported GDM. We detected 3 exclusive groups with distinctive menarche initiation patterns, the early menarche group, the normal menarche group, and the late menarche group. The regression model shows that compared to the normal menarche group, the early menarche group had 1.80 (95% CI: 1.07, 3.02) times the odds of having GDM. No statistically significant difference was observed between the normal and the late menarche group. **Conclusions:** This study suggests that early menarche is significantly associated with increased risk of GDM. Future studies are warranted to examine and confirm this finding.

060

EXPOSURE TO ENVIRONMENTAL AIR MANGANESE AND MEDICATION USE. Danelle Lobdell*, Rosemarie Bowler, Shane Adams, Christian Wright, Yangho Kim, Andrew Booty, Michelle Colledge, Vihra Gocheva, Raisa Garcia (San Francisco State University)

Manganese (Mn) is an essential element with natural low levels found in water, food, and air, but due to industrialized processes, both workplace and the environmental exposures to Mn have increased. Recently, environmental studies have reported physical and mental health problems associated with air-Mn exposure, but medical record reviews for exposed residents are rare in the literature. When medical records and clinical testing are unavailable, examination of residents' prescribed medication use may be used as a surrogate of health effects associated with Mn. We examined medication use among adult Ohio residents in two towns with elevated air-Mn (n=185) and one unexposed control town (n=90). Study participants recorded medication use in a health questionnaire and brought their currently prescribed medication, over-the-counter and supplement lists to their interview. Two physicians (family and psychiatric medicine) reviewed the provided medication list and developed medical categories associated with the medications used. The exposed (E) and control (C) groups were compared on the established 12 medication and 1 supplement categories using chi-square tests. The significant medication categories were further analyzed using hierarchical binomial logistic regression adjusting for education, personal income, and years of residency. The two groups were primarily white (E:94.6%; C:96.7%) but differed on education (E:13.8; C:15.2 years), residence length in their respective towns (E:41.1; C:33.6 years) and hours sleep (E:6.6;C:7.0 hours). The exposed group was more likely to take medication than the controls (82.2% vs. 67.8%). Examining medication categories (OR [95% CI]), the exposed group was more likely to take medications for pain (2.40 [1.28,6.25]) and hypothyroidism (7.03[1.58,31.23]). To our knowledge, this is the first reported air-Mn study of increased medication use in adult-exposed residents in the U.S. This abstract does not necessarily reflect EPA policy.

061

BIOMONITORING IS A TOOL FOR LINKING KNOWLEDGE ABOUT EXPOSURES AND EXPOSURE PREVENTION WITH COMMUNITIES. Elizabeth Lewis-Michl,Ming* Liu, Samira Skochko, Elizabeth Irvin-Barnwell, Wendy Wattigney, Sana Savadatti, Julie Reuther, Syni-an Hwang (NYS Dept of Health)

Background: NYS is funded by ATSDR to conduct a biomonitoring project to gather baseline data on fish consumption patterns and contaminant body burdens (biomonitoring data for metals and persistent organic pollutants) for people who eat fish caught from contaminated Great Lakes waters. NYS recruited 400 licensed anglers, primarily long-term U.S. residents, and 200 recent refugees, primarily from Burma, for the project. **Methods:** Licensed anglers were recruited from three counties containing Great Lakes water bodies, using lists of state fishing licensees, mail and telephone invitations. Burmese refugees residing in the City of Buffalo were recruited using respondent driving sampling. Questionnaire data about participant demographics, exposures, fishing locations, types of fish, fish preparation and consumption, and blood and urine samples were collected. Differing criteria for recruitment were used: one locally caught fish consumed in the prior year for the licensed anglers versus six for the refugees. **Results:** Preliminary analyses provide descriptive information from project questionnaires that shows large differences in fish consumption patterns and knowledge about fishing health advisories. 32% of licensed anglers ate locally-caught fish more than once every other week while 75% of refugees ate locally-caught fish more than once per week. 80% of licensed anglers were familiar with fishing health advisories compared to fewer than 40% of refugees. Biomonitoring results are nearing completion, and will be shared in the form of individual analyte reports and community reports about overall findings. The project's findings will be shared with participants and the larger community at in-person events to begin a process of improving knowledge about healthy fishing practices to promote reduced contaminant exposures.

062

IMPACTS OF SEGREGATION AND COMMUNITY SES ON CHILD GROWTH TRAJECTORIES. Hyojun Park*, Maureen Durki (University of Wisconsin-Madison)

Objectives: This study aimed to determine if and to what extent the community variables of segregation and socioeconomic status (SES) were associated with growth trajectories during early childhood and to evaluate if these associations were moderated by fetal growth or duration of gestation. **Methods:** Individual level data were from the Early Childhood Longitudinal Study, Birth Cohort (n=6,650). Community level data were from the RAND Center for Population Health and Health Disparities data. Lagged polynomial growth curve modeling and spline modeling were used to capture the impacts of segregation and community SES on body mass index (BMI) percentile or obesity risk trajectories after adjusting for other covariates. The robustness of the results were evaluated by using alternative definitions of segregation or SES, and fitting alternative modeling with generalized estimating equation. **Results:** Significant interactions between segregation and child growth were found. On average BMI percentile of Hispanic was higher than that of non-Hispanic (NH) White (b=0.19, s.e.=0.06, $p<0.001$). For Hispanic children, increasing levels of community segregation were associated with lower BMI percentiles (b=0.05, s.e.=0.02, $p<0.001$) at 24 and 48 months. BMI percentile of NH-African American was similar with that of White (b=0.06, s.e.=0.06, $p<0.28$). In contrast, for non-Hispanic African American children, increasing levels of segregation were associated with higher BMI percentiles (b=-0.10, s.e.=0.04, $p<0.02$) at 24 and 48 months. No effect was found in SES. **Discussion:** The mechanisms the way segregation affected child growth may require further studies. This study suggested analytic approach that reduces the impact of potential threats to validity in neighborhood studies.

063

CHEMICALS IN URINE AND BLOOD: METHODS FOR CREATININE AND LIPID ADJUSTMENT. Katie M. O'Brien*, Kristin Upson-Nancy R. Cook, Clarice R. Weinberg (Biostatistics and Computational Biology Branch, National Institute of Environmental Health Sciences)

Background: Investigators measuring exposure biomarkers in urine typically adjust for urinary creatinine to account for individual variation. Similarly, it is standard to adjust for serum lipids when measuring lipophilic chemicals in serum. However, there is controversy as to the best approach, and existing methods may not effectively correct for measurement error. **Objectives:** We compared adjustment methods, including novel approaches, using simulated case-control data. **Methods:** Using a directed acyclic graph framework, we defined six causal scenarios for epidemiologic studies of urine- or serum-based environmental chemicals. The scenarios include variables known to influence creatinine (e.g. age and hydration) or serum lipid levels (e.g. body mass index and recent fat intake). Over a range of true effect sizes, we analyzed each scenario using seven adjustment approaches and estimated the corresponding empirical bias and confidence interval coverage across 1000 simulated studies. Results: For urine-based measurements, our proposed method, a hybrid adjustment approach that includes both covariate-adjusted standardization and the inclusion of creatinine as a covariate in the regression model, had low bias and had 95% confidence interval coverage close to 95% for most simulated scenarios. For serum-based measurements, a similar approach involving standardization plus serum lipid level adjustment generally performed well. **Conclusions:** To control measurement error bias due to variations in serum lipids or urinary diluteness, we recommend improved methods for standardizing exposure levels across individuals.

064

URINE PHTHALATES AND SEMEN QUALITY - LONGITUDINAL INVESTIGATION OF FERTILITY AND THE ENVIRONMENT. Michael S. Bloom*, Brian W. Whitcomb, Zhen Chen, Aijun Ye, Kurunthachalam Kannan, Ying Guo, Germaine M. Buck-Louis (University at Albany, State University of New York)

Phthalate diesters are used broadly in consumer products, leading to widespread human exposure. Experimental and observational evidence implicate phthalates as an anti-androgenic male reproductive toxicant. The aim of our study was to identify specific phthalate monoesters, metabolites of phthalate diesters, associated with semen quality indicators. We collected blood and urine specimens from 501 men participating in the Longitudinal Study of Infertility and the Environment (LIFE). Men collected semen specimens approximately one month apart, which were mailed overnight for a â€˜next dayâ€™ analysis of 35 quality parameters according to American Society of Andrology guidelines. We quantified 14 phthalate monoesters in urine and cotinine in serum using high-performance liquid chromatography with tandem mass spectrometry. Compared to U.S. men, levels of MiBP were similar but LIFE study participants had lower levels of MBP, MEHP, MEOHP, MEP, and MBzP, and higher MCPP than U.S. men. Using individual mixed linear regression models, we detected significant (P<0.05) inverse associations with total sperm count for one IQR increases in log-transformed MCMHP (-2.89 106/mL), MEHHP (-2.85 106/mL), and MBzP (-4.96 106/mL), adjusted for age, cotinine, and other covariates. We also detected significant inverse associations for measures of sperm motility with higher MMP and MCPP, including % straightness (-15.30 and -17.28, respectively) and % linearity (-11.63 and -11.15, respectively). Levels of several phthalate monoesters, including MCMHP, MEHHP, MECPP, MMP, MiBP, and MBzP were associated significantly with changes in sperm head size (i.e., length, area, width, perimeter, and elongation factor), and sperm morphology, including % normal (strict and WHO criteria), pyriform, megalo head, cytoplasmic droplet, and # immature sperm. No associations were indicated for sperm chromatin. Our results suggest that phthalate diesters negatively impact semen quality, even at low exposure levels.

065

ASSOCIATIONS BETWEEN LOW-MODERATE LEVEL ARSENIC CONTAMINATED WATER CONSUMPTION AND BIRTH OUTCOMES IN ROMANIA. Michael S. Bloom*, Iulia A. Neamtiu, Simona Surdu, Cristian Pop, Ioana Rodica Lupsa, Doru Anastasiu, Edward F. Fitzgerald,Eugen Gurzau (University at Albany, State University of New York)

Epidemiologic studies conducted in regions with high groundwater inorganic arsenic (iAs) contamination (>10.0 Î¼g/L) report an increased frequency of adverse birth outcomes. However, few data are available to assess the risks at low to moderate iAs levels (<10.0 Î¼g/L). To address this data gap, we prospectively followed 122 women, residing in an area of Romania known for low-moderate groundwater iAs contamination, from early pregnancy to singleton live birth. Women completed a study questionnaire and we abstracted clinical data from hospital records. We also measured iAs levels in residential drinking water sources using hydride generation-atomic absorption spectrometry. Women were exposed to a median 1.28 Âµg/L iAs (IQR <0.5-3.58) via drinking water. In linear regression models adjusted for maternal age, body mass index, education, and cigarette smoking during pregnancy, no associations were suggested for average drinking water iAs as a predictor of gestational age, or birth weight, birth length, ponderal index, and head circumference standardized to gestational age using a reference population (Z-scores). However, when including a product term between average drinking water iAs level and cigarette smoking during pregnancy in regression models to assess the interactions, we detected longer gestational age (1.89 weeks; 95% CI 0.17, 3.61), lower Z-birth weight (-2.45; 95% CI -4.49, -0.42), and shorter Z-birth length (-1.17; 95% CI -2.33, 0.001) for a 10 Âµg/L iAs increase among cigarette smokers (P<0.05 for product term). No effects were indicated for non-smokers exposed to iAs. Though based on limited data, our results suggest that low-moderate drinking water iAs exposure may increase risks for adverse birth outcomes in smokers. Given that smoking remains common, especially in low to middle income countries, and that low-moderate level groundwater iAs contamination is widespread, a larger, biomarker-based investigation is needed to more definitively assess the risks.

066

ASSOCIATION BETWEEN URINARY MOLYBDENUM AND SERUM URIC ACID LEVELS IN A NATIONALLY REPRESENTATIVE SAMPLE. Sarah Geiger*, Joseph Olson, Roy Irving, Ryan Wozniak, Jie Xiao, Elizabeth Rogers, Henry Anderson (Northern Illinois University)

Hyperuricemia has been shown to be associated with diabetes, hypertension and elevated lipid levels, along with more advanced forms of cardiovascular disease. Research has shown a possible link between molybdenum and uric acid levels, but studies are extremely limited and may be methodologically flawed. In this context, we conducted a cross-sectional study using 10 total years of National Health and Nutrition Examination Survey data (1999-2010) to examine the putative association between urinary molybdenum and serum uric acid levels. Our sample consisted of 5,392 men and women (48.8%) aged >20 years, with 73.1% of the sample being white. Mean age of the sample was 46.4 years and 23.4% exhibited hyperuricemia (serum uric acid>6.0 mg/dL for females and >6.8 mg/dL for males). We conducted unadjusted and multivariable-adjusted linear and logistic regression analyses, controlling for potential confounders age, sex, race, body mass index, income category, physical inactivity, total cholesterol, and serum cotinine levels. Preliminary results indicate a significant positive association between urinary molybdenum and serum uric acid levels in multivariable-adjusted linear regression analyses. Compared to participants in quartile 1 of urinary molybdenum (referent category, molybdenum level <24.3 Î¼g/L), the mean change (95% CI) of uric acid was 0.15 mg/dL (0.03-0.26) in quartile 2 (molybdenum level 24.3-45.4 Î¼g/L); p-trend=0.017. Logistic regression analyses revealed that participants in quartile 2 of molybdenum exposure experienced significant, positive associations with hyperuricemia across models. In the most conservative model, those in quartile 2 experienced an OR for hyperuricemia of 1.57 (1.16-2.14) compared to those in the quartile 1, the reference category. Results suggest that a significant, positive association between urinary molybdenum and serum uric acid may persist, even at the baseline levels of molybdenum experienced by the general United States population.

067

ENVIRONMENTAL QUALITY INDEX AND CHILDHOOD MENTAL HEALTH. Shannon C Grabich* (UNC-Chapel Hill)

Childhood mental disorders affect between 13%-20% of children in the United States (US) annually and impact the child, family, and community. Literature suggests associations exist between environmental and childrenâ€™s mental health such as air pollution with autism and ADHD and sociodemographic status and depression. To better understand the relationship between cumulative environmental health and childhood mental disorders we estimated associations between environmental quality and county-level prevalence of childhood mental disorders. Environmental exposure was defined using a novel county-level environmental quality index (EQI), which was developed for all US counties from 2000-2005 representing five environmental domains: air, water, land, built, and sociodemographic. We linked the EQI to childhood (age 5-15) mental disability (having difficulty learning, remembering, or concentrating) from the 2005 American Community Survey (ACS) for 649 metropolitan US counties. Linear regression models estimated mental disability prevalence differences (PD [95% CI]) for increases in EQI quintiles, stratified by male and female. We found an unexpected negative relationship comparing the lowest and highest quintiles of environmental quality and mental disorder prevalence: as environmental quality worsened, mental disability prevalence decreased (cumulative EQI PD = (-1.43% [-2.25%, -0.63%]). This was consistent across all five domains. There were differences between sex (cumulative EQI: male (-2.18% [-3.38%, -0.98%]); female (-0.59% [-1.35%, 0.17%]). Counterintuitive results could be related to ACS definition of mental disability, self-report biases, and only using a subset (20%) of US counties. Next steps include examining grouped psychiatric conditions from insurance claims data for all US counties. This abstract does not necessarily reflect EPA policy.

068

URINARY PHENOL AND PARABEN CONCENTRATIONS IN RELATION TO ANTIOXIDANT ENZYMES AND OXIDATIVE STRESS BIOMARKERS IN WOMEN. Anna Z. Pollack*, Sunni L. Mumford, Neil J. Perkins, Jean Wactawski-Wende, Kurunthachalam Kannan, Enrique F. Schisterman (Global and Community Health Department, College of Health and Human Services, George Mason University)

Exposure to phenols and parabens comes from a variety of personal care products and is nearly ubiquitous. Laboratory evidence points to possible health effects via oxidative stress pathways, but little human evidence is available. This study aimed to estimate the association between urinary phenols (bisphenol a (BPA), benzophenone-3 (BP-3), 2,4-dichlorophenol (24-DCP), 2,5-dichlorophenol (25-DCP), 2,4,5-trichlorophenol (245-TCP), 2,4,6-trichlorophenol (246-TCP), triclosan (TCS)) and parabens (benzyl, butyl, ethyl, heptyl, methyl, propyl) with markers of oxidative stress (f28-isoprostanes, 9-hydroxyoctadecadieneoic acid (9-HODE), and 13-hydroxyoctadecadieneoic acid (13-HODE)) and antioxidant enzymes (glutathione peroxidase (GPx) and glutathione reductase (GSHR)). Linear mixed models were used to account for dependence within individuals due to repeated measures and to determine the relationship between natural-log transformed exposure and outcome concentrations (n=143 subjects, 509 measurements). Models were adjusted for age, body mass index, race (white, black, other), and urinary creatinine. Biomarkers of oxidative stress were not associated with phenol and paraben levels. 246-TCP was associated with increased GSHR (beta=0.032 [95% CI 0.006, 0.059]) and methyl paraben was marginally associated with GSHR (0.021 [95% CI -0.001, 0.043]). 245-TCP and 246-TCP were associated with increased GPx (0.018 [95% CI 0.002, 0.034] and 0.014 [0.001, 0.028]). Butyl and ethyl paraben were associated with increased GPx (0.006 [95% CI 0.001, 0.011] and 0.007 [0.001, 0.013]). Methyl and propyl paraben were marginally associated with increased GPx (0.011 [95% CI -0.001, 0.022) and 0.008 95% CI -0.001, 0.017]). While phenols and parabens were not associated with biomarkers of oxidative stress, our findings suggest that phenols and parabens may be related to antioxidant enzyme levels, particularly GPx. Further research is needed.

069-S/P

AUTISM SPECTRUM DISORDER PREVALENCE AND ASSOCIATIONS WITH AMBIENT AIR CONCENTRATIONS OF LEAD, MERCURY, AND ARSENIC. Aisha S. Dickerson*, Mohammad H. Rahbar, Amanda V. Bakian, Deborah A. Bilder, Russell Kirby, Rebecca A. Harrington, Sydney Pettygrove, Maureen Durkin, Martha Slay Wingate, Lin Hui Tian, Walter M. Zahorodny, Inkyu Han, Lemuel A. Moyé, III , Deborah A. Pearson, Jon Baio (University of Texas Health Science Center at Houston, Houston, TX USA)

Lead, mercury, and arsenic are neurotoxicants with known effects on neurodevelopment. Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder apparent by early childhood. Although the etiology of ASD is not well understood, it may be triggered by environmental exposures. Using data on 4,486 children with ASD residing in 2,489 census tracts in five sites of the Centers for Disease Control and Prevention's Autism and Developmental Disabilities Monitoring Network, we investigated if air concentrations of lead, mercury, and arsenic, as estimated by the US Environmental Protection Agency National-Scale Air Toxics Assessment, were associated with tract-level prevalence of ASD. Additive and interactive effects of the aforementioned metals were investigated using multi-level negative binomial models. After adjusting for potential confounding factors, tracts with air concentrations of lead in the highest quartile had significantly higher ASD prevalence than tracts with lead concentrations in the lowest quartile [relative risk (RR) 1.36, 95% confidence interval (CI) 1.18, 1.57]. Although unadjusted analysis of air mercury concentrations was inversely associated with ASD prevalence, direction of effects changed after adjustment for race and socioeconomic factors. Evaluation of interactive effects of metal concentrations showed that tracts with high mercury (> 0.0017µg/m3) and low arsenic concentrations (≤ 0.000019µg/m3) had a significantly higher ASD prevalence (adjusted RR 1.20, 95% CI 1.03, 1.40) compared to tracts with arsenic, lead, and mercury concentrations below the 75th percentile. Our results are suggestive of the association between ambient lead concentrations and ASD prevalence in both univariable and multivariable results. Additionally, we demonstrate that exposure to multiple metals may have a synergistic effect in ASD prevalence, although our findings have several limitations.

070-S/P

EXPLORING COOKSTOVE USE AND PERCEPTIONS IN WESTERN HONDURAS. Bonnie N. Young*, Sarah Rajkumar, Megan Graham, Maggie L. Clark, Jennifer L. Peel (Department of Environmental and Radiological Health Sciences, Colorado State University)

Traditional, biomass-burning stoves are integral in rural Honduran homes to cook, heat, and generate light. Household air pollution resulting from biomass combustion is estimated to be the third leading cause of morbidity and mortality worldwide. Cleaner-burning stoves have the potential to reduce these exposures, but previous stove interventions have been plagued by low adoption and sustained use. We conducted semi-structured household surveys to evaluate stove use and perceptions among women in 12 agricultural communities near La Esperanza, IntibucÃ¡. Our sample included 336 women with traditional stoves and 173 women with cleaner-burning stoves (e.g., an adobe stove with a combustion chamber, metal griddle, and chimney; mean stove age of 29 months [standard deviation=21]). No differences were observed between cleaner-burning and traditional stove users based on age, education, or employment. Women with a cleaner-burning primary stove were more likely to have a second stove compared to women with a traditional primary stove (38% and 14%, respectively). The multi-stove users preferred cleaner-burning stoves for less smoke, cleanliness, less wood, smaller sized wood, maintenance, and safety. Stove type preferences were much less pronounced for cooking time, light, heat, and cooking larger meals. Corn, a major staple in this population, was the only food item for which the traditional stove was preferred. We observed suggestive evidence that cleaner-burning stoves were in better condition among households that paid for part of its construction compared to households that did not. Common complaints of the cleaner-burning stoves included malfunctioning parts that likely led to increased pollution. These results highlight the need to consider unique physical and social contexts surrounding stove use. Without addressing the ongoing behavioral processes of sustained adoption, the full benefits of stove dissemination programs cannot be realized or estimated.

071-S/P

THE ASSOCIATION BETWEEN AMBIENT STYRENE EXPOSURE AND ADHD DIAGNOSIS IN A COHORT OF NATIONALLY REPRESENTATIVE CHILDREN. Jeanette A Stingone*, Luz Claudio (Department of Preventive Medicine, Icahn School of Medicine at Mount Sinai)

Exposure to styrene, a volatile organic compound has been associated with autism, however other neurodevelopmental and behavioral effects have not been well studied. The objective of this research was to determine if exposure to ambient styrene is associated with attention-deficit/hyperactivity disorder (ADHD) diagnosis by kindergarten entry. Residential ZIP Code at 9 months of age was used to link spatial estimates of ambient styrene from the 2002 National Air Toxics Assessments (NATA) to parent interview data from the Early Child Longitudinal Study, Birth Cohort (ECLS-B), a of nationally-representative sample of children born in 2001 and followed from 9 months through kindergarten entry. As NATA provides census-tract based pollutant estimates, we constructed weighted styrene exposure estimates for each child's ZIP Code of residence, using the percentage of the ZIP Codes' residential buildings within each census tract from the 2000 U.S. Department of Housing and Urban Development Crosswalk files. Ambient styrene concentrations were categorized as less than the 25th centile, 25th-50th, 50th-75th, 75th-90th, and greater than or equal to the 90th centile due to skewness in the data. We constructed modified Poisson regression models for approximately 6900 children with complete data and adjusted for child's race, maternal age, household language, maternal marital status and a composite socioeconomic status variable, which included parental education, occupation and household income. Comparing to children with exposure less than the 25th centile, children with exposure in the 75th-90th centile had 1.69 times the risk of having ADHD diagnosis (RR 1.69 95%CI 1.02, 2.90). Considerably elevated/reduced risk ratios were not observed at other exposure levels (RR, 95%CI: 25th-50th 1.16 0.72,1.89; 50th-75th 1.18 0.74,1.89; 90th+ 0.83 0.38,1.79). Potentially neurotoxic air pollutants such as styrene may contribute to neurobehavioral outcomes in children.

072-S/P

PERFLUOROALKYL SUBSTANCE (PFAS) SERUM BIOMARKERS IN A COASTAL SOUTH CAROLINA GULLAH AFRICAN AMERICAN SAMPLE: INDIVIDUAL AND POPULATION-LEVEL TRAJECTORIES OVER 2003-2013. Matthew O. Gribble*, Scott M. Bartell, Kurunthachalam Kannan, Qian Wu, Patricia A. Fair, Diane L. Kamen (Department of Preventive Medicine, University of Southern California)

Perfluoroalkyl substances (PFAS) are exposures of interest in environmental health. Although toxicities are compound-specific and currently being researched, the C8 Science Panel studies found probable links between perfluorooctanoic acid (PFOA) and high cholesterol, ulcerative colitis, thyroid disease, testicular cancer, kidney cancer, and pregnancy-induced hypertension. Since these exposures are of public health interest, patterns of exposure to perfluoroalkyl substances including PFOA are epidemiologically relevant. Longitudinal data on the same individuals over time for these chemicals are limited. In this study, we examined individual and population -level longitudinal trends in serum PFAS biomarkers measured by high performance liquid chromatography-tandem mass spectrometry among a sample of Gullah African-American participants from a community-engaged lupus study in Charleston, South Carolina over 2003-2013. As the relationship between PFAS and lupus is unclear, we restricted to non-cases (N=71). The study was approved by the Medical University of South Carolina Institutional Review Board for Human Subjects Research and all participants provided informed consent. Individual visit-to-visit differences were summarized by change scores, while population-average trajectories were modeled using proportionate percentile regression with cluster robust standard errors for clustering within individuals, and linear mixed models. Individualsâ€™ change scores suggested a decline for many but not all PFAS over time; there was a median decrease of -2.2 ng/g wet weight across visits in PFOA. In the proportionate percentile models, PFOA declined by 5 (95% confidence interval: 4, 7)% each year. In linear mixed models, there was an interaction between participant age and calendar year for several congeners including PFOA, possibly suggesting slower elimination with higher age. Additional research on the possibly changing routes of exposure to PFAS, including PFOA, is needed.

073-S/P

MENTAL WELL-BEING OF ADULTS RESIDING NEAR COAL ASH STORAGE FACILITY. Clara G. Sears*, Guy Brock, Kristina M. Zierold (University of Louisville School of Public Health and Information Sciences)

Background: Respirable particles of coal ash, a by-product of energy generation, contain heavy metals and radioactive elements that are stored in landfills and holding ponds. These open-air storage structures are loosely regulated, occupy a vast area of green space, and allow fugitive dust and odors to invade surrounding low-income communities. Similar environmental factors have been associated with an increased risk of common mental disorders, including anxiety and depression. This study compares the mental and emotional well-being of adults residing near a coal ash storage facility with similar adults not residing near coal ash. **Methods:** From 2013 to 2014, a cross-sectional survey about adult's health and behaviors was conducted in a community residing adjacent to a coal ash storage facility and in a community located approximately 60-miles from a coal ash facility. Descriptive statistics and a cumulative logit model were used to compare the prevalence of self-reported mental health conditions and overall quality of health in the two populations. **Results:** Adults exposed to coal ash reported feeling down ($p=0.01$), experiencing mood swings ($p=0.04$), and fatigue ($p<0.0001$) significantly more often than non-exposed adults in the comparison community. Adults exposed to coal ash perceived their health as worse than other same-aged persons significantly more than adults in the comparison community ($p<0.0001$). When controlling for age, adults exposed to coal ash were 2.6 times (95% CI= (1.8, 3.8)) more likely to perceive their health as poorer than non-exposed adults. **Conclusions:** In this study, adults residing adjacent to a coal ash facility had a poorer perception of their health and experienced adverse mental health symptoms more frequently than non-exposed adults. The impact of living adjacent to these environmental hazards, which exist in 41 states throughout the USA, on mental well-being and quality of life needs to be better evaluated.

074-S/P

SLEEP DISRUPTIVE BEHAVIORS REPORTED IN CHILDREN RESIDING NEAR A COAL ASH STORAGE FACILITY. Clara G. Sears*, Kristina M. Zierold (University of Louisville School of Public Health and Information Sciences)

Background: Coal ash, a by-product generated from burning coal for electricity, contains respirable particles of metals, radioactive elements, and polycyclic-aromatic hydrocarbons. Coal ash is stored in open-air impoundments that allow fugitive dust to be suspended into the ambient air and escape into surrounding communities. Children who are chronically exposed to the neurotoxic heavy metals in coal ash particles are at an increased risk for systemic inflammation and neurological disorders. The aim of this study is to compare sleep disruptive behaviors in children exposed to coal ash with non-exposed children. **Methods**: In 2013, a cross-sectional survey about childrenâ€™s health (age 4-17 years) and sleep was conducted in a community living adjacent to a coal ash storage facility and in a non-exposed community. Descriptive statistics and logistic regression were used to compare the prevalence of sleep disruptive behaviors in the two populations. **Results:** Delay in sleep onset ($p= 0.007$), frequent night awakenings ($p <0.001$), teeth grinding ($p= 0.03$), lip smacking ($p= 0.006$), and complaint of leg cramps while resting ($p< 0.001$) were significantly greater in the exposed children compared to the non-exposed children. When controlling for health conditions and bedtime activities, children exposed to coal ash were six times more likely to have frequent night awakenings, compared to non-exposed children. **Conclusions:** In this study, children residing near a coal ash storage facility were more likely to experience sleep disruptive behaviors. The storage of coal ash is a current policy issue and environmental concern; more research is needed to understand the effect of coal ash on the health of the public.

075-S/P

PROXIMITY TO TRAFFIC AND EXPOSURE TO POLYCYCLIC AROMATIC HYDROCARBONS AND NEURODEVELOPMENTAL OUTCOMES IN CHILDREN. Stephani Kim*, Ann Vuong, Kim Dietrich, Aimin Chen (University of Cincinnati)

Exposure to traffic related air pollution (TRAP) and its component polycyclic aromatic hydrocarbons (PAHs) may be neurotoxic in children. There is limited research on postnatal exposure to TRAP and PAHs and child neurodevelopment. We linked data from the National Health and Nutrition Examination Survey 2001-2004 with National Highway Planning Network 2005 to examine the associations among proximity to major roads, urinary PAH metabolites, and the diagnosis of attention deficit hyperactivity disorder (ADHD) and conduct disorder (CD) based on Diagnostic Interview Schedule for Children (C-DISC) in 1253 children 8–15 years of age. We calculated ORs and 95% CIs for ADHD and CD by traffic proximity and PAH exposures with adjustment for survey years, age group, sex, race, maternal age at birth, household reference education level, poverty income ratio, maternal smoking during pregnancy, current serum cotinine, current blood lead level, and US born status after considering complex sampling strategies. A higher ADHD prevalence was observed among children who lived <500 m (9.86%) compared to those who lived ≥500 m (3.84%) from a major road. Prevalence of children with CD was comparable between groups (2.51% and 2.43%). We found little difference in urinary PAH metabolite levels between children who lived near major roads and those who did not. Children who lived less than 500 m from a major road had higher odds of ADHD (OR=1.97, 95% CI 0.85-5.03), although this was not statistically significant. For ADHD, children who resided within 500 m of a major road had an OR of 1.97 (0.83-4.65) and those who resided within 500 m of 2 or more major roads had an OR of 2.27 (0.71-7.26), but they were not statistically significant. There was no association between proximity to major roads and the diagnosis of CD. In summary, we found that living close to a major road was not associated with increased PAH levels, but was associated with a statistically non-significant higher risk of ADHD.

076-S/P

SHORT-TERM EXPOSURE TO AIR POLLUTION AND BIOMARKERS OF OXIDATIVE STRESS: THE FRAMINGHAM HEART STUDY. Wenyuan Li*, Elissa H. Wilker, Kirsten S. Doran-Mary B. Rice, Joel Schwartz, Brent Coull, Petros Koutrakis, Ramachandran S. Vasan, Emelia J. Benjamin, Murray A. Mittleman (Department of Epidemiology, Harvard T.H. Chan School of Public Health, Boston MA)

Rationale: Air pollution is hypothesized to increase systemic oxidative stress, however there are few community-based studies of this association. Accordingly, we studied the association of ambient air pollution with biomarkers of systemic oxidative stress in the Framingham Offspring Study. **Methods:** Among non-smoking participants living within 50 km of the Harvard Boston Supersite, we assessed biomarkers of oxidative stress including myeloperoxidase (MPO) at examination cycle 7 (1998-2001), and urinary creatinine-indexed 8-isoprostane (8-IsoP) at cycles 7 and 8 (2005-2007). We measured fine particulate matter (PM2.5), black carbon, sulfate, particle number, nitrogen oxides, and ozone, and calculated the 1-, 2-, 3-, 5-, and 7-day moving averages prior to the Heart Study examination date. Measured blood MPO and urine 8-IsoP were loge transformed. We used linear regression models for MPO, and linear mixed models with random intercepts for 8-IsoP. Models were adjusted for age, sex, individual and area level measures of socio-economic position, tobacco use, alcohol intake, body mass index, exam date, day of week, season, temperature, and relative humidity. **Results:** Of the 2,005 participants, the mean age was 62 years (standard deviation 9.5), and 47% were men. Every 2 μg/m3 increase in 3-day average PM2.5 and sulfate was associated with 3.82% (95% CI: 0.64-7.10) and 5.07% (95% CI: 1.95-8.30) higher 8-IsoP, and with 4.31% (95% CI: 0.17-8.63) and 7.39% (95% CI: 2.97-12.00) higher 8-IsoP for the 7-day averages. No consistent associations were observed for other pollutants. A stronger positive association of pollutants with MPO was consistently observed among diabetic participants than nondiabetics. Associations otherwise did not vary by age, sex, season, antihypertensive, or statins use. **Conclusion:** Our findings supported the hypothesis that short-term exposure to ambient air pollution is associated with higher oxidative stress, particularly among participants with diabetes.

080

ASSOCIATION BETWEEN ADVERSE CHILDHOOD EXPERIENCES AND COGNITIVE IMPAIRMENT LATER IN LIFE Masra Shameem*, Sean Clouston (Program in Public Health, Stony Brook University)

Background: Studies of veterans and holocaust survivors consistently find an association between experiences of trauma and rapidity of cognitive aging. However, to date no studies have examined the effects of adverse childhood experiences (ACE), an indicator of trauma before age 18, on cognitive functioning later in life. **Methods:** Data come from the 2011 Behavioral Risk Factor Surveillance System (BRFSS) survey (N=2,758). Cognitive functioning was assessed using self-reported indicators of poor memory, confusion and memory loss, and of cognitive limitations. ACE were measured using the standard ACE self-report questionnaire, which examines exposure to violence or household dysfunction before age 18. ACE subscales for violence and household dysfunction were further used to identify specific types of trauma linked to cognitive impairment. Multivariate logistic regressions were used to examine the association between ACE and cognitive impairment severity. Analyses were also stratified by sex to examine the influence of sex on the association between ACE and cognitive impairment. **Results:** We found that moderate and severe ACE was associated with increased severity of cognitive impairment (OR=1.55; 95% CI= 1.08-2.03; p=0.006 and 3.97; 95% CI= 2.31-6.83; p<0.001, respectively). Among those with poor self-reported memory, moderate and severe ACE was also associated with indicators of severity of cognitive impairment. Notably, violence during childhood was associated with increased severity of cognitive impairment (OR=1.97; 95% CI= 1.52-2.54; p< 0.001). In sex-stratified analyses, ACE severity was only predictive of CI severity among females (OR=1.74; 95% CI= 1.52-2.54; p< 0.01 and 4.99; 95% CI= 2.60-9.58; p<0.001, respectively). **Conclusion:** This study broadens existing research among Holocaust victims and combat veterans showing that trauma may be a determinant of cognitive impairment in the general population.

081

DISPARITIES IN ROUTINE CERVICAL LENGTH SCREENING WITH TRANSVAGINAL ULTRASOUND, Miriam Haviland* (Beth Israel Deaconess Medical Center)

Background: Cervical length screening during pregnancy has been shown to be effective at identifying women at high risk of spontaneous preterm birth. In 2012 our institution began routine screening with transvaginal ultrasound for all pregnant women. **Objective:** To determine if race or ethnicity is associated with the risk of 1) missed transvaginal cervical length screening or 2) a composite outcome of missed or late screening. **Study Design:** This was a retrospective cohort study of nulliparous women with singleton gestations and a fetal anatomy ultrasound from 16-24 weeks' gestation at our institution from January, 2012 to November, 2013. We calculated the risk ratio (RR) and 95% confidence interval (CI) for missed cervical length screening and a composite outcome of missed or late screening at ≥20 weeks' gestation, with log-binomial regression. **Results:** There were 2967 women who had a fetal anatomy ultrasound. Their mean (SD) age was 31.7 (5.4) years; 1256 (42.3%) were white, 600 (20.2%) were Asian, 485 (16.4%) were black, 191 (6.4%) were Hispanic and 435 (14.7%) were other/unknown race or ethnicity. Among these women, 779 (26.3%) did not receive cervical length screening and an additional 192 (6.5%) received late screening. Unadjusted analysis suggested that black (RR: 1.1; 95% CI: 0.92-1.3) and Hispanic (RR: 1.2; 95% CI: 0.94-1.5) women were more likely to miss screening than white women, while the RR was 1.0 (0.86-1.2) for Asian women. Similarly, black (RR: 1.3; 95% CI: 1.1-1.5) and Hispanic (RR: 1.2; 95% CI: 1.01-1.5) women were more likely to miss screening or be screened late than white women, while the RR was 1.0 (0.89 -1.2) for Asian women. Adjusting for maternal age and insurance status did not attenuate these associations. **Conclusions:** Our findings suggest that black and Hispanic women may be more likely to have missed opportunities for cervical length screening or be screened later in gestation, allowing less time for intervention.

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SOCIAL SECURITY DISABILITY INSURANCE ENROLLMENT AND ACCESS TO PRESCRIPTION MEDICATION AMONG DISABLED WORKING-AGE ADULTS IN THE 1998-2005 NATIONAL HEALTH INTERVIEW SURVEY-SOCIAL SECURITY ADMINISTRATION LINKED DATA. Patricia Lloyd*, Cordell, Golden, Deborah Ingram, Jennifer Parker, Julie Weeks (National Center for Health Statistics/Centers for Disease Control and Prevention)

Reduced access to prescription drugs among disabled adults may be associated with preventable health conditions. The Social Security Disability Insurance (SSDI) program provides income and delayed Medicare enrolment to workers under age 65 years who can no longer work due to a disability. We examine potential associations of SSDI enrollment and reported health insurance (HI) coverage on access to prescription drugs for SSDI-eligible disabled working-age adults. Using the 1998-2005 National Health Interview Survey (NHIS)-Social Security Administration (SSA) linked file, we examined adults with NHIS-reported complex activity limitation, eligible for SSDI benefits based on SSA records (N=5,104). Reduced access to prescription drugs was based on NHIS report of not getting needed prescription drugs due to cost in the prior 12 months. As SSDI enrollment based on SSA data directly affects HI coverage, we defined a composite variable (no SSDI/no HI; no SSDI/HI; SSDI/no HI; SSDI/HI). Logistic regression was used to estimate differential access to prescription drugs for these groups, controlling for age, sex, race/ethnicity, marital status, education, region, poverty level, and health status. Of SSDI-eligible disabled working-age adults, 43% were SSDI-enrolled and 25% had reduced access to prescription drugs; 13% were in the no SSDI/no HI, 44% were in the no SSDI/HI, 4% were in the SSDI/no HI, and 40% were in SSDI/HI categories. Compared to those with both SSDI and HI, we found elevated odds of reduced access to prescription drugs among those without HI: no SSDI/no HI (OR=4.50, 95%CI: 3.63, 5.58) and SSDI/no HI (OR=3.66, 95%CI: 2.67, 5.03). Among those with HI, there was no difference by SSDI status. Among disabled working-age adults, not getting needed prescription drugs due to cost was associated with HI but not SSDI-enrollment. Linking SSA and survey data can increase our understanding of possible associations between disability programs and health.

083

EFFECTS OF PERCEIVED DISCRIMINATION AND LENGTH OF RESIDENCY ON THE HEALTH OF FOREIGN-BORN POPULATIONS. Shauna K. Carlisle*, Andrea Stone (University of Washington Bothell)

This study explores the relationship between chronic conditions, perceived discrimination, and length of residency among three racial groups of foreign-born respondents in the CPES merged data from the National Latino and Asian American Study (NLAAS) and the National Survey of American Life (NSAL). Using a stratified probability sampling design, the NLAAS and NSAL included a representative sample of Latino Americans, Asian Americans and Caribbean Americans. Analysis used weighted data that adjusted for demographic variables in the multi-stage stratification sampling, non-response rates, and post-stratification factors. The analysis also takes into account sample design effects using SAS callable SUDAAN. Afro-Caribbean subgroups were more likely than Asian and Latino American subgroups to report perceived discrimination. Logistic regression analysis revealed significant differences between Asian, Latino, and Afro-Caribbean immigrants in reports of cardiovascular and respiratory conditions (p<.001). Odds ratios revealed for cardio and pain conditions, only those who have lived in the United States for 20 years or more were at greater risk of cardiovascular (OR=3.62) and pain (OR=1.74) conditions. For respiratory conditions, there is greater risk with increased length of residency at all three lengths of residency periods (OR=2.05; OR=1.86; OR=2.84, respectively), indicating that immigrantsâ€™ risk for respiratory conditions continues to increase the longer they live in the United States. Models examining the relationship between perceived discrimination and chronic conditions, revealed no significant findings. Marginal findings suggested that experiencing a moderate dose of perceived discrimination may be associated with an increased odds of cardiovascular conditions (OR=1.43, 95% CI [1:00-2:05], p=.0504) and a decreased odds of experiencing respiratory conditions by about 30% (p=0.0731).

084-S/P

FEMALE DISADVANTAGE IN VERY YOUNG IMMIGRANT CHILDREN'S HEALTH CARE USE: A SYSTEMATIC REVIEW. Ariel Pulver*, Marcelo Urquia, Chantel Ramraj (University of Toronto)

Background: Son-preferences in some world regions culminate in higher mortality, inadequate immunization, and less frequent health care use for girls compared to boys of the same age. Higher male to female birth ratios among immigrant groups to high-income countries, from such regions including India, Pakistan, and China, imply that gender biases persist after immigration and affect parenting decisions. It is unknown if parent-held gender biases continue into infancy and early childhood, and influence health care decision-making for their children. **Objective:** To review the literature regarding gender disparities in health care use among immigrant children age 0 to 5 years. Methods: A systematic review using Medline, Embase, PsycINFO and Scopus databases identified studies reporting gender-specific estimates of immigrant children's health care use. A total of 1547 titles were retrieved, 103 were given full-text reviews, and 12 met inclusion/exclusion criteria. Data extraction was duplicated and a quality assessment tool was applied to included studies. **Results:** Studies employed cross-sectional or registry-based designs. Overall, greater use of acute health services and some routine care including immunizations and medications was observed for immigrant boys. No consistent gender differences were found for primary care use. Select US studies demonstrated higher health care use from physician exams and health expenditures among immigrant females than immigrant males. The absence of gender-based analysis, and other methodological concerns in immigrant children's health research, including the neglect of acculturation factors, were noted. **Discussion:** Patterns indicate that health care use among young immigrant children may be gendered, however studies are severely lacking. Gender-based analysis may be useful for studying immigrant children's health care. Studies are important to health care providers identify families who may have children with unmet health care needs.

085-S/P

WHY WE SHOULD STILL WORRY ABOUT TUBERCULOSIS IN THE U.S.: EVIDENCE OF HEALTH DISPARITIES IN TB INCIDENCE IN MICHIGAN, 2004-2012. Grace A. Noppert*, Mark L. Wilson, Wen Ye, Peter Davidson, Xiao Qing Wang, Philippa Clarke, Zhenhua Yang (University of Michigan)

Background: The incidence of Tuberculosis in Michigan during 2012 was 1.5 per 100,000 people, roughly half that of the U.S. Despite successes in TB control, disparities still exist in Michigan, particularly by race, age, and foreign-born status. A major challenge in understanding patterns of disease burden disparity is determining recent transmission vs. reactivation of latent infection, information critical to tailoring control strategies. **Methods:** We used genotyping data of Mycobacterium tuberculosis isolates collected by the Michigan Department of Community Health, combined with routine surveillance data, to establish clustered and non-clustered cases of TB. Clustered cases were defined as those sharing a genotype with at least one other case in the population, and diagnosed within one year of that case. Clustered cases were considered a proxy for recent infections, with non-clustered cases considered as reactivation of latent infection. Univariate and multivariate Poisson regression models were used to examine temporal trends in TB incidence among both clustered and non-clustered TB cases during 2004-2012. Trends by race, sex, age, and foreign-born status were also examined. **Results:** During the nine-year period, annual incidence declined an average of 8.7% per year for clustered cases and 6.6% for non-clustered cases. Race was the most significant predictor of incidence among clustered cases, with foreign-born status best predicting non-clustered. For both clustered and non-clustered cases, blacks had significantly higher incidence than whites, even after accounting for foreign-born status, sex, and age. This racial disparity was greater than that for the U.S. as a whole. **Discussion:** While Michigan is considered a low burden state for TB, stark disparities exist along lines of race, sex, age, and foreign-born status for clustered and non-clustered cases. These patterns suggest variation among subpopulations that may require specialized approaches to TB control.

086-S/P

UNRAVELING THE "HISPANIC PARADOX": DISPARITIES IN DELIVERY CHARACTERISTICS AND BIRTH OUTCOMES BY HISPANIC ETHNIC SUBGROUPS. Katheryne Downes* (University of Maryland- College Park)

The "Hispanic Paradox" has been well-documented, but recent studies have noted variation by ethnic subgroups and nativity. The purpose of this study was to compare delivery characteristics and birth outcomes among Mexican, Puerto Rican and Cuban ethnic subgroups, in contrast to non-Hispanic white women. The 2013 national vital statistics were used to examine cesarean delivery (CD) and induction/augmentation of labor, low birth weight, preterm birth, prolonged ventilation, neonatal intensive care unit (NICU) admission and use of surfactants among the specified groups. Group comparisons were performed with chi-square tests. A total of 2,752,742 births were available within the specified groups: Mexican (19.8%), Puerto Rican (2.5%), Cuban (0.7%), and non-Hispanic white (77.1%). Compared to white women, CD was significantly higher among Cuban (32.0% vs 48.2%, $p<0.001$) and Puerto Rican women (32.0% vs 34.2%, $p<0.001$), but significantly lower among Mexican women (32.0% vs 30.9%, $p<0.001$). When stratified by nativity, the pattern of CD was similar but more pronounced among foreign-born women. Compared to white women, low birthweight was significantly higher among Puerto Rican women (4.7% vs 7.2%, $p<0.001$) and preterm birth was significantly higher among both Puerto Rican women (10.2% vs 13.0%, $p<0.001$) and Cuban women (10.2% vs. 14.2%, $p<0.001$). In contrast, Mexican women had incidence of both low birthweight (4.8%) and preterm birth (10.8%) that was comparable to white women. The pattern of group differences remained after stratifying by nativity, but foreign-born women of all Hispanic ethnic subgroups tend to have more favorable birth outcomes compared to women in the same subgroups that are born within the U.S. The "Hispanic Paradox" is not a uniform phenomenon. Women who identify as Puerto Rican or Cuban may represent a higher risk subgroup; additional studies are needed to more fully understand the nature of these differences and the underlying mechanisms.

087-S/P

THE ROLE OF RACISM RELATED VIGILANCE AND OPTIMISM IN BLACK-WHITE DIFFERENCES IN INFLAMMATION. Kristen M Brown*, Margaret Hicken, Hedwig Lee (Department of Epidemiology, University of Michigan)

Background: Chronic inflammation has emerged as an important risk factor for eight of the top ten leading causes of death in the United States. Racial disparities exist in seven of these eight diseases as well as chronic inflammation. Exposure to racially patterned psychosocial stressors may be an important mechanism through which race associates with health. One such stressor is racism-related vigilance, the anticipation and preparation for racial discrimination. In this study, we investigate the association between racism-related vigilance and C-reactive protein (CRP), a marker of inflammation. Further, we examine the influence of optimism, a personality trait that has been shown to positively influence health, on the vigilance-CRP relationship. **Methods:** We used a sample of 505 adults from the Chicago Community Adult Health Study in our analyses. Bivariate analyses were used to examine racial differences in vigilance, optimism, CRP levels, and potential confounders. Race stratified multivariable linear regression models adjusted for age, sex, education, and marital status were conducted to assess the relationships between vigilance, optimism, and CRP. **Results:** Compared to Whites, Blacks had higher levels of both racism-related vigilance and CRP. In Blacks, racism-related vigilance was marginally, positively associated with CRP while there was no association in Whites. There was no difference in optimism scores between races. However, in Blacks, but not in Whites, optimism was inversely associated with CRP. Further, we found that optimism attenuated the relationship between vigilance and CRP levels in Blacks **Conclusion:** These findings suggest that racism-related vigilance is an important stressor that adversely influences health in Blacks. However, its effect may be attenuated by optimism. Future studies should work towards further identifying both racially patterned stressors and potential buffers as an approach to reducing racial disparities in health.

088

DOES THE SMOKING BEHAVIOR OF IMMIGRANTS CONVERGE TO THE NATIVE-BORN AUSTRALIANS? EVIDENCE FROM THE LONGITUDINAL HILDA SURVEY. Suresh Joshi*, Santosh Jatrana (Deakin University, Australia)

Tobacco smoking is a significant modifiable risk factors for the overall health status and chronic health conditions such as cardiovascular diseases and cancers. Adoption of smoking behavior due to the acculturation in the host country is one of the mechanism through which immigrants health declines over time. Most of the prior research from the developed countries have shown that immigrants initially have lower rates of smoking but as they stay longer in the host countries their smoking behavior changes and ultimately converges to the level of native-born population. Though these earlier cross-sectional studies are useful, the results obtained from them are more likely to be biased because they are potentially confounded by time and cohort effects. Using twelve waves of longitudinal data from the Household, Income and Labour Dynamics in Australia (HILDA) survey and multilevel hybrid (mixed) logistic regression model, this study investigates the differences and changes in the smoking behavior of immigrants from English speaking and non-English speaking countries compared to native-born Australians over time. The uniqueness of this regression model is that it has the good features of both the fixed effects and random effects models. Moreover this model produces more efficient and less biased estimates than the conventional mixed effects models. After adjusting the possible confounders, this study found that immigrants from non-English speaking countries had lower prevalence of smoking compared to the native-born Australians. However, as they stay longer for more than 20 years in Australia, their smoking behavior converges towards the native-born people. Immigrants from English speaking countries had similar prevalence of smoking compared to native-born, irrespective to their duration of residence. Community-based smoking cessation programmes and mass media campaigns needs to be intensified for all Australians including immigrants from non-English speaking background.

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HEPATITIS B VIRUS (HBV) AND HBV/HIV CO-INFECTION AMONG REPORTED FEMALE CASES IN SOUTH CAROLINA Afiba Manza-A. Agovi*, Wayne Duffus, Melinda Forthofer, Jihong Liu, Wilfried Karmaus (Norman J. Arnold School of Public Health, University of South Carolina, Columbia, South Carolina)

The aim of this study was to characterize the burden of hepatitis B virus (HBV) and human immunodeficiency virus (HIV) co-infection, demographic characteristics and the order of HBV/HIV virus diagnosis in women in South Carolina (SC). Additionally, for maternal hepatitis B surface antigen positive (HBsAg+) cases, we evaluated the data agreement between surveillance data for HBV and HIV, linked to birth registry data for years 2004 to 2011. A total of 2 245 female cases of HBV (confirmed and probable) were included. Of these, 1 918 (85%) were chronic HBV (cHBV) cases, 325 (15%) were acute HBV (aHBV) cases and 2 were perinatal cases. Chronic HBV/HIV co-infection made up 5% of all cases. HIV was diagnosed first in 74% of cHBV/HIV cases with a median time to HBV diagnosis of 9 years (range, 2-21). Black women represented 78% of all cHBV/HIV cases and heterosexual contact was the most commonly reported mode for HIV transmission (58%). At the time of HIV diagnosis, most cases had HIV viral load counts >100,000 copies/mL and lived in urban areas of the state. Agreement measures for HBsAg+ women reported to surveillance and birth registry records were moderate: Cohen's Kappa = 0.49 (95% CI= 0.44-0.54); percent positive agreement = 49%; percent negative agreement= 99.9%; bias adjusted Kappa=0.49 and prevalence-adjusted and bias-adjusted Kappa =0.99. An increase in efforts to improve screening, reporting and prevention especially among black women is warranted. Also, reports to disease surveillance of infections diagnosed during prenatal screening needs to be improved.

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HIV COMMUNITY VIRAL LOAD AS A PUBLIC HEALTH SURVEILLANCE TOOL: GEOGRAPHIC DISTRIBUTION, OVERLAP WITH BACTERIAL STIS, AND IMPLICATIONS FOR PRACTICE Kathryn M. Leifheit*, Christina Schumacher, Andrea Rowan, Jason Lambden, Amelia Greiner Safi, Ravikiran Muvva, Carolyn Nganga-Good, Rafiq Miazad, Jacky M. Jennings (Johns Hopkins University School of Medicine Center for Child and Community Health Research)

Background: HIV treatment decreases viral transmission by reducing plasma viral load (VL) in infected individuals. Focusing "seek, test, and treat" activities conducted by local health departments on areas with high community viral load (CVL) may then be an effective targeted control strategy to reduce HIV transmission on a population level. To inform targeted control activities, we 1) describe the geographic distribution of community viral load in Baltimore City and 2) determine associations between high CVL and two biologic HIV transmission cofactors- gonorrhea (GC) and early syphilis (ES). **Methods:** We utilized surveillance data from individuals testing positive for HIV (n=549), GC (n=3634) and ES (n=697) from September 2012-July 2014. Census tract (CT)-level CVL and STI rates were calculated for mapping and statistical analyses. Linear regression was used to test the association between log-transformed CVL and GC and separately, ES rates. **Results:** Mean HIV viral load was 20,874 copies/mL (SD 144,799). 76% (152) of CTs had at least one individual with a quantifiable viral load. CT mean VLs ranged from 111-231,157 copies/mL. 53% (106) of CTs had CVLs indicating a high probability of HIV transmission (i.e. CVL>1500 copies/mL), with 6% (11) indicating very high transmission (≥50,000 copies/mL). CVL maps suggest spatial clustering of high viral load. Log-transformed CVL was significantly associated with GC rate (coefficient = 0.066 ln(copies/mL)/GC rate; 95%CI=0.015, 0.118; p=0.012) and non-significantly associated with ES rate (coefficient=0.122 ln(copies/mL)/SE rate; 95%CI= -0.091, 0.335; p=0.261). **Conclusions:** CVL shows a broad geographic distribution with spatial clustering, suggesting areas for targeted control. Contrary to previously published findings of collocated HIV and ES epidemics, we do not find an association between CVL and ES. The observed significant association between CVL and GC warrants further investigation and decomposition by key population.

092-S/P

TRAVELLING LONGER DISTANCES TO A TESTING SITE THAN GEOGRAPHICALLY NECESSARY IS ASSOCIATED WITH DELAYS IN HIV DIAGNOSIS Anna B. Cope*, Kimberly A. Powers, Marc L. Serre, Peter A. Leone, Michael E. Emch, Victoria L. Mobley, William C. Miller (University of North Carolina)

Background: Early diagnosis of HIV contributes to decreased morbidity, mortality and transmission risk. We aimed to describe the association between distance from residence to testing sites and HIV disease stage at diagnosis. **Methods:** We used HIV surveillance data to identify all new HIV diagnoses made at publicly-funded sites in central North Carolina between 2005 and 2013. Road network distance between residence at diagnosis and testing site was dichotomized at 5 miles for the 1) site of diagnosis and 2) closest site. Early stage was defined as acute HIV (antibody-negative test with a positive HIV RNA) or recent HIV (normalized optical density 5 miles from their residence, 1273 (68%) lived ≤5 miles from a different site. Residing >5 miles from one's closest testing site had no association with post-early HIV ([adjusted] aPR=0.97, 95% CI 0.91-1.03). Cases diagnosed >5 miles from their home were more likely to be diagnosed during post-early HIV than those diagnosed ≤5 miles from their home (aPR=1.08, 95% CI 1.02-1.14). Most of the elevated prevalence observed in cases diagnosed >5 miles from their home occurred among those living ≤5 miles from a different site (aPR=1.09, 95% CI 1.03-1.16). **Conclusions:** HIV diagnosis delays were apparent among persons choosing to travel longer distances than geographically necessary to test. Greater understanding of reasons for increased travel distances could improve accessibility and acceptability of HIV services and increase early diagnosis rates.

093-S/P

AIDS MORTALITY IN THE CITY OF PORTO ALEGRE, SOUTH OF BRAZIL: A 5-YEAR-SURVIVAL RATE ANALYSIS. Caroline Beck* (Universidade Federal do Rio Grande do Sul)

Considering the importance of the AIDS epidemics south of the country, specifically in the city of Porto Alegre, it is important to determine the survival of PLHA in a local context, especially between individuals coinfected with tuberculosis. The objective is to determine the 5-year-survival rate and hazard ratio for AIDS mortality. Data were obtained by the linkage of the national Mortality Information System and the National Disease Notification System (SIM and SINAN databases) from 2007, using RecLink Software v 3.1.6. A COX regression model was used for the hazard ratios, and the Kaplan-Meier method to determine the 5-year-survival estimates. The resulting database had 1800 cases notified in 2007. Sixty percent were male, mostly of white race (67%), median age of 37 years old (IQR=14), and most of them had low schooling. Around 70% acquired the vírus through sexual transmission. Over 20% of the cases were diagnosed around the time of their death, and those comprised nearly 70% of the deaths. Individuals notified by the death criteria have proportionally more individuals of the black race, when compared to total cases, (46.1% and 32.5%, respectively) and more males (40% and 27.8%, respectively). Mean survival was 1495 days (95% CI 1449 – 1550). The 5-year survival rate was 64.4%, the letality of the cases was 35.6% (n=641), with 23.9% (n=431) being those diagnosed with HIV/AIDS by the time of their death. In the multivariate model black race, blood transmission of the vírus and low scholarity were factors associated with higher mortality. Survival rates were according to the literature, however showing there's still much to accomplish in order to better address the current AIDS epidemics. The death criteria represents missed opportunities of interventions, especially in preventable events, and might serve as negative indicator of the surveillance.

094-S/P

A MEDIATION ANALYSIS TO INVESTIGATE THE MECHANISM BEHIND SMOKING, HPV ANTIBODIES, AND HPV RE-ACQUISITION Ronald C. Eldridge*, Michael Pawlita, Lauren Wilson, Philip E. Castle, Tim Waterboer, Patti E. Gravitt, Mark Schiffman, Nicolas Wentzensen (Division of Cancer Epidemiology and Genetics, National Cancer Institute, Bethesda, MD)

The link between smoking, human papillomavirus (HPV) infection and cervical neoplasia is complex. Smoking may directly damage cervical cells but can also impair the immune system. In the presence of HPV, both mechanisms may increase the risk of precancer. Mediation analysis can estimate mechanisms by decomposing smoking's total effect into a direct effect (cell damage), and a mediated indirect effect (impaired immune system). Using a two year follow-up study (n=1,978), we sought to estimate how smoking influences HPV re-acquisition. We first posit our causal model: smoking affects a woman's HPV serological antibody response; smoking and HPV antibodies affect HPV re-acquisition directly; sexual behavior can confound the stated effects. Since there are two dichotomous outcomes (antibodies, re-acquisition), two logistic equations define the model – which includes an exposure-mediator interaction term. From these equations, causally-defined natural direct and indirect effects are estimated using Mplus software; bootstrapping provides confidence intervals. For current smokers compared to never, the antibody-mediated indirect effect was weak but significant (OR=1.24, 95% CI: 1.08, 1.60); the direct effect was not (OR=0.66, 95% CI: 0.34, 1.31). Smoking's overall effect was not significant (OR=1.07, 95% CI: 0.71, 1.61), illustrating the differences between overall and mechanistic effects. For comparison to the indirect effect, modeling low antibodies on smoking gave an OR=1.86 (95% CI: 1.43, 2.40), and for HPV re-acquisition on low antibodies gave an OR=1.56 (95% CI: 0.97, 2.50). The data suggests that smoking's main mechanism for HPV re-acquisition is by impairing antibodies. In a larger cohort we will replicate our findings and extend to precancer. In summary, mediation analysis can assess mechanistic research questions, but it depends on the causal model assumptions. Thus, scrutiny of the model will include sensitivity analyses to assess potential unmeasured confounding.

095-S/P

GREATER AGE-DIFFERENTIAL IN HETEROSEXUAL PARTNERSHIPS PREDICTS LOWER HIV-1 INCIDENCE Samuel Jenness* (University of Washington)

Sex-structured age homophily, defined as the propensity for men to form sexual partnerships with women close to their own age but younger, has been shown with mathematical models to contribute to population-level HIV-1 transmission in Sub-Saharan Africa. However, no studies have simultaneously taken account of both this age homophily and partnership concurrency, which occurs when sexual partnerships overlap in time. Concurrency is typically much more common in men than women, and increases rates of disease transmission but not acquisition. Therefore, the interaction between men's' older age and higher rates of concurrency may influence the effects of age homophily on HIV incidence. We built stochastic mathematical models of HIV-1 transmission dynamics with the EpiModel software in R. These models use the statistical framework of temporal exponential random graph models to simulate partnership networks over time, and then epidemiologic and demographic processes on top of those networks. Base model parameters were drawn from a 2012 empirical study of high-risk adults in Ghana, West Africa, in which the prevalence of concurrency was 17.2% for men and 2.3% for women, and where the mean male-female age differential was 5.4 years. When the average age differential was set to 0, the endemic disease incidence was 2.54/100 person-years, compared to 0.39/100 person-years in the base model (RR = 6.44). These results suggest that the typical male age differential is associated with lower HIV-1 incidence, after concurrency is also incorporated into the model. The protective benefits of the age differential are due to the unique transmission but not acquisition risk inherent in concurrency. With the age differential men choose younger, less-infected partners, which slows the chain of transmission across the network.

096-S/P

THE EFFECT OF INITIATING TENOFOVIR ON HIV TREATMENT OUTCOMES IN ADULTS IN SOUTHERN AFRICA: A REGRESSION DISCONTINUITY ANALYSIS Alana T Brennan*, Jacob Bor, Mary-Ann Davies, Izukanji Sikazwe, Arianna Zanolini, Gilles Wandeler, Hans Prozesky , Frank Tanser, Till Barnighausen, Geoffrey Fatti, Matthew P Fox (Boston University, Center for Global Health & Development, Boston, MA)

Background: Countries now recommend initiating HIV patients on tenofovir (TDF), instead of stavudine (d4T), as the standard NRTI in first-line ART. We assessed the causal impact of a policy to initiate TDF on ART outcomes using a regression discontinuity design (RDD). **Methods**: Prospective cohort study of ART-naïve adults who initiated first-line ART in South Africa or Zambia (IeDEA-SA). Patients were included if they initiated ART +/-12-months around the national guideline changes (South Africa-1 April 2010 and Zambia-1 July 2007). Outcomes were single-drug substitution (SDS) (changing NRTI within first-line ART) and death in the first 24-months on ART. We implemented a RDD, using the timing of national guideline changes as natural experiments. Although patients initiating just before/after the guideline change are similar, they receive different first-line regimens. Comparing patients, we estimated the intent to treat (ITT) effect of the guideline change on the outcomes of SDS and death on a risk difference scale. **Results:** 19,017 South African and 49,094 Zambian patients were eligible. The probability of initiation onto TDF increased significantly in both countries after the guideline changes. Compliance with the guideline change was greater in South Africa then in Zambia. Using data on the full period (+/-12-months), ITT estimates showed a significant decrease in the risk of SDS in South Africa (RD:-11.7%;95%CI:-13.4%,-10.0%) and a significant decrease in Zambia (RD:-0.9%;95%CI:-1.7%,-0.03%). There was no effect of the guideline change on mortality in South Africa (RD:-0.5%;95%CI:-2.0%,1.0%) and a significant decrease in Zambia (RD:-1.0%;95%CI:-2.0%,-0.01%). **Conclusion:** Guideline changes led to an increase in TDF use in both countries and to significant reductions in SDS, suggesting that a global policy to initiate tenofovir may have resulted in fewer patient-years spent on sub-optimal therapy. Little to no change was observed in mortality. Conclusion: Guideline changes led to an increase in TDF use in both countries and to significant reductions in SDS, suggesting that a global policy to initiate tenofovir may have resulted in fewer patient-years spent on sub-optimal therapy. Little to no change was observed in mortality.

097-S/P

COMPARATIVE SAFETY OF IN UTERO EXPOSURE TO ATAZANAVIR VERSUS NON-ATAZANAVIR CONTAINING REGIMENS ON NEURODEVELOPMENT IN HIV EXPOSED BUT UNINFECTED INFANTS Ellen C. Caniglia, Kunjal Patel*, Yanling Huo, Suad Kapetanovic, Kenneth Rich, Patricia Sirois, Paige Williams, Miguel A. Hernan, George Seage (Harvard T.H. Chan School of Public Health)

Objective: To evaluate the safety of in utero exposure to atazanavir and neurodevelopment in HIV-exposed but uninfected (HEU) infants age 9-15 months. **Methods:** We used data from HEU infants enrolled in the dynamic cohort of the PHACS Surveillance Monitoring for Antiretroviral Therapy Toxicities (SMARTT) study from 2007 to 2014. HEU infants, at least 9 months of age, of HIV-infected mothers who were not on ARVs at their last antepartum menstrual period were included in the analysis. For each individual, we ascertained whether the first ARV regimen initiated in pregnancy contained atazanavir. Neurodevelopment at 9-15 months was evaluated using the Bayley Scales of Infant and Toddler Development–Third Edition (Bayley-III), which assesses cognition, language, motor skills, social-emotional development and adaptive behavior. We estimated mean differences for each Bayley-III domain for atazanavir versus non-atazanavir regimens by trimester of ARV initiation. Results: 146 and 671 HEU infants were exposed to atazanavir and non-atazanavir regimens in utero, respectively. 575 (70%) infants completed the Bayley-III assessment. The adjusted mean difference (95% CI) in domain score for exposure to atazanavir compared to non-atazanavir regimens initiated in the first trimester was -1.37 (-5.95, 3.21) for cognitive, -3.34 (-7.76, 1.07) for language, -2.40 (-7.25, 2.45) for motor, 0.53 (-5.72, 6.78) for social-emotional, and -0.88 (-5.19, 3.43) for general adaptive. The respective mean differences (95% CIs) for regimens initiated in the second or third trimester were 0.74 (-2.79, 4.27), -2.83 (-5.68, 0.02), 0.75 (-2.37, 3.87), -5.67 (-9.21, -2.13), and -2.24 (-5.60, 1.12). **Conclusions:** We found no evidence for an effect of in utero exposure to atazanavir regimens initiated early in pregnancy on neurodevelopment in HEU infants. However, in utero exposure to atazanavir regimens initiated later in pregnancy may result in lower language and social-emotional scores at 9-15 months.

098-S/P

EFFICACY OF NEW ANTIRETROVIRALS DRUGS TO HIV-1-INFECTED MULTIEXPERIENCED PATIENTS DURING THE LAST 12 YEARS: WHICH COMBINED THERAPY SHOULD PATIENTS RECEIVE? A SYSTEMATIC REVIEW AND META-ANALYSIS. Lucas Pitrez Mocellin*, Patricia Ziegelman, Ricardo de Souza Kuchenbecker (PhD student in Epidemiology, Universidade Federal do Rio Grande do Sul)

Antiretroviral treatment (ARV) to HIV-1 infection in experienced patients is supported by clinical trials that assessed regimens based on new ARV plus optimized background therapy (OBT) vs placebo plus OBT. We conducted a systematic review assessing the efficacy of ARV in multirresistant HIV-1 infection through randomized clinical trial (RCT) using OBT. The databases accessed were MEDLINE, EMBASE, LILACS, Cochrane Central Register of Controlled Trials, SCOPUS and ISI Web of Science from January/2003 to September/2014. We selected RCT assessing the efficacy of ARV to multiexperienced HIV-1-infected patients - resistant to at least one drug of each antiretroviral class: NRTI, NNRTI and PI. OBT of the studies was defined based on genotypic/phenotypic sensitivity tests. Seventeen trials (n = 8,129) assessing 9 new ARV. Eight RCT provided virological suppression data (percentage with HIV RNA < 50 HIV-1 copies/mL) stratified to the number of fully active ARV (zero; 1 and ≥ 2 fully active drug), resulting in Risk Difference (RD) of 0.29 (95%CI 0.12 – 0.46); RD 0.28 (95%CI 0.17 – 0.38) and RD 0.17 (95%CI 0.10 – 0.24) respectively. The pooled RD was 0.24 (95%CI 0.18 – 0.30). We Also estimated virological suppression according to the Cochrane Collaboration's tool for assessing risk of bias: high, moderate and low risk resulting in RD 0.14 (95%CI 0.09 – 0.19); RD 0.20 (95%CI 0.11 – 0.29) and RD 0.33 (95%CI 0.21 – 0.45) respectively. The pooled RD was 0.20 (95%CI 0.14 – 0.25). The findings demonstrate that the use of 2 or more active drugs are associated with a higher rate of virological success, despite the risk difference verified did not varied significantly according to the number of fully active drugs. RCT with lower risk of bias where associated to higher RD, that varied significantly amongst the strata. Further studies, with better methodological quality, are needed to establish the number of ARV and what ARV use in combined therapy.

100-S/P

SOCIAL CLUSTERING OF SEX PARTNER MEETING PLACES FREQUENTED BY HIV-INFECTED MSM IN BALTIMORE, MARYLAND. Meredith L. Reilly*, Christina Schumacher, Errol L. Fields, Jamie Perin, Amelia Greiner Safi, Ravikiran Muvva Carolyn, Nganga-Good, Jacky M. Jennings (Johns Hopkins Bloomberg School of Public Health)

Baltimore, Maryland ranks among U.S. cities with the highest incidence of HIV infection among men who have sex with men (MSM), and the proportion of new diagnoses among MSM continues to increase. In light of limited resources available to reduce HIV transmission across the city, targeted control strategies are critical for addressing the epidemic. Screening at sex partner meeting places (SPMPs) frequented by MSM most likely to transmit, i.e., individuals with new diagnoses and/or high viral load, may help reduce transmission by identifying and linking infected individuals to care. To inform targeted HIV control strategies, we investigated the social clustering of SPMPs reported by newly diagnosed HIV-infected MSM in Baltimore, with a focus on identifying high HIV transmission places. HIV surveillance data from MSM diagnosed between October 2012-June 2014 and reported ≥1 SPMP were examined. Venue viral load (VL) was defined as the geometric mean VL of MSM reporting the venue and categorized into two levels: low (≤1,500 copies/mL) and high (>1500 copies/mL). Social clustering of SPMPs was explored through venue affiliation network diagrams among venues with >1 case report. Level of venue VL and venue typology (bar, internet, market, park or school, street corner) were differentiated to identify locations of highest transmission risk and outreach feasibility. 108 newly diagnosed MSM provided information on ≥1 SPMP, accounting for 99 unique venues. Twenty venues were reported by >1 case; of these, a tightly connected cluster of 8 venues (4 bars, 4 internet) emerged, representing 77% of reports. All 8 venues were characterized by high VL. We identified areas with high potential for HIV transmission by linking the majority of newly diagnosed MSM to a cluster of 8 high VL venues at which they met sex partners. Clusters of venues, particularly high viral load venues, may be important for targeted HIV control among this high incidence population.

099-S/P

READY OR NOT: THE CAUSAL EFFECT OF ART ELIGIBILITY ON RETENTION IN HIV CARE. Matt Fox*, Jacob Bor, Sydney Rosen, Frank Tanser, Deenan Pillay, Till Bärnighausen (Boston University School of Public Health)

Background: Lower retention has been observed among pre-ART patients than among ART initiators in many settings, but it is unknown whether referring patients to pre-ART vs. ART has a causal effect on retention. We assessed the causal effect of ART eligibility on retention in a public sector HIV care and treatment program in rural South Africa using a quasi-experimental regression discontinuity design. **Methods:** Data on all CD4 counts, viral loads, and dates of ART initiation were obtained for all patients (n=11,306) in the Hlabisa HIV Treatment and Care Programme with a first CD4 count 12 Aug 2011-31 Dec 2012. Patients were eligible for ART if CD4 count ≤350 cells/mm3 or Stage III/IV condition, as per national guidelines. Patients referred to pre-ART were told to return every 6 months for CD4 monitoring. Patients initiated on ART were told to return every 6 months for viral load monitoring. Retention was defined within 6-month intervals after a patient's first CD4 count as an indicator for whether the patient had any CD4 count, viral load, or initiated ART in that period. Regression discontinuity was used to identify the causal effect of ART eligibility on retention, exploiting the fact that patients just above/below 350 are similar but assigned to different exposures. Differences in outcomes were estimated using local linear regression. **Results:** Among patients presenting with first CD4 counts close to 350 cells/mm3, those eligible for ART (CD4<350) were 27.4% (95%CI 22.9,31.9) more likely to initiate ART within six months (42.6% vs. 15.2%). Eligibility at first CD4 count increased 12-month retention by 12.6% points (95%CI 6.5,18.7) relative to ineligibility (41.2% vs. 28.6%). Patients who induced to ART because they had an eligible CD4 count were 3.9 times more likely to be retained in care at 12 months than patients who were not initiated because they were ineligible (70% vs. 18%). **Conclusion:** Deferred ART eligibility reduced retention in care.

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INTERPRETATION OF DISCREPANCIES IN THE ASSOCIATION OF ANDROGEN BIOMARKERS WITH CARDIOVASCULAR DISEASE RISK FACTORS. C Mary Schooling* (School of Urban Public Health at Hunter College and City University of New York School of Public Health, School of Public Health, Li Ka Shing Faculty of Medicine, The University of Hong Kong)

Testosterone emerged in 2014 as a potential cause of cardiovascular disease risk with a warning from Health Canada and with both the Food and Drug Administration in the US and the European Medicines Agency suggesting that the use of testosterone replacement for age related decline in testosterone in men should be restricted. This advice is in contrast to the observed negative association of serum testosterone with cardiovascular disease and its risk factors, which suggests testosterone replacement might protect against cardiovascular disease. To clarify how this discrepancy might have arisen, the association of two different androgen biomarkers with cardiovascular disease risk factors (blood pressure, LDL- and HDL-cholesterol and HbA1c) was assessed in a nationally representative sub-sample of US men (n=977) from NHANES 1999-2004. Serum testosterone is largely a marker of circulating gonadal production, while a correlate of the final breakdown product of all androgens androstanediol glucuronide (AAG) is a marker of total androgen production. Serum testosterone was negatively associated with systolic blood pressure (-3.01mmHg per standard deviation (SD) testosterone, 95% confidence interval (CI) -4.62 to -1.41), LDL-cholesterol (-0.09mmol/L, 95% CI -0.18 to 0.001) andHhbA1c (-0.12%, 95% CI -02.27 to -0.15), and positively associated with HDL-cholesterol (0.08mmol/L, 95% 0.04 to 0.12), adjusted for age, education, race, ethnicity and smoking. In contrast, similarly adjusted, AAG was positively associated with systolic blood pressure (1.07mmHg per SD AAG, 95% CI 0.05 to 2.09) and negatively associated with HDL-cholesterol (-0.03, 95% CI -0.05 to -0.01). Testosterone is known from meta-analysis of randomized controlled trials (RCTs) to lower HDL-cholesterol but not to lower blood pressure. Biomarkers with observational associations congruent with those from RCTs might provide a better guide to the effects of interventions than biomarkers with discrepant associations.

111-S/P

GLOBAL BURDEN OF MEN'S UROLOGIC DISEASES IN 2010 AS REPRESENTED BY REVIEWS AND PROTOCOLS IN COCHRANE DATABASE OF SYSTEMATIC REVIEWS. Tyler S Okland*, Hannah Pedersen, Lindsay Boyers, Mark D Sawyer, Mohsen Naghavi, Robert P Dellavalle (University of Colorado, School of Medicine)

Although many factors are involved in the allocation of research funds, this study demonstrates that systematic reviews may be mapped against burden of disease, and that this could guide future research prioritization efforts. The objective of this study was to determine whether Men's Health and Urologic Disease-related systematic reviews and protocols published in Cochrane Database of Systematic Reviews (CDSR) adequately represent burden of disease, measured as disability-adjusted life-years (DALYs) by the Global Burden of Disease (GBD) 2010 Project. Two investigators independently assessed thirteen Men's Health and Urologic Disease (MHUD) categories in CDSR for representation from March to August 2014. MHUD categories were then matched to their respective DALYs from GBD 2010 to determine over- and under-representation in CDSR. Relationship of CDSR representation (systematic reviews and protocols) with percentage of total 2010 DALYs, 2010 DALY rank, and DALY percentage change from 1990 to 2010 for the thirteen MHUD conditions was compared. Twelve of the thirteen MHUD conditions were represented by at least one review in CDSR. Four disease categories tubulointerstitial nephritis, pyelonephritis, urinary tract infections, and other urinary diseases) were considered 'over-represented', and six (testicular cancer, dysuria/bladder pathology/ hydronephrosis due to schistosomiasis, hydrocele due to lymphatic filariasis, bladder cancer, kidney and other urinary organ cancers, and benign prostatic hyperplasia) were considered 'under-represented. Three disease categories (urolithiasis, male infertility and prostate cancer) were considered proportionately matched to corresponding DALYs according to our criteria. These results may help inform research and resource prioritization for Men's Health and Urologic Disease.

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LIFETIME FAMILY WEALTH AND MENTAL HEALTH AMONG YOUNG ADULTS. Felice Le-Scherban*, Allison Brenner, Robert Schoeni, (Drexel University)

Background: Mental health is critical to young adult health, as the onset of 75% of psychiatric disorders occurs by age 24 and psychiatric disorders early in life predict later mental illness and substance abuse. Wealth may be an important socioeconomic influence on mental health, serving as a buffer against economic stressors. Family wealth may be particularly relevant for young adults by providing them with an economic resource to draw on as they make educational decisions and move towards financial and social independence. **Methods:** We used prospectively collected data from 2060 young adults aged 18–27 in 2005–2011 from a national cohort of US families. We examined associations between nonspecific psychological distress (measured using the K-6 scale: range 0–24, higher = more distress) and average childhood household wealth (net worth in 2010 dollars, averaged over the years when the young person was aged 0–18). **Results:** In demographics-adjusted generalized estimating equation models, higher average childhood household wealth percentile was related to a lower prevalence of serious psychological distress (K6 score ≥ 13) (for 75th vs 25th percentile, PR [prevalence ratio] = 0.55 [95% CI 0.41–0.75]) but was not related to moderate psychological distress (K6 score 5–12; PR = 1.01 [0.94–1.09]). The association with serious psychological distress was robust to adjustment for parent education, household income in the year of birth, and caregiver psychological distress but was attenuated by adjustment for average childhood household income percentile to PR = 0.74 (0.51–1.07). There was some evidence of mediation by the young person's education level. **Conclusions:** Socioeconomic background, including family wealth, may help protect young adults from serious psychological distress during a critical period with respect to future health. It remains, however, to disentangle potential mechanistic pathways specific to different aspects of socioeconomic background.

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ASSOCIATIONS BETWEEN REGIONAL LOCATION AND SENSE OF BELONGING WITH PHYSICAL ACTIVITY AND WEIGHT STATUS IN INDIVIDUALS REPORTING MAJOR DEPRESSIVE EPISODE. Karen M Davison*, Lovedeep Gondara (University of British Columbia, School of Nursing)

Suboptimal health-related behaviors in those with depression show alarming rates but little is known about their correlates. Using data from Canadian Community Health Survey's Cycle 1.2, we examined 696 individuals (15 years plus) residing in Ontario who had a major depressive episode (MDE) in the previous 12 months and assessed relationships between regional location and health behaviors. Measurements included: 1) physical activity based on average energy expenditure (EE) estimates in leisure activities; moderate or active (EE ≥ 1.5 kcal/kg/day) versus inactive (EE < 1.5 kcal/kg/day); 2) BMI categorized as acceptable (BMI 20 to 24.9) and excess weight (BMI 25+); and 3) Regional locations: i) Central: population of 1,070,644 and contains small to medium sized urban centres, farms, and sparse populated forested land; ii) Southwest: population of 2,504,878 that includes prosperous agricultural activity and significant towns and cities; iii) North: population of 732,914 with land area of 310,000 mi2; iv) East: population of 1,603,625 that contains 18 urban areas plus auto, agriculture, and hi-tech industries; v) Toronto: Canada's most populous city (land area of 243 mi2; population of 2,791,140) and one of the world's most diverse cities (baseline). Other measures included: 1) Self-reported description of belonging to one's local community; very and somewhat strong versus very or somewhat weak (baseline); 2) Current self reported stress; and 3) Sociodemographics. Logistic regression analysis results indicated increased sense of belonging was related to higher levels of physical activity (ORs of 1.78; 95% CI 1.19 to 2.65 to 2.01; 95% CI 1.22 to 3.51). Furthermore, residing in remote regions (North Ontario) was associated with increased odds of carrying excess body weight (OR = 2.87; 95% CI 1.33 to 6.23) compared to large urban areas (Toronto). Socio-ecological and coping frameworks may be useful in the development of prevention and intervention programs for depression.

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EXPOSURE TO STRESSORS MEDIATES THE EFFECT OF ASSAULTIVE TRAUMA ON POSTTRAUMATIC STRESS SYMPTOMS. Spruha Joshi*, Sarah R. Lowe, Magdalena Cerda (Columbia University Mailman School of Public Health Department of Epidemiology)

Individuals exposed to assaultive trauma (e.g. being held up or mugged, sexual assault) have higher rates of posttraumatic stress symptoms (PTSS). In addition to having direct effects on PTSS, assaultive trauma is likely to influence PTSS indirectly, by increasing the risk of experiencing stressful life events, such as experiencing financial loss or job loss. In this study we aimed to investigate the indirect effects of assaultive violence on PTSS through exposure to stressors using a longitudinal mediation model. Data were drawn from the Detroit Neighborhood Health Study, a community sample of predominately African Americans adults (18 years or older) living in Detroit, Michigan. Participants completed measures on assaultive trauma (8 items), stressors (11 items) and PTSS (PTSD Checklist-Civilian Version) over three waves approximately one year apart; individuals who completed all three waves (n=847) were included in this analysis. A longitudinal mediation model in which assaultive trauma at each wave were predictive of stressors at the subsequent wave, and stressors at each wave were in turn predictive of PTSS at the subsequent wave was tested in Mplus 7.0. The longitudinal mediation model showed evidence of good fit with the data, (Ï‡2 = 71.95 ($p < 0.001$), RMSEA = 0.09, CFI = 0.97). More Wave 1 assaultive traumas were significantly associated with more Wave 2 stressors (Standardized Estimate [Std. Est.] = 0.12, $p < .01$), which in turn were associated with higher Wave 3 PTSS (Std. Est. = 0.32, $p < 0.001$). In addition, the indirect effect from Wave 1 assaultive trauma to Wave PTSS through Wave 2 stressors was significant (Std. Est. = .04, $p < 0.01$). Taken together, the results suggest that exposure to stressors partially mediated the relationship between assaultive trauma and PTSS. Findings from this study suggest that alleviating stressors that develop after exposure to assaultive trauma may be a promising approach to preventing assault-related PTSS.

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NEIGHBORHOOD CONTRIBUTIONS TO PSYCHOLOGICAL DISTRESS AMONG HISPANIC NEW YORK CITY ADULTS. Sungwoo Lim*, Cynthia R. Driver, Valerie Meausoone, Christina Norman
(New York City Department of Health and Mental Hygiene)

Neighborhood characteristics have been reported to have protective impacts on psychological distress among Hispanic Americans. This evidence is based on specific, not full, neighborhood factors (e.g., ethnic densities) or subgroups (e.g., Mexican Americans). We sought to address this limitation by estimating total neighborhood-level influence on psychological distress in all Hispanic subgroups. The 2008 New York City Community Health Survey gave rise to individual-level and neighborhood (zip codes) data. Psychological distress was determined if Kessler 6 scores were >12. Of all race/ethnic groups stratified by nativity, United States (US)-born non-Hispanic whites served as a reference. We estimated prevalence ratios (PR) of psychological distress by race/ethnicity via 1) conventional log-linear models with individual-level socio-demographic variables and 2) conditional pseudolikelihood method that accounted for both individual-level and full neighborhood confounding. By subtracting the second PR from the first PR, we quantified the total neighborhood-level influence on psychological distress. US-born Hispanics were mostly Puerto Rican (79%), and they were more likely to experience psychological distress than the reference (9% vs. 4%). The higher prevalence was still observed after adjusting for individual-level confounding (PR: 1.96, 95% Confidence Interval: 1.28, 3.00). After controlling for full neighborhood confounding, the PR was unchanged, indicating absence of neighborhood-level influence. For foreign-born Hispanics, mostly from the Dominican Republic (42%) and Central/South America (30%), the prevalence was not statistically different from that of the reference. This null finding persisted after accounting for neighborhood confounding. This study shows higher prevalence of psychological distress among Hispanics over non-Hispanic whites only in the subsample of US-born adults, and neighborhood-level characteristics did not contribute to this disparity.

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CONCORDANCE BETWEEN A REPORTED PHYSICIAN DIAGNOSIS OF A BIPOLAR DISORDER AND A POSITIVE SCREEN ON THE MOOD DISORDER QUESTIONNAIRE IN THE NATIONAL INSTITUTE OF ENVIRONMENTAL HEALTH SCIENCES (NIEHS) ENVIRONMENTAL POLYMORPHISM REGISTRY (EPR). William B. Jackson*, Kathryn M. Rose, John M. McGrath, Robyn D. Stephens, Beverly A. Warden, Shepherd H. Schurman, Stavros Garantziotis (Social & Scientific Systems, Inc.)

The public health impact of undiagnosed bipolar spectrum disorders (BPD) is significant, with negative implications for health, work productivity and family life. We examined the concordance between the Mood Disorder Questionnaire (MDQ), (a validated BPD screening tool with sensitivity and specificity comparable to other mental health screening tools), and a self - reported physician diagnosis of BPD. As part of the Environmental Polymorphisms Registry (EPR), 8,674 participants completed a health and exposure survey. It included a direct query of a physician diagnosis of BPD as well as the MDQ. A positive screening for BPD on the MDQ was defined as responding yes to > 7 of 13 items and reporting that two or more of the items happened concurrently, and that they had a moderate or serious impact on normal activities. Overall, 439 (5.1%) reported a physician diagnosis of BPD, 312 (3.6%) screened positive on MDQ, and 614 (7.1%) were positive on either. Only 137 (1.6%) screened positive for BPD using both measures and calculated agreement was moderate (Îº = 0.34, 95%CI=0.29-0.38). In a logistic model, a family history of BPD (OR=5.57, 95%CI=4.51-6.89), fair/poor perceived health (OR=2.44, 95%CI=1.93-3.08), black race (OR =1.51, 95%CI=1.19-1.91), male gender (OR =1.26, 95%CI=1.01-1.58), being an ever smoker (OR =1.69, 95%CI=1.35-2.11) or drinker (OR =1.63, 95%CI=1.03-2.57) and having a low family income (OR =1.97, 95% CI=1.53-2.52) or a high school education or less (OR=1.75, 95%=1.30-2.35) were associated with greater discordance on BPD status. Increased age was associated with less discordance (OR=0.98, 95%CI=0.97-0.99). Our results show considerable variation in positive screens for BPD using different approaches, with variation by health and sociodemographic factors. This suggests that multiple screening modes may be advisable for identifying potential BPD cases in research studies, in the absence of a gold standard clinical diagnosis.

125-S/P

MATERNAL C - REACTIVE PROTEIN DURING PREGNANCY AND RISK OF AUTISM SPECTRUM DISORDER: THE EARLY MARKERS FOR AUTISM (EMA) STUDY. Ousseny Zerbo*, Cathleen Yoshida, Judith K. Grether, Paul Ashwood, Judy Van de Water, Lisa A. Croen (Division of Research, Kaiser Permanente Northern California, Oakland, California)

Background: C-reactive protein (CRP), a marker for chronic and acute inflammation, has been previously reported by one study to be associated with increased risk of autism spectrum disorder (ASD). **Objective:** To further investigate the association between maternal C-reactive protein during pregnancy and risk of ASD. **Methods:** We conducted a population-based case-control study, nested within the cohort of infants born from 2000 - 2003 to women who participated in the prenatal screening program in Orange, San Diego and Imperial County, California. Cases (n = 416), where all children receiving services for ASD at their respective Regional Centers. Two comparison groups from the same study population were included: children with developmental delay (DD, n = 188) receiving services at the same regional center, and children not receiving services for developmental disabilities, randomly sampled from the California birth certificate files and frequency-matched to autism cases on sex, birth year, and birth month (GP, n =432).Maternal CRP concentration was measured in archived serum samples collected during 15-19 weeks of pregnancy. We compared levels of C-reactive protein amongst ASD vs. GP, and DD vs. GP using crude and multivariate logistic regression analyses. We analyzed maternal CRP both as continuous and categorical measures. **Results:** Maternal CRP level was associated with a 17% decreased risk of ASD (OR = 0.83, 95 % CI 0.72 - 0.97). Maternal CRP in the third and fourth quartiles were associated respectively with a 43% (AOR = 0.57, 95% CI 0.38 - 0.85) and 42% (OR = 0.58, 95% CI 0.38 - 0.89) decreased risk of ASD. Maternal CRP levels were not associated with developmental delays (OR =0.95, 95% CI 0.78 - 1.17). **Conclusion:** Maternal CRP levels at 15-19 weeks gestation were lower in mothers of ASD compared to controls. These data suggest that elevated CRP in mothers of cases compared to controls could signal a shift in the maternal immune activation of cases vs control.

126-S/P

IMPACT OF MISCLASSIFICATION ERROR IN THE ESTIMATION OF MAJOR DEPRESSION DISORDER PREVALENCE AMONG MOTHERS OF YOUNG CHILDREN (0-5 YEARS) RECEIVING HOME VISITATION SERVICES IN OKLAHOMA. Arthur H. Owora*, Hélène Carabin , Tabitha Garwe, Jane F. Silovsky (Oklahoma University Health Sciences Center)

Background: The frequency of major depression disorder (MDD) is typically estimated using measurement scales in community-based settings. Yet, such scales are prone to misclassification error (ME) which is rarely adjusted for when reporting prevalence estimates. The objective of this study was to estimate the impact of ME on MDD prevalence estimation among mothers of young children receiving home visitation services in Oklahoma County, Oklahoma. **Methods:** Baseline data were collected between December 2010 and December 2014 among mothers of young children participating in home visitation programs in Oklahoma County. Participants were asked to self-report depressive symptoms using the Center of Epidemiological Studies-Depression –Short Form (CESD-SF) instrument. The CESD-SF scores range from 0 to36 and a cutoff of ≥ 10 was used to categorize mothers as positive for MDD. A Bayesian latent class analysis in the absence of a 'gold standard' was used to compare MDD prevalence before and after adjustment for ME. Prior estimates of CESD-SF sensitivity and specificity among mothers of young children were based on a meta-analysis, with sensitivity and specificity values ranging from 69% to 90% and 84% to 99% respectively. A uniform prior distribution was used for the MDD prevalence estimate. **Results:** A total of 220 out of 524 mothers scored ≥ 10 on the CESD-SF, for an observed MDD prevalence of 42% (95% Bayesian credible interval [BCI]: 37%-46%). After adjustment for ME, the MDD prevalence was 47% (95%BCI: 36%-59%). **Conclusions:** The adjusted MDD prevalence was five percent higher than the unadjusted estimate and had a larger 95% BCI reflecting greater uncertainty in the detection of MDD. This underscores the importance of ME adjustment for MDD prevalence estimates which are critical for resource allocation and appropriate planning of preventive strategies. Future analyses will examine the use of both provider and self-report assessments to better estimate MDD prevalence.

127-S/P

SELECTIVE CUTOFF REPORTING IN STUDIES OF DIAGNOSTIC TEST ACCURACY OF DEPRESSION SCREENING TOOLS: COMPARING TRADITIONAL META-ANALYSIS TO INDIVIDUAL PATIENT DATA META-ANALYSIS. Brooke Levis*, Andrea Benedetti, Alexander W. Levis, Brett D. Thombs

McGill

Background: Major depressive disorder (MDD) may be present in 10-20% of patients in medical settings. Screening for depression has been recommended to improve access to depression care, but questions have been raised about the published accuracy estimates of screening tools. Studies examining the diagnostic accuracy of depression screening tools typically use data-driven methods, and report results for a small range of cutoffs around the study's most accurate cutoff. When data from these studies are combined in meta-analyses, accuracy estimates for different cutoffs are often based on data from different studies. Individual patient data (IPD) meta-analysis can address this problem by synthesizing data from all studies for all cutoffs. **Objective:** To compare a traditional meta-analysis of published accuracy data to an IPD meta-analysis using all original patient data from the same studies. **Methods:** For each dataset in a published meta-analysis of the Patient Health Questionnaire-9 (PHQ-9), we extracted PHQ-9 scores and MDD diagnoses. We compared a traditional meta-analysis using published results only to an IPD meta-analysis where for each cutoff we included data from all studies. **Results:** For the recommended cutoff score of 10, 11 of the 13 obtained studies published accuracy results; results using traditional meta-analysis were similar to those using IPD meta-analysis. For other cutoffs, only 3 to 6 of the 13 studies published accuracy results, and results using the two different meta-analytic methods were more discrepant. In the traditional meta-analysis, sensitivity was underestimated for cutoffs 10. The optimal cutoff was 11 in the traditional meta-analysis, whereas 10 was optimal in the IPD meta-analysis. **Conclusion:** Traditional meta-analyses may exaggerate the diagnostic accuracy of depression screening tools. IPD meta-analysis provides a mechanism to obtain unbiased estimates of accuracy.

128-S/P

LATENT TRAJECTORIES OF CIVILIAN AND MILITARY TRAUMA SYMPTOMS IN US NATIONAL GUARD AND RESERVE: A LATENT GROWTH MIXTURE MODELING APPROACH. David S. Fink*, Sarah Lowe, Laura Sampson, Gregory H Cohen, Robert J Ursano, Robert Gifford, Carol Fullerton, Sandro Galea (Columbia University, Department of Epidemiology, Mailman School of Public Health, New York, NY)

Decades of research show that traumatic events are ubiquitous exposures that can cause posttraumatic stress disorder (PTSD). Recent studies have moved beyond investigating the association of trauma exposure with PTSD to prospectively examining the shape of PTSD symptomology through trajectories. Trajectory analysis has been increasingly used in trauma research to identify homogenous symptom patterns in a larger heterogeneous population. These studies have documented that some people exposed to trauma will suffer mild to moderate psychological distress that is followed by a return to pre-trauma health, whereas others will experience substantial distress that can last for several years. Identification of risk and protective factors that predict trajectory membership can then be used to inform interventions to mitigate psychopathology. However, the extent to which the type of trauma experienced affects PTSD symptom trajectories, both in regards to the shape of the trajectories and proportion of survivors falling into each trajectory, remains unclear. Therefore, we aimed to document PTSD symptom trajectories in a representative sample of US National Guard and Reserve (RNG) (N=2002) from 2008 to 2012. We chose this population because of their likelihood to experiences both military and civilian traumas, which can vary greatly in expectedness, chronicity, type of threat, and time during life course. We employed latent class growth analysis to model trajectories in respondents who completed two or more study waves and had either a potentially traumatic military event, civilian event, or both. For both military and civilian trauma, we found evidence of 3 trajectories that were similar in shape and frequency: resistant (75% and 79%, respectively), chronic subthreshold (20% and 16%, respectively), and chronic PTSD (5% for both). Taken together, the results suggest that PTSD symptom trajectories are similar for RNG service members across military and civilian trauma.

129-S/P

PROTECTIVE ENVIRONMENTS AGAINST PSYCHOLOGICAL DISTRESS, DEPRESSION, AND SUICIDE IN YOUTH. Reshley Andrew Dalisay*, Ray M. Merrill, Elizabeth Brutsch (Brigham Young University)

Objective: To identify the effect of prosocial community, family, school, and peer environments on adolescents' risk of suicide ideation and attempts, controlling for demographic variables, depression, and psychological distress. **Method:** Regression analysis of health survey data from a statewide sample of adolescents examined the effects of four prosocial environments on past year's history of suicide ideation, suicide plan, and suicide attempt, controlling for symptoms of depression and psychological distress. **Results:** Statewide rates of youth suicide ideation, planning, and attempt were consistent with national rates. Youth who had more prosocial environments were less likely to have considered suicide, made a suicide plan, or attempted suicide in the previous year. The greatest protective effect was found from family environments, which played a significant protective role against all three outcomes even after controlling for psychological distress and suicide ideation. **Conclusion:** Family has the greatest potential among the environments examined for protecting youth against psychological distress, depression, and suicidality. Community and peer groups also play an important role in promoting favorable outcomes in these domains. Compared to the other environments, school-based suicide prevention approaches may not be the most impactful means of addressing the issue. Key words: suicide prevention, depression, psychological distress, adolescents, protective factors.

130-S/P

POSTTRAUMATIC STRESS DISORDER FACTOR STRUCTURE AMONG SURVIVORS OF THE 2010 HAITIAN EARTHQUAKE: ADJUDICATING HETEROGENEOUS POST-DISASTER PTSD DIMENSIONALITY. Sabrina Hermosilla*, Bruce Link, Moise Desvarieux, Alastair Ager, Magda Cerda, Sandro Galea (Columbia University)

Accurate, reliable, and reproducible measurement is central to the rigorous study of epidemiology. There is inconsistent empirical evidence supporting a single underlying factor structure of posttraumatic stress disorder (PTSD). We assessed model fit of six theoretical factor structures of PTSD: 1-factor Diagnostic and Statistical Manual of Mental Disorders (DSM)-IV; 3-factor DSM-IV (arousal, avoidance, and intrusion); 3-main factor (arousal, avoidance, and intrusion) and 1-hierarchical factor DSM-IV; 4-factor King 1998 (avoidance, hypervigilance, emotional numbing, re-experiencing); 4-factor Simms 2002 (avoidance, dysphoria, hyperarousal, intrusion); and 4-factor DSM-5 (arousal, avoidance, intrusion, negative mood and cognition) models. Confirmatory factor analyses were conducted on PTSD symptoms identified through the Posttraumatic Checklist - Civilian Version in a population-based sample of 1302 survivors of the 2010 Haitian Earthquake. All models adequately fit the data, fit indexes ranged from: root mean square error of approximation (RMSEA) 0.056'0.069; comparative fit index (CFI) 0.885-0.927; Tucker Lewis Index (TLI) 0.865-0.915; weighted root mean square residual (WRMR) 1.768-2.148; Akaike information criterion (AIC) 24,768.459-29,346.352; and Bayesian information criterion (BIC) 24,952.178-29,584.705. The King 1998 and Simms 2002 models fit slightly better than the DSM-IV 1-factor and DSM-5 models and the 3-factor DSM-IV (arousal, avoidance, and intrusion) model fit the sample best (Ï‡2=593.257, 116 degrees of freedom; RMSEA=0.056; CFI=0.927; TLI=0.915, WRMR=1.769; AIC=24,760.459; and BIC=24,952.178). The tight range in model fit statistics, consistent with heterogeneous factor structures found in the literature, suggests that empirical-based model selection is insufficient to universally characterize PTSD. Comprehensive PTSD models need unequivocal theoretical and empirical support to guide the measurement and diagnosis of PTSD.

131-S/P

LACKING EMPIRICAL EVIDENCE FOR A UNIVERSAL POSTTRAUMATIC STRESS DISORDER FACTOR STRUCTURE, A SYSTEMATIC REVIEW. Sabrina Hermosilla*, Laura Sampson, Bruce Link, Moise Desvarieux, Alastair Ager, Magda Cerda, Sandro Galea (Columbia University)

Documented heterogeneity in the determinants and consequences of posttraumatic stress disorder (PTSD) challenge our ability to develop an appropriate response to this growing epidemic. The diverse and evolving multifactorial latent structure of PTSD challenges cross-study and cross-population comparisons. Agreement on the underlying factor structure of PTSD will empower epidemiologists to appropriately document burden of disease and guide intervention and policy development. This study systematically reviews and synthesizes the empirical literature from PubMed and Psych Info on PTSD symptom structure to identify a universal PTSD factor structure. 40 (3%) out of 1,249 citations published between 1980 and 2914 provided empirical PTSD factor structure evidence. Studies reviewed are largely from United States' samples (70%) of unspecified potentially traumatic event(s) (17%), with sample sizes ranging from 111-12,443, and response rates from 22%-96%. The Posttraumatic Checklist – Civilian Version (38%) is the most common measurement instrument used, and confirmatory factor analysis (73%) is the most common analytic method. 152 PTSD latent factor models were specified in the 40 papers reviewed. There is a clear consensus in the factor components of PTSD (98% of models had arousal and avoidance factors, 95% intrusion or re-experiencing factor, and 93% emotional numbing factor). There is still significant heterogeneity in underlying factor structure in PTSD with the 4-factor King 1998 (30%) and Simms 2002 (20%) models consistently fitting study data better than other tested models (the remaining 50% of studies identified 11 different factor structures of PTSD). A universal understanding of the operationalization of the specific underlying factor structure of PTSD, supported by the empirical literature, is absent. Future studies should aim to understand the precise interrelated nature of known factors as opposed to hypothesizing novel symptom classifications.

132-S/P

GENDER DIFFERENCES IN THE ASSOCIATION BETWEEN NETWORK, COGNITIVE AND STRUCTURAL SOCIAL CAPITAL AND DEPRESSION IN TAIWAN. Yun-Hsuan Wu*, Kellee White, Bo Cai, Nancy L. Fleischer, Spencer Moore, Shing-Chia Chen (University of South Carolina, Columbia, SC, USA)

Background: Depression is the most common mental health condition in Taiwan. Taiwanese women typically exhibit higher levels of depression in comparison to Taiwanese men. Although evidence suggests that social capital is associated with depression, it remains unclear whether the association between different types of social capital are associated with depression and whether these association differ between men and women. **Methods**: Data from the 1997 Taiwan Social Change Survey (n=2,598) were used to examine the association between three dimensions of individual-level social capital and depression. The 20-item Center for Epidemiological Studies Depression Scale was used to measure depressive symptoms, and scores ≥ 15 indicated depression. Three dimensions of social capital were assessed: cognitive social capital (measured using questions on perceived neighborhood trust and reciprocity), structural social capital (measured using questions on local social participation), and network social capital (measured using a position generator). Multivariable logistic regression models were used to assess the relationship between social capital and depression stratified by gender. Models for each dimension of social capital were run separately and accounted for the complex sampling design. **Results:** Higher cognitive social capital (i.e., more perceived trust and reciprocity) was independently associated with lower odds of depression in both men (OR= 0.90, 95% CI=0.87, 0.94) and women (OR= 0.93, 95% CI=0.90, 0.96) after controlling for confounders. Higher structural social capital (i.e., more frequent participation) was independently associated with lower odds of depression in men (OR=0.69, 95% CI=0.50, 0.96). Network social capital was not associated with depression in men or women. **Conclusion:** The findings suggest that the association between social capital and depression in Taiwan may differ by gender and according to the specific dimension of social capital assessed.

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CLARIFYING RISK FACTORS. C Mary Schooling*, Heidi E Jones (School of Urban Public Health at Hunter College and City University of New York School of Public Health)

Epidemiology is concerned with identifying vulnerable groups, i.e., risk stratification, and with identifying modifiable targets of intervention, i.e., causal inference. The same terminology, 'risk factors', and the same techniques are sometimes used in both contexts, however, these fundamentally different questions require different approaches and have different interpretations. Identification of vulnerable groups is a question of statistical inference requiring a representative sample which produces time and place specific risk predictors that may or may be causal. In contrast, identification of modifiable targets of intervention, i.e., causal factors, is a question of scientific inference best conducted using a hypotheses generating model of population health and implemented to minimize bias from confounding, selection and measurement. Here we clarify the distinction between these two purposes of epidemiology to facilitate the most effective use of research effort.

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IDENTIFYING THE TWO AXES OF CONFOUNDING. Etsuji Suzuki*, Toshiharu Mitsuhashi, Toshihide Tsuda, Eiji Yamamoto (Okayama University)

Confounding is a major problem in epidemiology. Despite its significance, however, the different notions of confounding have not been fully recognized in the literature, which has led to widespread confusion of causal concepts. In this presentation, we aim to highlight the significance of differentiating between the subtly different notions of confounding from the perspective of counterfactual reasoning, identifying the two axes of confounding. We illustrate the significance of considering the distribution of response types to distinguish causation from association, showing that confounding depends not only on the population chosen as the target of inference, but also on the notions of confounding in distribution and confounding in measure (i.e., the first axis of confounding). This point has been relatively underappreciated partly because some literature on the concept of confounding has used only the exposed and the unexposed groups as the target populations. Thus, it would be helpful to use the total population as the target population. Moreover, to clarify a further distinction between confounding "in expectation" and "realized" confounding (i.e., the second axis of confounding), we illustrate the usefulness of examining the distribution of exposure status in the target population. To grasp the profound distinction between confounding in expectation and realized confounding, we need to understand the mechanism that generates exposure events, not the product of that mechanism. Finally, we graphically illustrate this point, highlighting the usefulness of directed acyclic graphs to examine the presence of confounding in distribution in the notion of confounding in expectation.

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A GRAPHICAL ILLUSTRATION OF THE PRINCIPAL STRATIFICATION APPROACH: AN APPLICATION OF EXTENDED DIRECTED ACYCLIC GRAPHS. Etsuji Suzuki*, Toshiharu Mitsuhashi, Toshihide Tsuda, Eiji Yamamoto (Okayama University)

A considerable volume of literature highlights the hazards of conditioning on an intermediate, which may be between the cause and effect. This point has been often explained by using directed acyclic graphs (DAGs), and this type of bias is generally referred to as a "collider-stratification bias" due to the presence of intermediate-outcome confounder(s). As an alternative to the crude measure, recent literature has applied the principal stratification approach, which involves assessing the effect of the exposure on the outcome among the subpopulations for which the intermediate would be present irrespective of the exposure status. The advantage of using the principal stratification approach is that it essentially avoids the problem of conditioning directly on the intermediate. In this presentation, we aim to graphically illustrate this point by extending DAGs, which integrate response types and observed variables. By using the recently-proposed extended DAGs, we can clearly show that, in the principal stratification approach, one essentially conditions on an underlying characteristic of the individual, like a baseline covariate. We also aim to generalize our discussion by illustrating the usefulness of extended DAGs in other situations under which the principal stratification approach can be used (e.g., the issues of truncation-by-death and non-compliance). We also discuss some implications from the perspective of the target population concept in causal inference. The extension of DAGs using response types maintains the integrity of the original DAGs, which allows one to understand the underlying causal structure in observational studies as well as randomized controlled trials.

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SENSITIVITY ANALYSES FOR SPARSE-DATA PROBLEMS - USING WEAKLY INFORMATIVE BAYESIAN PRIORS. Ghassan B Hamra* Richard Maclehose, Steve Cole (Drexel University School of Public Health)

Sparse-data problems are common, and approaches are needed to evaluate the sensitivity of parameter estimates based on sparse-data. We propose a Bayesian approach that uses weakly informative priors to quantify sensitivity of parameters to sparse-data. The weakly informative prior is based on accumulated evidence regarding the expected magnitude of relationships using relative measures of disease association. We illustrate the use of weakly informative priors with an example of the association between lifetime alcohol consumption and head and neck cancer. When data are sparse and the observed information is weak, a weakly informative prior will shrink parameter estimates toward the prior mean. Additionally, the example shows that when data are not sparse and the observed information is not weak, a weakly informative prior is not influential. Advancements in implementation of Markov Chain Monte Carlo simulation make this sensitivity analysis easily accessible to the practicing epidemiologist.

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META-ANALYSIS OF MEAN DIFFERENCES IN MINIMAL IMPORTANT DIFFERENCE [MD(MID)] UNITS: APPLICATION WITH APPROPRIATE VARIANCE CALCULATIONS. Ian Shrier* (Centre for Clinical Epidemiology, Lady Davis Institute for Medical Research, Jewish General Hospital, McGill University)

Practicing evidence-based medicine requires succinctly summarized data, preferably in a meta-analysis if the data are appropriate. For continuous outcomes, systematic reviewers frequently calculate a mean difference in standard deviation units (standardized mean difference, SMD) when the construct being measured is the same across studies but the actual measurement instrument differs, such as with different questionnaires assessing pain or quality of life. Other proposed methods for standardization include the ratio of means (RoM), and a more recent method based on mean difference between groups expressed in minimal important differences [MD(MID)] units, where the MID is considered a constant. Although standardization in MID units is easily interpretable clinically, considering MID as a constant imposes important limitations. Our objective is to illustrate how considering the MID as a random variable, thus to have a distribution, provides solutions to these limitations. First, considering the MID as a random variable enables investigators to obtain estimates for questionnaires with no previous MID. Second, variance calculations for the MD(MID) using the delta method allow investigators to avoid making the unrealistic assumptions that 1) the coefficient of variation for MID is independent of the measure, and 2) there is no correlation between the MID and mean difference. Using sensitivity analyses for different assumptions, we illustrate that the variance of MD(MID) calculated when MID is considered a constant instead of a random variable can be under or over-estimated to significant degrees. We explore the effects on two different datasets, (i) data originally used to present the MD(MID), and (ii) data from osteoarthritis studies using different pain scales and disability scales.

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WEB-BASED SIMULATION APPLICATION TO OPTIMIZE DESIGN AND ANALYSIS DECISIONS FOR STUDIES OF THE HEALTH IMPACTS OF POLICIES AND PROGRAMS. Jennifer Ahern*, K. Ellicott Colson, Scott Zimmerman, Kara Rudolph, Dana Goin (Division of Epidemiology, School of Public Health, University of California Berkeley)

The choice of the study design and analysis approach to assess the health effects of policies and programs is typically informed by general guidelines. However, simulations would allow investigators to choose the best study design and analysis for their question. We have developed a web-based simulation generator to make this possible. A simple graphical user interface (GUI) allows users to input information about the causal structure between variables, distributions of variables, and the strengths of relations between variables. Extensive sensitivity tests have been carried out to inform the minimum necessary set of information that must be solicited from usersÂ¬ in order to obtain consistent study design and analysis recommendations. The software allows a range of optional user specifications, including scripts for the user to run on his/her own data to parameterize the simulations if data are available. Design options include a variety of sampling schemes and matching approaches. Analysis options include parametric and semi-parametric estimating equation and substitution estimators. Simulations will identify the optimal study design and analysis combination as the one that results in the lowest mean squared error ([MSE] = bias2 + variance) for the parameter of interest. The software provides users with scripts that can be applied to implement the optimal design and analysis with their data. We demonstrate the software, and provide an example of insights gained with a simulation to determine the optimal design and analysis for a study of a violence prevention program. Overall, simulations facilitated by our software have the potential to substantially improve the rigor of studies of the health effects of policies and programs.

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THE ASSOCIATIONS OF ALCOHOL AND TOBACCO CONSUMPTION WITH MORTALITY: EVIDENCE FROM THREE NATIONAL RECORD-LINKED SURVEYS. Katherine Keyes*, Silvia Martins, Ava Hamilton, Frank Popham, Alaistar Leyland, Linsay Gray (Columbia University)

Increasingly, survey respondents in the United States are linked to vital statistics records to track causes of death; the present study aimed to examine the precision and magnitude of estimates between alcohol and tobacco use at the time of the survey with later death across subgroups. Because health effects of heavy alcohol and tobacco use are well documented, such assessment can provide evidence of the utility and veracity of vital statistics linked survey data for epidemiological interrogation. We used data from three national surveys linked to the national death index (NDI) to compare how reports of alcohol consumption and smoking at the time of the survey are associated with all-cause, tobacco-related and alcohol-related mortality; National Health and Nutrition Examination Survey (NHANES; survey years: 1999-2004; NDI through 2004; N=17,039; 1,333 deaths), National Health Interview Survey (NHIS; survey years: 1986-2004; NDI through 2004; N=1,853,894; 153,903 deaths), and General Social Survey (GSS; survey years 1978-2002; NDI through 2006; N=32,830; 9,271 deaths). In age-adjusted analyses, binge or problematic drinking at the time of the survey was associated with all-cause mortality in NHANES (RR=1.66, 95% C.I. 1.33-2.08) and NHIS (RR=1.05, 95% C.I. 1.01-1.1), but only among certain subgroups in GSS. Current smoking at the time of the survey was associated with all-cause mortality in NHANES (RR=1.27, 95% C.I. 1.07, 1.51) and GSS (RR=1.41, 95% C.I. 1.30-1.50); pack-a-day smoking was associated with all-cause morality in NHIS (RR=1.57, 95% C.I. 1.52-1.62). Stronger associations were generally observed for alcohol- and tobacco-related mortality, although there was substantial subgroup variation. There are age, race, and gender subgroup and cross-survey differences in observed associations between substance use and mortality. Methods to harness and use linked survey data are increasingly needed to employ these growing data resources in epidemiological inquiries.

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OPTIMAL SURVEILLANCE NETWORK DESIGN: A VALUE OF INFORMATION MODEL. Matteo Convertino*, Yang Liu (University of Minnesota)

Infectious diseases are the second leading cause of death worldwide Of the estimated 57 million deaths that occur throughout the world each year, about 15 million, that more than 25% of all deaths, are directly caused by infectious diseases. The ability to early detect outbreak sources via a highly efficient surveillance system is hugely important for health and economic outcomes of populations. Here, we propose a model analogous to wave pattern recognition models to detect "zero-patient" areas based on outbreak spread. We demonstrate model effectiveness with real data from the Cholera epidemic in Cameroon, foodborne Salmonella epidemic in USA, and the H5N1 avian influenza pandemic. We complement previous models by introducing an optimal selection algorithm of surveillance networks based on their value of Information (VoI) of reporting nodes that are sub- networks of mobility networks in which people, food, and species move. The optimal surveillance network has the highest VoI and lowest detection error. A 40% minimum increased accuracy in detecting outbreak sources is estimated by maximizing the VoI versus the random surveillance model independently of outbreak epidemiology. Such accuracy is achieved with an average 25% reduction of required surveillance nodes. We emphasize that accuracy in systems diagnosis increases when system syndromic signs are the most informative. Only in this way surveillance network can reveal linkages of outbreak patterns and network processes. The developed model is extremely useful for the design of optimal surveillance networks that can drastically reduce the burden of infectious diseases. Such model is a cyber-technology that governments and industries can use in real-time in order to avoid dramatic and costly outcomes. Further applications are for chronic diseases and for other detection problem.

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ADJUSTING FOR POOLED COVARIATES IN CASE-CONTROL STUDIES. Neil J Perkins*, Emily M Mitchell, Edwina Yeung, Enrique F Schisterman (NIH/NICHD)

Pooling designs offer a variety of benefits over analysis of individual samples in epidemiologic studies involving biomarkers, such as reducing assay costs and increasing efficiency compared to full and random sampling. When pooling a biomarker of an exposure of interest, current pooling designs seek to form pools that are homogeneous with respect to the outcome, in order to facilitate analysis. When this design is not implemented, such as when pools are formed before the outcome is observed, available statistical methods may not be directly applicable. This obstacle often discourages researchers from applying potentially significant cost-saving pooling techniques to measure biospecimens. In this study, we extend a multiple imputation framework for pooled, skewed biomarkers, focusing on logistic regression to adjust a main exposure measured individually for potentially costly covariates utilizing pools. The proposed methods readily permit analysis of pools that are heterogeneous with regard to outcome status. We perform a simulation study to quantify the benefit of adjusting for pooled measurements rather than complete individual measurements or a random sample of individual measurements. Polychlorinated biphenyls, both relatively costly and difficult to measure, were used to illustrate these methods. Adjusted main effect estimates using pooled covariates are similar with those using full individual data and standard errors are within 5% while drastically reducing the number of nuisance assays, at least half, necessary to achieve adjusted estimates.

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ROAD SEGMENT CHARACTERISTICS AND THE INCIDENCE OF FARM VEHICLE-RELATED CRASHES: A MULTI-STATE GIS-BASED MATCHED CASE-CONTROL STUDY. Shabbar I Ranapurwala*, Elizabeth Mello, Marizen Ramirez (Injury Prevention Research Center, The University of Iowa, Iowa City, IA)

Agricultural workers have the highest occupational mortality rate in the United States, and more than a third of the fatalities are attributed to transportation. Farm vehicle-related crashes (FVC) are hazardous for both farm and non-farm vehicle operators. In a matched case-control study, we measured gradient and sinuosity of road segments using ArcGIS, and evaluated their association with the incidence of FVCs from nine Midwestern states of the US during 2005-2010. A road segment with a FVC was defined as case (n=6,848), and a road segment without FVC was defined as control. The FVC data were collected from nine state departments of transportation, and road segment data from the Environmental Sciences Research Institute. Controls were matched by ZIP code, road type, and road segment length following 1:1 (controls=6,808) and 1:2 (controls=13,566) matching schemes. Using multivariable conditional logistic regression, odds ratios (OR) and 95% confidence intervals (CI) were computed. For sensitivity analyses, risk ratios for FVC incidence were calculated from the full cohort of road segments (n=6,491,811) using log linear regression. Compared to a leveled (<1% gradient) and straight (<1% sinuosity) road segment, increased gradient and sinuosity were associated with fewer FVCs. A road segment with >10% gradient was associated with 40% decreased FVC incidence (OR=0.60, 95% CI: 0.49, 0.75), and a road segment with >30% sinuosity was associated with 79% decreased FVC incidence (OR=0.21, 95% CI: 0.13, 0.36). Results were robust across all analyses. These associations may be due to cautious driving behaviors when maneuvering curvy or steep roads.

150-S/P

METHODS FOR ESTIMATING THE COMPARATIVE EFFECTIVENESS OF CLINICAL STRATEGIES THAT ADMINISTER THE SAME INTERVENTION AT DIFFERENT TIMES. Anders Huitfeldt*, Mette Kalager, James Matthew Robins, Geir Hoff, Miguel A. Hernan (Harvard School of Public Health)

In the absence of randomized trials, the generation of evidence to support clinical guidelines requires the emulation of trials using observational data. In this paper, we provide a methodology for emulating trials that compare the effects of different timing strategies, i.e., strategies that vary the frequency of delivery of a medical intervention or procedure. We review trial emulation for comparing (i) single applications of the procedure at different times, (ii) fixed schedules of application, and (iii) schedules adapted to the evolving clinical characteristics of the patients. For illustration, we describe an application where we estimate the effect of surveillance colonoscopies in patients who had an adenoma detected during the NORCCAP trial. We discuss methodological challenges that arise in the context of this surveillance intervention, such as confounding due to covariates that are only observed in those who undergo a colonoscopy, and the possibility of lead time bias.

151-S/P

EVALUATING INTERACTION IN THE METRIC OF TIME. Andrea Bellavia*, Matteo Bottai, Nicola Orsini (Unit of Biostatistics and Unit of Nutritional Epidemiology, Institute of Environmental Medicine, Karolinska Institutet, Stockholm, Sweden)

Statistical interaction between two exposures of interest can be evaluated as a departure from additivity or multiplicativity, depending on the scale of the chosen model. The public health meaning and importance of presenting interaction according to both scales has been widely emphasized. In time-to-event analysis, however, given the popularity of the Cox proportional-hazard model, interaction analysis is usually limited to the multiplicative scale. Measures of additive interaction can be calculated using coefficients from a Cox regression, but these are seldom presented in epidemiological studies. In addition, all measures of interaction in time-to-event analysis, whether additive or multiplicative, are based on the hazard/rate scale, and a constant interaction during the follow-up period is typically assumed for simplicity. A possible approach for the analysis of time-to-event data is the evaluation of survival percentiles, defined as the time points by which different subpopulations reach the same fraction of events. In this approach the prospective is changed, with probability of the event of interest fixed to a specific proportion, and the time variable to be estimated. Statistical methods for the evaluation of conditional survival percentiles are available and their application in epidemiology is increasing. Evaluating interaction in this context assesses how the impact of one exposure on survival time is affected by another exposure. Moreover, this approach makes interaction dependent on the proportion of events considered, allowing an evaluation of how interaction is changing during follow-up time. The aim of this presentation is to introduce the concept of interaction in the metric of survival time, presenting the benefits of focusing on survival percentiles in its evaluation and estimation. With the proposed method interaction can be assessed both on the additive or multiplicative scales without assuming constant effects over time.

152-S/P

ACCOUNTING FOR TEMPORAL TRENDS IN STANDARDIZED RATIO MEASURES WITH RANDOM EFFECTS POISSON REGRESSION MODELS. Kaitlin Kelly-Reif* (University of North Carolina Chapel Hill Department of Epidemiology)

In population studies where stratum-specific numbers are small, indirect standardization may be used to avoid imprecise estimates. Standard incidence ratios (SIRs) compare observed disease incidence in a small study population against expected incidence based on stratum-specific rates from a large standard population. SIRs cannot be directly compared across calendar periods unless the underlying person-time distributions of the standardization variables (such as age) are the same over time. We apply of a method for examining and reducing heterogeneity in standardization variables across time. We chose a population surrounding a former nuclear facility in Apollo, Pennsylvania and a standard population of Pennsylvania. Prior studies of the Apollo area indicated that inferences form traditional SIR calculations may be limited because of migration and aging. A random effects model was fit to test and control for heterogeneity of person-time distribution by age across calendar periods. While SIRs are most often calculated in a tabular format, SIRs can be estimated by fitting a lognormal Poisson model in which the offset represents the product of the person-time in the study population and the rate of cancer in the standard population; a random effect for age was included to test and account for person-time heterogeneity of age across calendar periods. SIRs in the random effects model did not differ significantly from the standard SIR estimates. From 1990 to 1994 the standard SIR was 2.03 (95%CI: 1.88, 2.17) and the hierarchical SIR was 2.06 (95%CI: 1.85, 2.26). From 1995 to 1999, the standard SIR was 1.64 (95%CI: 1.50, 1.77) and the hierarchical SIR was 1.65 (1.47, 1.82). All corresponding Ï*f*2 estimates were below 0.01, indicating that the amount of heterogeneity in incidence ratios was minimal. This example shows how random effects models can be used to evaluate the comparability between SIRs across time when the underlying person-time distribution may change.

154-S/P

UNIFORM VERSUS ALL-AVAILABLE LOOK-BACKS TO IDENTIFY STUDY EXCLUSION CRITERIA IN OBSERVATIONAL COHORT STUDIES. Mitchell M. Conover Michele*, Jonsson Funk (Department of Epidemiology, Gillings School of Global Public Health, University of North Carolina at Chapel Hill)

BACKGROUND: In cohort studies using secondary data, conventional methods characterize subjects using a uniform baseline window (look-back) for all subjects. However, Brunelli et al (PDS 2013) reported using all available covariate history to identify and adjust for confounders was superior to uniform look-backs in most scenarios examined. AIM: Compare bias and efficiency of two approaches (uniform, all-available) to identifying study exclusion criteria. **METHODS:** We simulated dichotomous confounder (C), exposure (E), outcome (D), and 120 month history of healthcare encounters and insurance status (ie. database enrollment). We also simulated an unmeasured confounder (F) causally associated with all study variables and causally linked insurance status to healthcare encounters. In addition to a crude model with no exclusions, we identified and excluded subjects with C using uniform and all-available look-backs. We varied model parameters and variable relationships in multiple scenarios, conducting 1,000 iterations with study sizes of 5,000. We estimated relative bias and relative mean squared error (MSE) as all-available/uniform. **RESULTS:** With no unmeasured confounding present, relative bias ranged from 0.04 to 0.70 and relative MSE from 0.21 to 1.34. All-available look-back was least biased but was in some cases less precise than uniform and crude estimates due to additional exclusions. In scenarios with unmeasured confounding acting in the same direction as the measured confounder, relative bias ranged from 0.44 to 0.97 and relative MSE from 0.31 to 0.99. When unmeasured and measured confounding acted in opposite directions, the crude usually outperformed all adjustment methods. **CONCLUSIONS:** The all-available approach results in the best control of the measured confounder C. It produces the best estimates in all cases examined except when residual confounding due to misclassification of C offsets the bias of an unmeasured confounder acting in the opposite direction.

155-S/P

ESTIMATING ADDITIVE INTERACTIONS FROM FIRST PRINCIPLES. Orestis A. Panagiotou*, Sholom Wacholder (Division of Cancer Epidemiology & Genetics, National Cancer Institute, National Institutes of Health, Bethesda, MD)

Estimating additive interactions from first principles Orestis A. Panagiotou, Sholom Wacholder Division of Cancer Epidemiology & Genetics, National Cancer Institute, National Institutes of Health, Bethesda, MD We use first principles to quantify the difference between the risk reduction obtained from reducing each of 2 exposures together and the sum of the risk differences obtained from reducing the 2 exposures separately. Metrics of the impact of joint effects or comparisons of joint effects presented in units of absolute risk, such as the "absolute measure of the interactive effect" (I), can provide more meaningful quantitative measures of public-health impact of potential interventions that reduce exposures than "unit-less" metrics like ratios, and standardized metrics, like population attributable fraction. In particular, the venerable attributable community risk (ACR) metric can provide an estimate of the community impact of such interventions in units of absolute risk. Using algebra, graphics, and examples, we show that positive interaction, or synergy, on the additive scale implies that the impact on risk reduction from a program that applies both interventions will be lesser than the sum of the impacts of the separate interventions.

156-S/P

PARAMETRIC MEDIATIONAL G-FORMULA APPROACH TO MEDIATION ANALYSIS WITH TIME-VARYING EXPOSURES, MEDIATORS AND CONFOUNDERS: AN APPLICATION TO SMOKING, WEIGHT, AND BLOOD PRESSURE. Sheng-Hsuan Lin*, Jessica Young, Eric Tchetgen Tchetgen, Miguel Hernan, Tyler J. VanderWeele (Department of Epidemiology and Biostatistic, Harvard School of Public Health)

Mediation analysis with time-varying mediators is a common but challenging problem with longitudinal cohort data, and standard mediation analysis approaches are generally inapplicable. The mediational g-formula is a new approach to address this question. In this paper, we develop a parametric approach to provide methods for the mediational g-formula to implement it with data, including a feasible algorithm and a Statistical Analysis System (SAS) macro. We apply this method to Framingham Heart Study dataset to examine pathways for the effect of smoking on blood pressure mediated by and independent of weight change for a 10-year follow-up period. Compared with non-smoking, smoking 20 cigarettes per day for 10 years increases blood pressure by 2.87 (95 % C.I. 0.36 - 5.38) mm-Hg. The direct effect in fact increases blood pressure by 3.06 (95 % C.I. 0.65 - 5.47), and the mediated effect is -0.19 (95 % C.I. -0.28 - -0.08). This provides evidence that weight change in fact partially conceals the detrimental effect of cigarette smoking on blood pressure. This work represents the first application of the mediational g-formula in an epidemiologic cohort study.

157-S/P

MULTIPLE IMPUTATION FOR MISSING OUTCOME DATA IN A MEDICAL CHART REVIEW STUDY USING INTERNAL VALIDATION DATA. Xiaojuan Li*, Violeta Hennessey, Fei Xue (Epidemiology, University of North Carolina, Chapel Hill, NC, United States)

Missing outcome data due to incomplete medical chart retrieval, which leads to missing information, is a common problem in studies in which the outcome status is confirmed through medical chart review. This may result in bias and loss of information. We aimed to evaluate the performance of multiple imputation (MI) to handle missing data for the outcome status when internal validation results are available for a subgroup in a chart review study of osteonecrosis of the jaw (ONJ). A cohort of 363 women, ≥55 years with post-menopausal osteoporosis who initiated a bisphosphonate between 2004 and 2012 and developed potential incident ONJ (PONJ) were identified using relevant diagnosis codes from the MarketScan claims database. Their true outcome status was determined using an alloyed gold-standard based on frequency and interval of diagnosis and treatment. In the complete data with the gold-standard outcome measure, the estimated positive predictive value (PPV) was 9.64% (95% CI: 6.61%-12.68%). With random sampling, we selected 30% of all PONJ cases to use as a hypothetical validation subgroup. In the analysis, we assumed that the true outcome status was available only for those selected to be in this subgroup. Restricting the analysis to the validation subgroup yielded a PPV of 9.09% (95% CI: 3.72%-14.46%). The MI approach with 40 repetitions produced a PPV of 9.52% (95% CI: 4.52%-14.52%). The sensitivity and specificity of the MI approach in the 70% subgroup missing true outcome status were 0.17 and 0.91, respectively, and increased slightly as the size of the validation subgroup increased. The MI approach can be used to derive missing outcome data and obtain valid statistical inference for aggregative data analysis when data for an internal validation subgroup are available. However, it is not advisable to use MI to derive individual-level case status.

158-S/P

EXTERNAL VALIDITY OF THE MAYO CLINIC OVARIAN CANCER CASE-CONTROL STUDY. Zhiying Zhang*, Aminah, Jatoi, Sara J. Holton, Jeremy A. Vold, Zachary A. Fogarty, Melissa C. Larson, Starr R. Guzman, Kimberly R. Kalli, Brooke L. Fridley, Ellen L. Goode (Department of Kinesiology and Community Health, University of Illinois at Urbana-Champaign, Champaign, IL 61820, USA)

External validity of clinic-based epidemiologic studies is often not thoroughly assessed. The present study aimed to evaluate characteristics of a clinic-based case series in the Mayo Clinic (Rochester, MN) Ovarian Cancer Case-Control Study. Women diagnosed with epithelial ovarian, fallopian tube or primary peritoneal cancer between 2000 and 2010 were eligible if they were aged 20-74 years, resided in 6 states (MN, ND, SD, WI, IL, or IA), consented in a year of diagnosis, and provided a blood sample and/or risk factor questionnaire. The demographics, tumor characteristics and survival of 925 enrolled cases were compared with those from the Iowa registry and 18 population-based cancer registries of the Surveillance, Epidemiology, and End Results (SEER) program. The demographic profiles were similar with a majority of the cases as white (97%, 98%, and 86% for Mayo, Iowa, SEER 18 respectively), aged 45 to 79 (92%, 91%, and 89% respectively), married or in a partnership (72%, 63%, and 58% respectively). Mayo participants had somewhat more aggressive disease than those reported to SEER. A greater proportion of enrolled patients were classified as primary peritoneal cancer (20%, 11%, and 8% for Mayo, Iowa, SEER 18 respectively) and "cystic, mucinous and serous" histology type (78%, 63%, and 60% respectively). They were also more likely to be diagnosed with grade IV, SEER regional stage and AJCC stage III cancer (38%, 49%, and 50% respectively) than Iowa (19%, 22%, and 41% respectively) and SEER 18 registries (18%, 21%, and 40% respectively). Although the 1-year overall survival rate was greater for the Mayo participants, the 5-year overall survival rates were very close. These analyses reveal a reasonable degree of external validity. Demographics, clinical characteristics, and 5-year survival of patients enrolled at Mayo Clinic were similar to the neighboring Iowa and the broader SEER 18 registries, suggesting that findings from the Mayo Clinic study may be generalizable.

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GENDER DIFFERENCES IN THE IMPACT OF BODY MASS INDEX ON SELF-RATED POOR HEALTH IN 49 LOW- AND MIDDLE -INCOME COUNTRIES. Aolin Wang*, Onyebuchi A. Arah (Department of Epidemiology, The Fielding School of Public Health, University of California, Los Angeles, Los Angeles, California, USA)

Introduction It is known that excess body mass index (BMI) affect self-rated poor health in high-income countries. Yet, few studies examined such relation using cross-national data and whether it differed by gender in low-income countries (LICs) versus middle-income countries (MICs). This study investigated the relations between BMI and poor health and whether such relations differed by gender in LICs versus MICs. **Methods** We analyzed World Health Survey (2002-2004) data on 160,099 participants from 49 LICs and MICs. Using random-intercept multilevel logistic regressions, we estimated adjusted odds ratios and corresponding 95% confidence intervals for the associations between BMI and self-rated poor health for males and females in LICs and MICs separately. **Results** We found U-shaped relations between BMI and poor health in both genders and in LICs and MICs. Being underweight was more strongly associated with poor health among males than females in both LICs and MICs. The relations between excess BMI and poor health were similar in both genders in LICs, but such relations were slightly stronger among females than among males in MICs. Being overweight was not or slightly negatively associated with poor general health among males and females in LICs, but such associations varied in direction by gender in MICs. **Conclusion** Expectedly, excess BMI is associated with poor general health, especially among females than males, although sometimes in complex ways by gender and in LICs versus MICs. Tackling obesity requires both local and global analyses aimed at intra- and cross-national learning.

161-S/P

SEX-SPECIFIC RELATIONSHIP BETWEEN ANTHROPOMETRY AND BODY COMPOSITION FROM COMPUTED TOMOGRAPHY (CT): THE MEDIATORS OF ATHEROSCLEROSIS IN SOUTH ASIANS LIVING IN AMERICA (MASALA) STUDY. Morgana Mongraw-Chaffin*, Alka M. Kanaya, Namratha R. Kandula, Arti Shah, Cheryl A.M. Anderson (Department of Family Medicine and Public Health, University of California, San Diego)

Despite the strong association between visceral fat and cardiometabolic risk, the relationships between anthropometry and the body composition measures that they are intended to approximate remain unclear. Few studies have examined these relationships, fewer have determined if they differ by sex, and none have investigated them in US South Asians. We conducted a cross-sectional study of 818 participants in the Mediators of Atherosclerosis in South Asians Living in America (MASALA) Study who had BMI<40kg/m2 and underwent abdominal CT scans for measurement of visceral fat area (VFA) and subcutaneous fat area (SFA). VFA and SFA were naturally log transformed, and linear regression was used to model the associations between anthropometric measures and body composition. Non-linearity and heterogeneity by sex were formally assessed by including quadratic and interaction terms in the model. All measures of anthropometry, except for height, were significantly associated with VFA and had a significant non-linear component ($p<0.05$). Only the association between VFA and waist circumference exhibited significant heterogeneity by sex (% difference in VFA slope by waist circumference(cm): for women 10.85 and men 11.74 with $p=0.011$ for interaction). Except for height, all measures of anthropometry were significantly associated with SFA, had a significant quadratic component, and significant heterogeneity by sex (Weight(kg): 5.44 for women, 6.82 for men BMI(kg/m2): 26.74, 31.00 Waist circumference(cm): 6.40, 8.33 Hip circumference(cm): 13.09, 15.37) at $p<0.001$. In MASALA participants, the relationships between anthropometric measures and VFA appear stronger than in other race/ethnic groups, but with weaker non-linearity and heterogeneity by sex. The significant heterogeneity by sex for waist circumference with VFA and for SFA indicate that researchers should consider separate models by sex for US South Asians when approximating SFA or using waist circumference to approximate VFA.

162-S/P

INVESTIGATING THE ASSOCIATION BETWEEN SLEEP DURATION AND OBESITY AMONG CHILDREN AGED 9 BY RACE AND GENDER. Erin Emanuele*, Sean Clouston, Lauren Hale (Program in Public Health, Stony Brook University)

Background: The increasing prevalence of childhood obesity in the United States is associated with a range of health risks both in childhood and throughout life. Recent research has associated chronic short sleep duration as a determinant of childhood obesity. While existing research has suggested that short sleep is more strongly associated with obesity among males, few scholars have examined whether the relationship between sleep duration and obesity varies at the intersection of race and gender. Our study examines the association between sleep duration and obesity by race and gender among children aged nine. **Methods:** We used data from the age 9 wave of the Fragile Families and Child Wellbeing Study, longitudinal cohort study of children residing in twenty metropolitan cities in the United States. Logistic regression models were used to analyze the proposed relationship. Additionally, interaction effects were examined by plotting the estimated likelihoods of obesity regressed on hours of sleep by race/ethnicity (white, black, and Hispanic). These models were stratified by gender. **Results:** Results showed that, after adjusting for covariates, each hour increase in sleep duration was associated with a 13% decrease in the odds of obesity among females (OR: 0.87, CI: 0.78-0.97, $p<0.05$). However, effects were concentrated among White females. Significant associations were not found among males. **Conclusion:** Among White females, short sleep was significantly associated with obesity. However, in contrast to other studies, this association was not found for non-white females nor for males of any race/ethnicity. Future studies should continue to examine the association between sleep duration and obesity by both gender and race.

163-S/P

EVALUATION OF ARSENIC EXPOSURE WITH BODY MASS INDEX, HEIGHT, AND WEIGHT IN A LARGE POPULATION-BASED COHORT. J. Li*, M. Argos, F. Parvez, Y. Chen, T. Islam, A. Ahmed, H. Ahsan (The University of Chicago, Chicago, IL,)

Background: Previous studies indicate that arsenic methylation efficiency may be associated with body mass index, although this observation has not been consistent across studies. However, no previous study has evaluated effects of urinary arsenic concentrations on body mass index. **Objective:** In cross-sectional analyses, we examined whether creatinine-adjusted urinary total arsenic exposure is associated with body mass index, height, and weight in a population-based sample of Bangladeshi population. **Method:** Participants included 20,026 individuals recruited in the Health Effects of Arsenic Longitudinal Study (HEALS) through souse-to-house survey. For each cohort member at recruitment, a spot urine sample was collected and urinary total arsenic and creatinine were measured in laboratory . In addition, height and weight were measured by a trained physician interviewer, from which body mass index was derived. Generalized estimating equations were used to estimate associations. **Results:** Creatinine -adjusted urinary total arsenic concentration was significantly inversely associated with body mass index, height and weight in a dose-dependent fashion. Effect estimates for log body mass index for increasing quintiles of arsenic exposure were 0 (reference), -0.0132 (-0.0201, -0.0064), -0.0266 (-0.0335, -0.0196), -0.0395 (-0.0465, -0.0325) and -0.0568 (-0.0640, -0.0496) (P for trend = <0.0001), adjusted for sex, age, smoking status, education, total calorie intake, and enrollment wave. Similar inverse association trends were observed for height and weight. **Conclusion:** Urinary arsenic is negatively associated with body mass index, height and weight at a population level. Further studies are needed to evaluate the biological basis and health implications of these associations.

164-S/P

IS THERE AN OBESITY PARADOX IN THE JAPANESE ELDERLY? A COMMUNITY-BASED COHORT STUDY OF 13,280 MEN AND WOMEN. Kenji Yamazaki*, Etsuji Suzuki, Takashi Yorifuji Toshihide Tsuda, Hiroyuki Doi (Okayama University)

Despite rising interest in an obesity paradox (i.e., a survival advantage of being obese), evidence remains sparse in Asian populations. In this cohort study, we aimed to verify this phenomenon among community-dwelling elderly people in Shizuoka, Japan. A total of 14,001 subjects (aged 65-84 years), randomly chosen from all 74 municipalities in the prefecture, completed questionnaires that inquired about age, gender, body weight, height, smoking status, alcohol consumption habits, socioeconomic status, physical activity, and disease conditions. Participants were followed from 1999 to 2009. In accordance with a suggestion by WHO, we classified participants by using appropriate body mass index for Asian populations as follows: 27.5 kg/m2 (obesity). We analyzed 13,280 subjects to estimate hazard ratios (HRs) and 95% confidence intervals (CIs) for all-cause mortality. After excluding 189 deaths that occurred during the first 1-year follow-up, 1,507 deaths were identified with a known date of death among 73,935 person-years. Compared with normal-weight subjects, overweight/obese subjects tended to have lower HRs; the multivariate HRs were 1.60 (95% CI: 1.40-1.82) for underweight, 0.83 (95% CI: 0.73-0.94) for overweight, and 0.86 (95% CI: 0.62-1.19) for obesity. When we performed subgroup analyses by sex and age (65-74 vs. 75-84), the HRs tended to be lower among obese men, albeit at a non-significant level (i.e., 0.56 (95% CI: 0.25-1.27) in men aged 65-74 and 0.78 (95% CI: 0.41-1.45) in men aged 75-84). Notably, overweight men had significantly lower HRs although no significant associations were found in overweight women. Our findings suggest that there may be an obesity paradox in Japanese elderly men, whereas we found no indication among elderly women. This pattern also persists in overweight subjects, implying the presence of "overweight paradox" only among elderly men.

165-S/P

CLINICAL, SOCIAL AND GENOMIC FACTORS THAT MAY INFLUENCE EARLY ONSET OBESITY. Sahel Hazrati* (Inova Health System)

Background: Childhood obesity has more than doubled in the past 30 years. Early childhood obesity is a multi-factorial condition, and genetic predisposition is one of the poorly understood risk factors. **Objective:** To identify risk factors that may influence childhood obesity Methodology: Over 1,700 families from various races or ethnicities have been recruited in prenatal stage, in the longitudinal genomic study of "First 1000 Days of Life", at Inova Translational Medicine Institute. Participants' biological specimens were collected and their clinical and social data were documented. Families receive a survey every six months after birth. Three hundred and seventy, 18-20 months old children have been included in this analysis by reason of availability of their 6, 12 and 18 months surveys. We analyzed the association of predictive variables such as breast milk, race/ethnicity, parental BMI and screen time to outcome variable (Weight to Length percentile), using Chi-square or Fisher's exact test and logistic regression. Collinearity of predictive variables was detected and removed and we performed a supervised case/control association analysis on 8 known variants associated with childhood obesity from 5 genes including FTO, MC4R, LEPR, NEGR1 and SAA1. **Results:** Over 30% of 18 months old children were overweight or obese (at or above the 85th percentile of weight to length). Children of Hispanic women or mothers with higher pre-pregnancy BMI had a higher rate of overweight or obesity while breast feeding was a protective factor. None of the 8 known genomic variants were significant for single site association. **Conclusion:** Early childhood obesity is a multi-factorial condition. Although Genome-Wide Association Study supports the idea of genetic heritage in obesity, our results from limited number of genes has not identified any association in a small cohort, but there is still much to be explained in terms of heritability and variants.

166-S/P

NEUROPEPTIDE Y GENOTYPE, DNA METHYLATION, AND BODY ADIPOSITY: THE POUNDS LOST TRIAL. Xiaochen Lin*, Qibin Qin Yan Zheng, Tao Huang, Mark Lathrop, Diana Zelenika, George A. Bray, Frank M. Sacks, Liming Liang, Lu Qi (Brown University)

Background: Neuropeptide Y is a key neuron-secreted peptide affecting adiposity; NPY variants have been related to obesity risk. However, little is known about the role of NPY variations in diet-induced change of adiposity. **Objective:** The objective was to examine whether NPY variants affected the change of adiposity in response to dietary interventions and whether DNA methylation at this locus affected the outcomes. **Design:** We genotyped a functional NPY variant rs16147 among 723 participants in the POUNDS LOST trial; we also derived CpG methylation in/near NPY from genome-wide methylation scan. Changes of obesity and fat distribution from baseline to 6 months and 24 months were evaluated with respect to the genotypes and methylation levels at different CpG sites. Gene-fat interaction was also examined. **Results:** The rs16147 C allele was associated with a greater reduction in waist circumference (WC) at 6 months ($P<0.001$). In addition, the genotypes showed a significant interaction with dietary fat in relation to WC (P for interaction=0.008): the association was stronger in individuals with high-fat intake (P=0.0002) than those with low-fat intake (P=0.869). At 24 months, the association remained significant in the high-fat diet group (P=0.019); though the gene-fat interaction became non-significant (P=0.301). In addition, we found associations between DNA methylation at 4 CpG sites and the reduction of WC at 6 months independent of the genotypes ($P < 0.05$ and FDR < 0.20). Among those four CpG sites, cg18119803 remained significant at 24 months ($P < 0.05$ and FDR < 0.20), and cg24245418 was also associated with the genotypes (P=0.001 and FDR=0.02). **Conclusion:** Our data indicates that genetic and epigenetic variations affect changes in abdominal adiposity in response to dietary interventions, and the effects of the rs16147 SNP were modified by dietary fat. DNA methylation at cg24245418 might be an intermediate linking the rs16147 SNP to the outcomes.

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ASSOCIATIONS BETWEEN OBESITY IN YOUTH, SUBSTANCE ABUSE AND OTHER HEALTH-RISK BEHAVIORS: FINDINGS FROM THE 2013 YOUTH RISK BEHAVIOR SURVEY. Ziyad Ben Taleb*, Raed Bahelah Raed (Florida International University)

Background The prevalence of obesity have increased dramatically among adolescents in the past two decades; yet, less information exists on the association of obesity with health-risk behaviors which are often established during childhood and adolescence. **Objectives** This study examined the association of obesity with substance abuse and other health-risk behaviors among U.S. youth.**Methods** Self-reported height and weight, tobacco, alcohol and other drugs use, violence and bullying and other health risky behaviors were assessed in a nationally representative sample of students enrolled between grade 9 to 12 (N=13583) who participated in the 2013 Youth Risk Behavior Survey (YRBS).**Results** About two thirds of the sample were normal weight, 15.4% were overweight 16.9% were obese. Females were more likely to be obese than males (AOR=1.78; 95% CI=1.52, 2.09). Obesity was positively associated with tobacco use (AOR=1.63; 95% CI=1.18, 2.25), history of fighting in school (AOR=1.29; 95% CI=1.08, 1.53), being bullied at school (AOR=1.34; 95% CI=1.17, 1.54), prolonged TV watching (AOR=1.48; 95% CI=1.31, 1.66), and prolonged video games playing (AOR=1.33; 95% CI=1.16, 1.52). Obesity was negatively associated with marijuana use (AOR=.76; 95% CI=.63, .91), ecstasy use (AOR=.53; 95% CI=.39, .73) and being physically active (AOR=.59; 95% CI=.50, .70). **Conclusions** Obese youth are at risk of developing health compromising behaviors which may compound medical and social problems associated with excess weight. Understanding the relationship between substance use, other health risk-behaviors and obesity is instrumental in designing obesity interventions for youth.

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INTERACTION BETWEEN MTHFR 677C>T AND PERICONCEPTIONAL FOLIC ACID SUPPLEMENTATION IN THE RISK OF HYPOSPADIAS. Nel Roeleveld*, Elisabeth Dokter, Iris van Rooij, Charlotte Wijers, Barbara Franke, Jan Jaap van der Biezen, Wout Feitz, Loes van der Zanden (Radboud Institute for Health Sciences, Radboud university medical center, Nijmegen, The Netherlands)

Background Hypospadias is a congenital malformation of the penis in which the meatus is located on the ventral side. Both environmental factors and genetic predisposition are believed to play a role in the pathogenesis. Folate is essential for cellular growth and differentiation during embryogenesis. Folate levels are reduced by the C677T polymorphism in the methylenetetrahydrofolate reductase (MTHFR) gene, which is involved in the etiology of several birth defects, but was never studied for hypospadias. Maternal use of folic acid supplements may compensate for reduced folate levels and play a role in the prevention of birth defects. As the results for hypospadias are inconsistent, we studied the role of maternal periconceptional use of folic acid supplements and mother and child MTHFR C677T polymorphisms in the etiology of hypospadias. **Methods** We conducted a case-control study among 914 nonsyndromic hypospadias cases and 711 population-based controls from the AGORA (Aetiologic research into Genetic and Occupational/environmental Risk factors for Anomalies in children) data- and biobank, born between 1990 and 2012. Information on folic acid use was derived from maternal questionnaires and DNA from mother and child was used to assess the MTHFR C677T polymorphism using Taqman assays. In the analyses, we assumed a dominant effect of the polymorphism. **Results** Preliminary univariable analyses showed a small protective effect of folic acid supplement use on the risk of hypospadias (OR=0.8, 95%CI: 0.6-1.0). No associations were found for the mother or child MTHFR C677T polymorphism (both OR=1.1; 95%CI: 0.9-1.4). However, lack of folic acid supplement use in combination with carrying the MTHFR C677T polymorphism increased the risk of hypospadias (child: OR=1.5; 95%CI: 1.1-2.1, mother: OR=1.5, 95%CI: 1.1-2.2). **Conclusion** This study showed an increased risk of hypospadias when no folic acid supplements were used and mother or child carried the MTHFR C677T polymorphism.

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LOW 50 G GLUCOSE CHALLENGE TEST RESULT AND ITS RISK ASSOCIATION WITH THE DELIVERY OF A SMALL-FOR-GESTATIONAL AGE NEONATE. Jian Liu*, Jing Zhang, Junhong Leng, John Hay, Xinlin Yang, Gongshu Liu (Brock University)

Objective: to examine whether low glucose challenge test result is associated with an increased risk of the delivery of a small-for-gestational age neonate. **Method:** 1,572 women from a population-based perinatal cohort study conducted in the District of Benshen, City of Tianjin, age between 19 and 39 years, singleton, 1 hour 50 g glucose challenge test result less than 7.8 mmol/L at 24 – 28 weeks of gestation, were included in this analysis. Small-for-gestational age neonate was defined as birth weight < the 10th percentile for gender separated gestational age of Tianjin singletons. **Results:** a total of 164 neonates (10.4%) were identified as small-for-gestational age infants. There was no statistical difference between male infants and female infants in the prevalence of small-for-gestational age (10.7% vs. 10.2%). The gender combined prevalence rates of small-for-gestational age were higher among mothers with lower glucose challenge test results when blood glucose levels were categorized into quintiles (Q1 [lowest] – Q5 [highest]: 14.2%, 11.6%, 8.0%, 9.1%, and 9.3%). After adjusting for the impact of potential confounding variables with logistic regression model, compared to participants in the Q3, the odds ratios (OR, 95% confidence intervals [CI]) of small-for-gestational age infant for Q1, Q2, Q4, and Q5 were 2.25 (1.27, 3.99), 1.80 (1.01, 3.24), 1.27 (0.69, 2.33), and 1.31 (0.71, 2.39), respectively. When blood glucose of GCT was considered as continuous, one standard deviation increases in blood glucose level of GCT was associated with 19% decreased odds of small-for-gestational age infants (OR [95% CI], 0.81 [0.68, 0.96]). **Conclusion:** low blood glucose of glucose challenge test result is associated with an increased risk of having a small-for-gestational age infant at delivery.

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INFANT FEEDING PRACTICES BY MODE OF CONCEPTION. Kara A. Michels*, Sunni L. Mumford, Rajeshwari Sundaram, Erin Bell, Scott Bello, Edwina Yeung (Division of Intramural Population Health Research, Eunice Kennedy Shriver National Institute of Child Health and Human Development, Rockville, MD)

Background: Differences in infant feeding practices between parents conceiving with and without fertility treatments are poorly described. Feeding may be influenced by socioeconomic differences or the increased risk of preterm birth and low birth weight among infants conceived with in vitro fertilization —as these outcomes may influence growth, appetite, and nutritional needs in infancy. **Methods:** The Upstate KIDS cohort enrolled mothers delivering live births in upstate New York between 2008-2010 and sampled on fertility treatment exposure. Parents reported fertility treatment at baseline and feeding practices such as provision of breast milk, solid foods, formula, juices, and plant/animal milks at 4, 8, and 12 months postpartum. Logistic regression for repeated measures was used to compare odds for each feeding practice by mode of conception, after adjusting for maternal age, body mass index, education, marital status, and private insurance status and paternal age, race, and education. **Results:** Among 4,332 infants (singletons and a randomly selected infant from twin sets), 1,273 (29%) were conceived with fertility treatments. Compared to mothers not conceiving with treatments, mothers who used treatments were less likely to breast feed at 8 (OR 0.74, 95%CI 0.62, 0.87) and 12 months postpartum (OR 0.66, 95%CI 0.53, 0.83); more likely to initiate solid foods by 8 months (OR 2.84, 95%CI 1.52, 5.30); and more likely to provide formula at 4 (OR 1.17, 95%CI 1.00, 1.36), 8 (OR 1.42, 95%CI 1.17, 1.73), and 12 months (OR 1.25, 95%CI 1.05, 1.48). Juices were also more likely to be provided at 4 months, as were milks at 12 months. Similar results were seen when limiting to singletons. **Conclusions:** Infants conceived with fertility treatments are less likely to be breast fed and more likely to be introduced to other forms of nutrition in infancy. Findings may be due to difficulties breast feeding, social beliefs, or physician recommendations.

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MATERNAL METABOLIC RISK FACTORS ASSOCIATED WITH AUTISM SPECTRUM DISORDER- AN ANALYSIS OF ELECTRONIC MEDICAL RECORDS AND LINKED BIRTH DATA. Natalia Connolly*, Daniel Lin, Keith Marsolo, Patty Courtney-Manning, Katherine Bowers (Cincinnati Children's Hospital Medical Center)

Autism spectrum disorder (ASD) affects around 1 in 68 children in the US. Prior studies have indicated that maternal weight characteristics and diabetes may be associated with offspring ASD risk; however results have varied across studies. Electronic medical records (EMR) present the opportunity for large-scale epidemiologic studies. Our objective was to construct a cohort using data from EMR and publicly available birth records and to determine potential associations between maternal metabolic risk factors and ASD. Methods- Demographic information and clinical narratives from outpatient office visits were abstracted for clinically confirmed ASD patient encounters at Cincinnati Children's Hospital Medical Center (CCHMC), spanning the time interval from 2006 -2014, and including patients with Ohio residences within the primary catchment area of CCHMC. To identify perinatal risk factors, whenever possible, subjects were linked to Ohio birth records by first and last name in a way that allowed for misspellings. A comparison cohort was constructed using births in the corresponding counties and birth years. Proportions and means were compared by case status using chi-square tests and t-tests, respectively. Logistic regression was employed to adjust for covariates identified a priori. Results- The cohort included 515 cases and 4,743 controls. Controlling for maternal age, gestational diabetes (GDM) was associated with an increased odds of having a child with ASD (odds ratio (OR) 1.41, 95% confidence interval (CI): 1.03, 1.92); however results were no longer significant after controlling for maternal pre-pregnancy BMI OR=1.31 (95% CI:0.95, 1.80). While maternal BMI was associated with offspring risk OR=1.02 (95% CI: 1.01, 1.03) the association was significant only for BMIs greater than 35 kg/m2 OR=1.67 (95% CI: 1.12, 2.49). Conclusion: High maternal pre-pregnancy BMI (>35 kg/m2) was significantly associated with having a child with ASD.

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EFFECTS OF INTERACTION BETWEEN MATERNAL SMOKING AND SOCIOECONOMIC STATUS ON BIRTH WEIGHT IN JAPAN. Kohta Suzuki*, Zentaro Yamagata, Ichiro Tsuji (University of Yamanashi)

Maternal smoking during pregnancy is associated with low birth weight. Moreover, recent studies have suggested that socioeconomic status (SES) may be associated with birth weight. However, few have examined the effect of the interaction of these factors on birth weight. We aimed to clarify the effects of this interaction using data from the results of 2 large national birth cohort studies in Japan. Data from the studies were linked with those from the vital statistics records of birth registration. Participants in the first and second studies were children born in 2001 (2001 cohort: n=47,015) and 2010 (2010 cohort: n=38,554), respectively. Of these, we analyzed 46,039 and 37,831 singleton babies born in 2001 and 2010, respectively. We conducted a multiple linear regression analysis to examine the association between maternal smoking and birth weight after controlling for sex of the children, parity, nationality of parents, and maternal age group. We compared the adjusted mean birth weight of children born to smoking and non-smoking mothers using the least square means method stratified by SES variables such as household income and maternal and paternal education. In the 2001 cohort, the difference in birth weights of children born to non-smoking and smoking mothers was smaller in the highest income quartile group (15.8 g) than that in the lowest income quartile group (59.4 g). The same trend was observed when the highest (16.7 g) and lowest (45.4 g) paternal education groups were compared. However, in the 2010 cohort, the difference in birth weights of children was only observed between the highest (16.8 g) and the lowest (68.7 g) paternal education groups. In conclusion, although some SES indicators modified the effect of maternal smoking on birth weight, this effect may differ depending on the time. However, our results suggest that the effects of unfavorable environment on infants may be more pronounced in communities with a lower SES.

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ASSOCIATIONS BETWEEN PRENATAL PHYSICAL ACTIVITY, BIRTH WEIGHT AND DNA METHYLATION AT GENOMICALLY IMPRINTED DOMAINS IN A MULTIETHNIC NEWBORN COHORT. Lauren E. McCullough*, Michelle A. Mendez, Erline E. Miller, Amy P. Murtha, Susan K. Murphy, Cathrine Hoyo (University of North Carolina Chapel Hill)

Background. Birth weight is a commonly used indicator of the fetal environment and a predictor of future health outcomes. While the etiology of birth weight extremes is likely multi-factorial, epidemiologic data suggest that prenatal physical activity (PA) may play an important role. The mechanisms underlying this association remain unresolved, although epigenetics has been proposed. This study aimed to estimate associations between prenatal PA, birth weight, and newborn DNA methylation levels at differentially methylated regions (DMRs) regulating four imprinted genes known to be important in fetal development. Methods. Study participants (N=1 281) were enrolled as part of the Newborn Epigenetics Study. Prenatal PA was ascertained using the Pregnancy Physical Activity Questionnaire, and birth weight data obtained from hospital records. Among 484 term mother-infant pairs, imprinted gene methylation levels were measured at DMRs using bisulfite pyrosequencing. Generalized linear and logistic regression models were used to estimate associations. Results. After adjusting for preterm birth and race/ethnicity, we found that infants born to mothers in the highest quartile of total non-sedentary time had lower birth weight compared to infants of mothers in the lowest quartile ($\hat{I}^2$= -81.16, SE=42.02, p=0.05). These associations appeared strongest among male infants ($\hat{I}^2$= -125.40, SE=58.10, p=0.03). Methylation at the PLAGL1 DMR was related to total non-sedentary time ($p<0.05$). Conclusions. Our findings confirm that prenatal PA is associated with reduced birth weight, and is the first study to support the role of imprinted gene plasticity in these associations. Larger studies are required.

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MATERNAL SERUM CAFFEINE METABOLITES DURING PREGNANCY AND CHILD COGNITION AND BEHAVIOR. Klebanoff MA*, Keim SA (Nationwide Children's Hospital and The Ohio State University)

Animal data indicate negative cognitive and behavioral effects of in utero caffeine on offspring, but few studies have evaluated associations in humans. We studied 2318 mother-child pairs from the Collaborative Perinatal Project (1959-66). The Stanford-Binet (48 mos) and WISC (84 mos) scales measured IQ, and psychologists observed child behavior. Maternal serum at <20 and ≥26 weeks was assayed for paraxanthine (caffeine's primary metabolite) by HPLC. Outcomes were IQ; and internalizing behavior at 48 & 84 months; oppositional at 48; hyperactive at 48; and externalizing at 84 (Donatelli, 2010). Covariates included maternal age, race, education, smoking, pre-pregnant weight and gestation at blood draw; secondary analyses included maternal IQ. Restricted cubic splines assessed non-linearity. After adjustment, serum paraxanthine <20 weeks was not significantly associated with any outcome. Maximum odds ratios for abnormal behavior over the range of paraxanthine were 1.4; mean IQ deficits for the 90th percentile of paraxanthine were <1 point. Paraxanthine ≥26 weeks manifested an inverted -U association with 84 month IQ, which increased to +1 point at ~750 ng/ml (66th percentile), returning to null at ~1685 ng/ml (92nd percentile, nonlinear p=.04; overall p=0.051). Results were of smaller magnitude for 48 month IQ. Paraxanthine ≥26 weeks had a positive, linear association with internalizing behavior at 48 mos (OR per 1000 ng/ml increase=1.6, 95% CI 1.1-2.4). No other associations approached significance. Adjustment for maternal IQ did not change results in the reduced sample. In general these results do not support an adverse effect of maternal caffeine use on child cognition or behavior.

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SLEEP HABITS AMONG PRIMARY SCHOOL STUDENTS IN JAPAN. Naoko Sakamoto*, Ai Noda, Itsuko Horiguchi, Noriko Morimoto, Takeshi Tanigawa (School of Health Sciences, Gunma University)

Background: Sleep is important for development, and insufficient sleep quality and quantity may lead to emotional and behavioral problems. We conducted a population-based study among primary school students to clarify the relationship between sleep habits, sleep duration, and emotional status. **Objective:** To describe issues related to sleep habits and duration in Japanese primary school students. **Design:** Cross-sectional study. **Setting:** All 55 public primary schools in Matsuyama city, Japan. Period: October, 2014 **Methods:** Self-administered questionnaires conducted on parents. Results: We received a total of 24,296 responses (response rate, 90%). After excluding those questionnaires that had not been completed in full, data from 22,482 were included in the analysis. **Results** showed that students obtained means of 8.6 and 9.0 hours of sleep on weekdays and weekends, respectively. Mean hours of sleep decreased with increasing school grade on both weekdays and weekends. As a screening tool for pediatric obstructive sleep apnea (OSA), we asked the following six questions: (i) Have you observed sleep apnea in your child?; (ii) Does your child snore during sleeping?; (iii) How loudly does your child snore? (iv) Does your child struggle to breathe during sleeping?; and (v) Do you shake your child to make them breathe during sleeping? (vi) does your child snore while asleep. The cumulative score was used to assess the students for OSA. In total, 2.45% of the scores were ≥2.72, which indicates a high risk for OSA. The percentages of scores ≥2.72 according to grade were 1.9%, 2.3%, 2.9%, 2.9%, 2.9%, and 3.1% for grades 1 to 6, respectively. **Discussion:** Previous studies have reported that the prevalence of OSA in primary school students is 1-4%, which is similar to that seen in this study. We plan to investigate this issue further by conducting clinical examinations for those students identified through screening as being at high risk for OSA.

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PERICONCEPTIONAL BENZODIAZEPINE USE AND THE RISK FOR BIRTH DEFECTS: DATA FROM THE NATIONAL BIRTH DEFECTS PREVENTION STUDY. Martha M. Werler*, Sarah C. Tinker, Jennita Reefhuis, Cheryl S. Broussard, Suzanne M. Gilboa, Rebecca H. Bitsko , Allen A. Mitchell (National Center on Birth Defects and Developmental Disabilities, Centers for Disease Control and Prevention)

Benzodiazepine medications can be used to treat anxiety, a common condition affecting 15% of women of childbearing age in the United States. Studies have shown conflicting results on the association of benzodiazepine use and risk for birth defects. We assessed whether periconceptional use of benzodiazepines was associated with an increased risk for selected birth defects using data from the population-based, multisite National Birth Defects Prevention Study. Logistic regression was used to estimate odds ratios for defect categories for which there were at least three exposed cases. Benzodiazepine use during the periconceptional period (month before to three months after conception) was reported by 0.7% (71/10,136) of mothers of control infants (liveborn without major birth defects). Alprazolam accounted for approximately half of benzodiazepine exposures. The prevalence of use of benzodiazepines decreased dramatically between the first and third month of pregnancy, corresponding to the timing of pregnancy recognition. Periconceptional alprazolam use was associated with esophageal atresia (crude odds ratio [cOR]: 3.6; 95% Confidence Interval [CI]: 1.7, 7.7) and hypospadias (cOR: 0.3; 95% CI: 0.1, 0.9); clonazepam use was associated with anotia/microtia (cOR: 3.9; 95% CI: 1.1, 13.8) and tetralogy of Fallot (cOR: 2.7; 95% CI: 1.1, 6.6); and lorazepam use was associated with pulmonary valve stenosis (cOR: 4.1; 95% CI: 1.2, 14.2), coarctation of the aorta (cOR: 4.4; 95% CI: 1.1, 16.9), and gastroschisis (cOR: 4.9; 95% CI: 1.4, 16.6). Individual adjustment for maternal age, race/ethnicity, education, and smoking status did not affect OR estimates, with the exception of gastroschisis, for which adjustment for age tended to strengthen associations. Many associations were tested and these results warrant additional study. Future analyses using empirical Bayesian methods will address potential confounding and data instability due to small sample size.

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WOMEN WHO PUMP WITHOUT FEEDING AT THE BREAST: WHO ARE THEY? Sarah Keim*, Kelly McNamara, Reena Oza-Frank, Sheela Geraghty (The Research Institute at Nationwide Children's Hospital)

Pumping (breast milk expression) has become increasingly common. Some women pump and never feed at the breast, but their characteristics are unknown. Women who delivered a singleton, liveborn infant at >24 weeks' gestation were invited to complete a postal questionnaire at 12 months postpartum (Moms2Moms Study). Women who intended to exclusively formula feed were excluded. Women reported socio-demographics and the timing of start/stop of pumping and feeding at the breast. Obstetric records were abstracted. Of 499 respondents (62% response), 96% ever provided milk for their infant (at the breast or pumped). Of these women, 7% pumped but never fed at the breast. Women who pumped but never fed at the breast pumped for a median 52 days (IQR=103, range 1-359 days) and fell into 3 categories: “hospital pumpers” – pumped milk during infant NICU stay and stopped at discharge, “short-term pumpers” – had healthy infant but pumped for <1 month, and “dedicated pumpers” – pumped for 2-12 months. After adjusting for length of infant hospitalization, women who pumped but never fed at the breast were more likely to have household income <$35,000/yr (OR=3.25, 95% CI: 1.41, 7.77), some college/associate’s degree or less education (OR=4.30, 95% CI: 1.82, 10.80), and delivered preterm (OR=6.69, 95% CI: 2.54, 17.40), compared to all other lactating women, per exact logistic regression. Further investigation into the motivations of and difficulties encountered by women who pump but do not feed at the breast is needed so lactation support can address their specific needs.

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PRENATAL EXPOSURE TO PERFLUOROALKYL COMPOUNDS (PFCS) AND BODY FATNESS IN GIRLS. Terry Hartman*, Ethel V. Taylor, Adrianne K. Holmes, Antonia M. Calafat, Kate Northstone, Kayoko Kato, W. Dana Flanders, Xiaoyun Ye, Michele Marcus, Michele Marcus (Dept. of Epidemiology, Rollins School of Public Health, Emory University, Atlanta, GA)

Perfluoroalkyl compounds (PFCs) are chemicals used to make coatings that resist stains, grease and water. Human exposure occurs through contaminated air, food and water. Previous analyses have reported an inverse association between prenatal PFC serum concentrations and birth weight. We used data from the Avon Longitudinal Study of Parents and Children (ALSPAC) in the United Kingdom to examine the association between in utero exposure to PFCs and body fatness in girls at age 9. Maternal serum samples were analyzed for perfluorooctane sulfonate (PFOS), perfluroroctanoate (PFOA), perfluorohexane sulfonate (PFHxS) and perfluoronanoate (PFNA). Body fat and lean mass at age 9 were measured by dual x-ray emission absorptiometry (DXA) and percent body fat calculated (%BF). Among 359 girls, median (intra-quartile range – IQR) %BF was 27.5 (IQR 21.7-34.6). Median (IQR) concentrations (all ng/ml) were 3.7 (2.9-4.8) for PFOS, 19.8 (15.0-25.3) for PFOA, 1.6 (1.3-2.2) for PFHxS, and 0.6 (0.5-0.8) for PFNA. Multivariable linear regression was used to model associations between each PFC and %BF after adjustment for covariates including mothers’ educational status, prepregnancy body mass index (BMI kg/m2) and smoking (PFNA only). Mothers’ education significantly modified the associations between maternal PFC concentrations and %BF of daughters. For example, for PFHxS, %BF significantly increased by 3.0% (p=0.04) and 3.3% (p=0.03) for each one unit (ng/ml) increase among girls with mothers in the highest and middle education groups, respectively, but decreased by 3.1% (p=0.04) for the corresponding change among girls with mothers in the lowest education group. Similar results were observed for PFOS and PFOA. Conversely, %BF significantly increased by 10% (p=0.04) for each one unit increase in PFNA (ng/ml) but only among girls with mothers in the lowest education group. These results suggest that prenatal exposure to PFCs is associated with body fatness among girls.

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MATERNAL MEDICAL CONDITIONS DURING PREGNANCY AND CHILDRENÂ’S GROSS MOTOR DEVELOPMENT UP TO AGE 24 MONTHS IN THE UPSTATE KIDS STUDY. Akhgar Ghassabian*, Rajeshwari Sundaram, Amanda Wylie, Erin Bell, Scott C. Bello, Edwina Yeung (Epidemiology Branch, Division of Intramural Population Health Research, Eunice Kennedy Shriver National Institute of Child Health and Human Development, National Institutes of Health)

Maternal health before or during pregnancy is related to children’s neurodevelopment. Less clear is whether children born to mothers with a medical condition in pregnancy experience mild delays in motor milestones. In this study, we obtained information on medical conditions before/during pregnancy using self-reports, birth certificates, and hospital records in 4909 mothers participating in Upstate KIDS, a population-based birth cohort. Mothers reported on their children’s motor milestone achievement at 4, 8, 12, 18, and 24 months of age. Failure time modeling under a Weibull distribution was used to examine the prospective relation of maternal medical conditions with time to achieve milestones in children. Hazard ratios (HR) <1 correspond to a longer time to achievement. After adjustment for confounders such as prepregnancy body mass index, children of mothers with gestational diabetes had a longer time to achieve sitting without support (HR: 0.85, 95%CI: 0.76-0.95), walking with assistance (HR: 0.88, 95%CI: 0.77-0.99) and walking alone (HR: 0.88, 95%CI: 0.77-0.99) compared to children of women with no diabetes. Associations slightly attenuated after adjustment for perinatal factors. Similar findings emerged for maternal diabetes diagnosed prior to pregnancy (HR: 0.82, 95%CI: 0.66-0.98 for walking with assistance; HR: 0.79, 95%CI: 0.62-0.96 for walking alone). Maternal hypertensive disorders of pregnancy were related to a longer time to achieve motor milestones, but the associations were not significant after adjustment for gestational age. Our data support the notion that children exposed to maternal diabetes, gestational or pre-gestational, may take longer to achieve motor milestones than children not exposed to diabetes, independent of maternal obesity.

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PERFLUOROALKYL ACIDS IN MATERNAL SERUM AND BIRTH WEIGHT IN THE AARHUS BIRTH COHORT. Cathrine Carlsen Bach*, Bodil Hammer Bech, Ellen Aagaard Nohr, Niels Bjerregaard Matthiesen, Jørn Olsen , Eva Cecilie Bonefeld-Jorgensen, Rossana Bossi,Tine Brink Henriksen (Perinatal Epidemiology Research Unit, Aarhus University Hospital, Aarhus, Denmark)

Background Previous studies indicated an association between intrauterine exposure to perfluorooctane sulfonate or perfluorooctanoate and birth weight. However, these two perfluoroalkyl acids (PFAAs) have to some extent been substituted by other compounds on which little is known. We aimed to investigate the association between levels of specific PFAAs and birth weight.**Methods** We studied 1488 first time mothers and their children from the Aarhus Birth Cohort (2008-2013). We measured 16 PFAAs in maternal serum (before 14 gestational weeks) and report results for those with more than 75 % of samples above the limit of quantification (seven compounds). The associations between PFAA quartiles and birth weight were determined by linear regression adjusted for potential confounders identified by directed acyclic graphs. **Results** For most PFAAs, no obvious association was apparent with birth weight. For perfluorooctanoate, the adjusted regression coefficient (95 % confidence interval) was 27 (-45; 100) g for the highest versus lowest quartile. Three compounds with a sulfonate group indicated possible associations (perfluorohexane sulfonate, perfluoroheptane sulfonate, and perfluoroctane sulfonate). These associations were stronger in term births and after additional adjustment for gestational age or modeling of z-scores. For perfluorooctane sulfonate the corresponding estimate was -52 (-125; 21) g in all births and [-64 (-129; 0) g] in term births. **Conclusions** Overall, we found no strong associations between PFAA exposures and birth weight. A few compounds showed tendencies towards an association. Two of these, perfluorohexane sulfonate and perfluoroheptane sulfonate, have only been studied sparsely.

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PERFLUOROALKYL ACID EXPOSURE AND INFANTILE COLIC: A STUDY IN THE DANISH NATIONAL BIRTH COHORT. Cathrine Carlsen Bach*, Ioanna Milidou,Bodil Hammer Bech,, Ellen Aagaard Nohr, Charlotte Søndergaard , Jørn Olsen , Tine Brink Henriksen (Perinatal Epidemiology Research Unit, Aarhus University Hospital, Aarhus, Denmark)

Background Perfluoroalkyl acids (PFAAs) are environmentally persistent chemicals measurable in blood samples from populations worldwide and known to cross the placenta. Infantile colic is a common condition of unknown etiology characterized by excessive crying during the first months of life. Our objective was to investigate the association between maternal levels of the two most common PFAAs, perfluorooctanoate (PFOA) and perfluorooctane sulfonate (PFOS), and infantile colic in the offspring. **Methods** We studied 1728 live-born singletons from two cohort samples from the Danish National Birth Cohort (1996-2002). Women gave blood samples in early pregnancy and participated in computer assisted telephone interviews assessing infant crying symptoms at 6 months post partum. Infantile colic was defined according to the modified Wessel's criteria (crying or fussing for > 3 hours per day, >3 days per week), starting before the age of 3 months. We investigated the association between quartiles of PFOA or PFOS and infantile colic (binary) by multivariate logistic regression. Covariates chosen with guidance from a directed acyclic graph included cohort sample, socio-economic status, maternal pre-pregnancy body mass index, age, and parity. **Results** There was no obvious association between PFAA exposure and infantile colic [adjusted odds ratios (95 % confidence intervals) for the highest PFOA and PFOS quartiles compared to the lowest were 1.04 (0.59 – 1.82) and 0.70 (0.40 – 1.22), respectively]. **Conclusions** In the first study to investigate the association between PFAA exposure and infantile colic we found no association. Larger studies, preferably with higher exposure contrasts, are needed.

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INTERGENERATIONAL TRANSMISSION OF THE HEALTHY IMMIGRANT EFFECT (HIE) THROUGH BIRTH WEIGHT: A SYSTEMATIC REVIEW AND META-ANALYSIS. Chantel Ramraj*, Ariel Pulver, Arjumand Siddiqi (Dalla Lana School of Public Health, University of Toronto)

Objectives: To assess the effects of generational status on the birth weight of infants born to first-generation and second-generation immigrant mothers and how this varies by country of origin and receiving country. **Methods:** We searched MEDLINE, EMBASE, Web of Science, PubMed, and ProQuest from inception to October 2014 for articles that recorded the birth weight of an immigrant's infant and at least one subsequent generation of infants' birth weight (mean birth weight (in grams) or odds of low birth weight (LBW)). Studies were analyzed descriptively and meta-analyzed using Review Manger 5.3 software. **Results:** We identified 10 studies (8 retrospective cohorts and 2 cross-sectional) including approximately 158,843 first generation and second-generation immigrant women. The United States and the United Kingdom represented the receiving countries with the majority of immigrants from South Asia or Mexico. Half of the studies were found to be of adequate quality. Six studies were meta-analyzed for mean birth weight and 7 for low birth weight. Although not statistically significant, a decrease in mean birth weight in the second-generation infants was consistently seen across all studies and subgroups. Second-generation infants were also at higher odds of LBW across all of the studies (7 studies, [147,854 births]; OR=1.21 [95% CI, 1.15, 1.27]) and subgroups, especially among infants of Mexican decent (3 studies, [46,099 births]; OR=1.47 [95% CI, 1.28, 1.69]). In the United States, second-generation infants were at 34% higher odds of LBW (4 studies, [52,941 births]; OR=1.34 [95% CI, 1.13, 1.58]) when compared to their first generation counterparts. **Conclusion:** With more time spent in the receiving country (in units of generations), the deterioration of birth weight is apparent among infants of second-generation immigrant mothers. The magnitude and direction of birth weight differences varies depending on the country of origin of the mother, and the receiving country.

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PROVISION OF OBSTETRICAL CARE IN FIRST NATIONS MOTHERS IN BRITISH COLUMBIA, CANADA. Corinne A. Riddell*, Jennifer A. Hutcheon, Leanne S. Dahlgren (McGill University)

Objectives The objective of this study was to compare indicators of obstetrical care quality and use of obstetrical interventions between First Nations and non-First Nations women in British Columbia (BC), Canada. **Methods** We linked obstetrical medical records with the First Nations status file for all nulliparous women delivering singletons in BC, 1999 to 2011. Using logistic regression models, we examined the differences in risk of various indicators of obstetrical quality and use of obstetrical interventions according to First Nations status, controlling for geographic barriers (distance to hospital) and other relevant confounders, including maternal age, diabetes, hypertension, and body mass index. The multiple imputation method, predictive mean matching, was chosen to impute missingness for BMI and distance. **Results** There were 220,350 singleton deliveries to nulliparous women, of whom 9,152 had First Nations status. First Nations women were less likely to have an early ultrasound (adjusted risk difference (RD)=10.2 fewer women with scans per 100 deliveries [95% CI= -11.3, -9.3]), less likely to have at least 4 antenatal care visits (RD=3.6 fewer women per 100 deliveries [-4.6, -2.6]), and less likely to have labour induction after prolonged (> 24 hours) pre-labour rupture of membranes (RD=-5.9 [-11.8, 0.1]) or at post-dates gestation (RD=-10.6 [-13.8, -7.5]). Obstetrical interventions including epidural, labour induction, instrumental delivery, and caesarean delivery were used less often in First Nations women. **Interpretation** First Nations women received suboptimal obstetrical care for a number of quality indicators. Obstetrical care providers should be aware of these inequalities in care and increase efforts to ensure that all women have culturally appropriate access to services regardless of their ethnicity.

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ASSOCIATION BETWEEN MATERNAL CHLAMYDIA DURING PREGNANCY AND RISK OF CYANOTIC CONGENITAL HEART DEFECTS IN THE OFFSPRING. Diane Dong*, José N. Binongo , Vijaya Kancherla (Emory University, Rollins School of Public Health)

Background: Genital Chlamydia is one of the most prevalent bacterial sexually-transmitted infections among reproductive aged women in the United States, and particularly in younger women. Untreated Chlamydial infection during pregnancy is associated with several adverse birth outcomes. Cyanotic congenital heart defects (CCHDs) constitute about one quarter of all cardiac malformations at birth, and are associated with high rate of morbidity and mortality. Epidemiological research on the association between maternal Chlamydia during pregnancy and CCHDs in the offspring is lacking. **Methods:** Using data from the 2012 U.S. birth certificates, we examined the association between CCHDs and prenatal exposure to Chlamydia among live singleton births with CCHDs (n=2487) and unaffected singleton births (n= 3,334,424). We estimated adjusted odds ratios (aORs) and 95% confidence intervals (CIs) using multiple logistic regression analysis for all CCHDs combined, and isolated CCHDs (without other major congenital malformations) controlling for several infant and maternal factors, including motherâ€™s history of prepregnancy diabetes and hypertension, and use of assisted reproductive technology. **Results:** Overall, 1.7% of case and 1.7% of control mothers reported having Chlamydia during their index pregnancies. After controlling for potential confounders, we found a positive association between maternal exposure to Chlamydia during pregnancy and all CCHDs combined (aOR=1.39; 95% CI, 1.02-1.90). A subgroup analysis for high-risk group of mothers aged 15-19 years and 20-24 years during the index pregnancy showed an increased risk for all CCHDs combined and isolated CCHDs; however, the associations were not statistically significant. **Conclusions:** Our analysis demonstrates that maternal exposure to Chlamydia during pregnancy is associated with higher risk of CCHDs in the offspring. We recommend that future studies examine the association in other populations, and those at high-risk.

187-S/P

CONTEMPORARY EVALUATION OF NURSE-FAMILY PARTNERSHIP BIRTH OUTCOMES. Dustin W. Currie*, William Thorland(Nurse Family Partnership National Service Office & Department of Epidemiology, Colorado School of Public Health)

Background. The Nurse-Family Partnership (NFP) is a national, evidence-based home visiting program currently serving over 30,000 first-time, low-income moms. Three randomized controlled trials have previously demonstrated program effectiveness in achieving a variety of beneficial birth, child development, and maternal life-course outcomes. This study describes birth outcomes of contemporary NFP clients compared to a reference cohort, and examines predictors of outcomes within the NFP cohort. **Methods.** A cohort of NFP clients who began the program from 7/1/2007 to 6/30/2010 was compared to a reference cohort of publicly available birth data (US Natality Data), limited to first-time moms. NFP clients with relevant outcome and demographic data (n=27,194) were matched to three similar controls, matching on maternal age group, race, smoking status, education, and marital status. We compared low birth weight (<2500 grams) and preterm birth (<37 weeks of gestation) outcomes between clients and matched controls using McNemar's Tests, and used logistic regression to identify predictors of negative outcomes. **Results.** We found no significant difference in proportion of low birth weight babies between clients and matched controls (aggregate data; NFP: 9.4%, matched controls: 9.6%, p=0.20). However, NFP clients were significantly less likely than matched controls to give birth to a premature baby (8.7% vs. 12.3%, respectively; p<0.0001). Within the NFP cohort, weight gain below Institute of Medicine (IOM) standards was a strong predictor of both preterm birth (OR compared to within IOM standards: 2.06, 95% CI: 1.78, 2.39) and low birth weight (OR: 2.00, 95% CI: 1.74, 2.29). **Discussion.** Preterm birth in NFP clients compares favorably to a demographically similar reference cohort drawn from the general population. Maternal weight gain during pregnancy represents a modifiable risk factor that can be targeted in future home visits that may reduce undesirable birth outcomes.

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THE ASSOCIATION OF AIR POLLUTION WITH BIRTH WEIGHT AND GESTATIONAL AGE, EVIDENCE FROM HONG KONG'S "CHILDREN OF 1997" BIRTH COHORT. Jian V Huang*, Gabriel M Leung, C Mary Schooling (University of Hong Kong)

Air pollution is a potentially modifiable driver of birth weight (BW) and gestational age (GA). Previous studies, mainly from Western settings have found inconsistent associations of air pollutants with BW and GA, which are open to residual confounding by socio-economic position as both air pollution and BW tend to be socially patterned. In the contrasting developed non-Western setting of Hong Kong, with high levels of air pollution, but little social patterning of BW or GA, we assessed the association of PM10, SO2, NO and NO2 exposure (obtained from air quality monitoring) with BW and GA in a large population-representative birth cohort "Children of 1997" using partial least square regression to account for the collinearity between air pollutants. PM10 and NO (per standard deviation higher) were associated with BW lower by 75.2g (95% confidence interval 61.1-90.0) and 46.5g (33.1-61.5) respectively, while SO2 and NO2 was associated with BW higher by 94.4g (77.4-112.2) and 13.3g (0.9-25.0) respectively, adjusted for household income, mother's migration status and parental education; these estimates were substantially attenuated by further adjustment for GA. Similarly adjusted, PM10 and NO were associated with GA shorter by 3.2 days (2.8-3.6) and 1.6 days (1.3-2.1) respectively, while SO2 and NO2 were associated with GA longer by 3.8 days (3.4-4.3) and 0.7 days (0.4-1.0) respectively; these estimates were little changed by adjustment for BW. Our results are similar in magnitude to the effect of maternal secondhand smoking or maternal asthma on BW. Our mixed findings are similar to those reported previously, and suggest a complex effect of air pollution during a critical period. Mechanisms by which different air pollutants affect health have not yet been fully confirmed in experimental studies and may depend on the constituents of PM10 and interactions between air pollutants possibly acting via oxidative stress and inflammation, which need further investigation.

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PARENTAL SUBFECUNDITY AND EPILEPSY IN THE CHILD- A COHORT STUDY BASED ON THE AARHUS BIRTH COHORT. Laura Ozer Kettner*, Cecilia Høst Ramlau-Hansen, Ulrik Schiøler Kesmodel, Bjørn Bay , Tine Brink Henriksen (Perinatal Epidemiology Research Unit, Department of Paediatrics, Aarhus University Hospital, Denmark)

Background Studies indicate that children conceived by fertility treatment may be at increased risk of epilepsy. However, whether this risk is due to the treatment or may be due to characteristics of the subfecund couple is unknown. **Objective** To investigate the association between parental subfecundity and epilepsy in the child. **Methods** This cohort study included all live-born singletons from the Aarhus Birth Cohort between 1995 and 2013. In a questionnaire, the mothers reported on time to pregnancy as a measure of fecundity, fertility treatment and maternal characteristics. Couples with a time to pregnancy of more than 12 months were categorized as infertile. By linkage to the Danish National Patient and Prescription Register, children with epilepsy were identified until December 2013. Data was analyzed using Cox proportional hazards regression adjusting for potential confounders, including maternal age, body mass index, education, smoking status and maternal diagnosis of epilepsy. **Results** A total of 60,434 singletons were included; 469 (0.8 %) children had epilepsy.Preliminary results indicate no increased risk of epilepsy in children of untreated, infertile couples, compared with children of couples with a time to pregnancy of 0 to 5 months (hazard ratio 1.22 (0.83-1.79)). Similar results were found if the couples received fertility treatment (hazard ratio 1.10 (0.76-1.61)). **Conclusion** Preliminary results indicate that children of subfecund couples have no increased risk of epilepsy in childhood.

190-S/P

MATERNAL NEUROTICISM AND BIRTH WEIGHT: A MEDIATION ANALYSIS. Mengxiong Wang,* Xinguang Chen, JIng Jin, Yaqiong Zhu (Department of Epidemiology, College of Public Health and Health Professions, University of Florida)

Background: Evidence from diverse sources indicate that psychological stress is a significant and independent predictor for a number of negative reproductive outcomes, including preterm birth and low birth weight. Moreover, certain maternal personality traits are also correlated with unhealthy behaviors, such as smoking and alcohol consumption, mediating the effect of stress on reproductive outcomes. Aim: The purpose of this study, is to investigate the association between maternal neuroticism and birth weight as a reproductive outcome and the effect of cigarette smoking and alcohol consumption in medicating the effect of maternal neuroticism on birth weight. **Method:** Data used for this study were derived from Wave I and Wave IV of National Longitudinal Study of Adolescent Health (Add Health). Young women aged 24-32 in the sample were included for analysis. Linear regression approach was used to assess the direct effect from maternal neuroticism on birth weight and the indirect effect mediated through tobacco/alcohol use during pregnancy. **Results:** A total of 5799 participants were included with an average age of 29 years (SD=1.75). Modeling results indicated that Maternal neuroticism score (p=0.0184) and tobacco use during pregnancy (p<0.0001) significantly predicted babiesâ€™ birth weight, and the association between alcohol use during pregnancy and child birth weight was not statistically significant (p=0.1020). Tobacco use during pregnancy significantly mediated the relationship between maternal neuroticism and birth weight. **Conclusion:** In addition to a direct effect, neuroticism increases the risk of low birth weight of children by increasing the risk of tobacco use during pregnancy. Maternal care should pay attention to tobacco control particularly among those mothers who are neurotic.

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CONGENITAL HEART DISEASE AND INDICES OF FETO-PLACENTAL GROWTH IN A NATIONWIDE COHORT OF 973,141 LIVEBORN INFANTS. Niels B. Matthiesen*, Tine B. Henriksen, James W. Gaynor, Peter Agergaard, Cathrine C. Bach, Vibeke Hjortdal, John R. Ostergaard (Department of Pediatrics, Aarhus University Hospital, Aarhus University, Denmark)

Background: Placental anomalies have recently been associated with fetal congenital heart disease (CHD), growth in fetuses with CHD, and neurodevelopmental disorders in children with CHD. We aimed to investigate the association between subtypes of CHD and placental weight (PW) and placental weight to birth weight ratio (PWR) in a large cohort. **Methods:** All Danish livebirths 1997-2012 were included. CHD, PW, PWR and potential confounders were identified in national registries. In 30% of infants with CHD diagnostic validity and genetic anomalies were assessed in detail. The association between CHD and placental measures was analyzed by multiple linear regression and adjusted for potential confounders with and without adjustment for gestational age. The study further includes a sibling analyses and a comparison cohort of other major birth defects (not reported here). **Results:** 973,141 livebirths were included (8,220 with CHD). Overall, CHD was associated with lower PW and larger PWR, adjusted -22g (95%CI -28; -16) and +0.010 (95%CI 0.008; 0.012). Most subtypes of CHD were associated with reduced PW and increased PWR. The largest PWR was found in atrial septal defects. Two subgroups: major ventricular septal defects and tetralogy of Fallot were associated with a markedly lower PW than the other subtypes. Sensitivity analyses revealed that the associations were unlikely to be explained by conditioning on live birth or gestational age. **Conclusion:** Overall CHD was strongly associated with PW and PWR in several subgroups. We confirm the presence of an association between placental anomalies and fetal CHD. It remains uncertain whether placental anomalies in early gestation may be implicated in the causation of CHD, whether placental anomalies and CHD share a common cause or whether CHD in some instances may cause placental anomalies. These associations deserve further investigation.

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PERINATAL MORTALITY ASSOCIATED WITH THREE CLASSIFICATIONS OF SMALL-FOR-GESTATIONAL AGE VARIES BY MATERNAL BODY MASS INDEX. Stefanie N. Hinkle*, Lindsey A. Sjaarda, Paul S. Albert, Pauline Mendola, Katherine L. Grantz (NICHD/NIH)

Prepregnancy obesity is associated with excess fetal growth; however, it is unclear whether obesity decreases the risk for growth restriction or mortality among infants born small-for-gestational age (SGA). This conflict may be due to differences in SGA definitions. Using a US obstetrical cohort of 113,909 singleton, non-anomalous pregnancies, we evaluated the ability of different SGA classifications to predict perinatal mortality by prepregnancy body mass index (BMI, kg/m2). SGA (neonatal birthweight <10th percentile) was classified using a population-based (SGA_POP) (Alexander), intrauterine-based (SGA_IU) (Hadlock) and customized (SGA_CUST) reference. For each SGA method, we evaluated prevalence and RR for perinatal mortality and c-statistics to assess diagnostic ability by BMI status. The respective prevalence of SGA among underweight (BMI0.18). Among normal weight women, SGA_CUST was most strongly associated with mortality (RR=5.82, 95%CI 4.63, 7.33) followed by SGA_IU (RR=4.61 95%CI 3.66, 5.80). Among obese women, however, SGA_IU was most strongly associated with mortality (RR=5.35 95%CI 3.74, 7.65) followed by SGA_CUST (RR=4.85 95%CI 3.43, 6.85). The diagnostic ability of SGA to detect mortality varied little across classifications with minimal to no improvement using the customization method, particularly among obese women. Overall, SGA neonates of underweight women had no increased mortality risk, while SGA neonates of obese women had a substantially higher mortality risk, therefore obesity does not appear protective against SGA-related perinatal mortality.

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YOUTUBE VIDEOS AS A SOURCE OF INFORMATION ON MEDICATION USE IN PREGNANCY.
Craig Hansen*, Julia D Interrante, Elizabeth C Ailes, Meghan T Frey, Cheryl S Broussard, Valerie J Godoshian, Courtney Lewis, Kara N Polen, Amanda P Garcia, Suzanne M Gilboa (National Center on Birth Defects and Developmental Disabilities, Centers for Disease Control and Prevention)

Background: Many women consult the Internet when making decisions around medication use in pregnancy. Our aim was to assess the content of videos discussing medication use in pregnancy that are publicly accessible on YouTube. **Methods:** Using a combination of 289 medication terms and seven pregnancy-related terms, 2,023 distinct paired search terms related to medications and pregnancy were used to extract metadata from the YouTube Application Programming Interface in June 2014. After excluding videos that did not have at least one medication and one pregnancy-related term in the title, we viewed and recorded additional information about each video, including the source of the video and any medications and associated adverse outcomes mentioned. For selected medications, we compared the Teratogen Information System (TERIS) ratings to the assessments of safety reported in the videos. **Results:** Of the 651 videos with at least one medication and one pregnancy-related search term in the title, 314 had relevant information about medication use in pregnancy and were included in the analyses. The majority of videos were legal in origin (210/314; 67%). Antidepressants were the most common medication type mentioned (249/314; 79% of videos); 225 of these videos mentioned risks associated with selective serotonin reuptake inhibitors (SSRIs). In 88% of those videos (198/225), the SSRI was noted as unsafe; in contrast, the TERIS risk ratings for SSRIs range from “unlikely” to pose a teratogenic risk to “minimal” risk. **Conclusions:** To our knowledge, this is the first assessment of the content of YouTube videos about medication use in pregnancy. For selected medications, such as SSRIs, the current YouTube video content does not adequately reflect what is known about the safety of their use in pregnancy. Given the high utilization of the Internet for health information, YouTube could serve as a valuable platform for communicating evidence-based medication safety information.

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DROSPIRENONE-CONTAINING COMBINED ORAL CONTRACEPTIVES AND THE RISK OF ARTERIAL THROMBOSIS: A POPULATION-BASED NESTED CASE-CONTROL STUDY. Kristian B. Filion*, Maria Eberg, Lawrence Joseph, Mark J. Eisenberg, Haim A. Abenhaim, Samy Suissa (Center for Clinical Epidemiology, Lady Davis Institute, Jewish General Hospital, McGill University, Montreal, Quebec, Canada)

Background: While much attention has focused on the risk of venous thrombosis with drospirenone-containing combined oral contraceptives (COCs) compared with that of levonorgestrel-containing COCs, their relative effects on the risk of arterial thrombosis (AT) remain understudied. Objective: To compare the rate of AT of drospirenone-containing COCs to that of levonorgestrel-containing COCs. **Methods:** We conducted a nested case-control analysis of a population-based cohort using the UK's Clinical Practice Research Datalink (CPRD). Cohort entry was defined by a prescription for drospirenone-containing or levonorgestrel-containing COCs. Cases were defined by a diagnosis of AT, including myocardial infarction and stroke. For each case, up to 10 controls were matched on age, year of cohort entry, year of CPRD registration, COC user type (first time, new, or prevalent users), total duration of COC use, total duration of non-COC use, duration of exposure use, and duration of follow-up. High-dimensional propensity scores were included in our conditional logistic models to reduce residual confounding. **Results:** Our cohort included 339,743 women followed over a mean 4.4 years, during which a total of 228 AT cases occurred (37 myocardial infarctions, 170 strokes, and 21 other ATs; overall rate = 1.5 events per 10,000 person-years [PYs]). After adjustment, current use of drospirenone-containing COCs was not associated with the rate of AT compared with current use of levonorgestrel-containing COCs, though 95% CIs were wide (OR = 0.89, 95% CI = 0.35, 2.28, corresponding to a rate difference = -0.16 events per 10,000 PYs, 95% = -0.97, 1.78). **Conclusions:** The overall rate of AT in this population is low, and we found no evidence of a difference in the rate of AT with drospirenone-containing COCs relative to levonorgestrel-containing COCs. Due to the limited number of events in this population, there remains a need for further studies examining this potential adverse drug effect.

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RISK OF MISCARRIAGE AFTER BIVALENT HUMAN PAPILLOMAVIRUS (HPV) VACCINATION: LONG-TERM OBSERVATIONAL FOLLOW-UP OF A RANDOMIZED TRIAL. Orestis A. Panagiotou*, Brian L. Befano, Paula Gonzalez, Ana Cecilia Rodriguez, Rolando Herrero, Mark Schiffman, Aimee R. Kreimer, Allan Hildesheim, Allen J. Wilcox, Sholom Wacholder (Division of Cancer Epidemiology & Genetics, National Cancer Institute, National Institutes of Health, Bethesda, MD)

Previous studies could not rule out an effect of the bivalent human papillomavirus (HPV) vaccine (Cervarix) on miscarriage for pregnancies conceived within 89 days of vaccination. We analyzed data from the trial and post-trial phases of the National Cancer Instituteâ€™s randomized vaccine trial in Costa Rica and from an unvaccinated cohort from the same census. The unit of analysis was pregnancy. We estimated the relative risk (RR) of miscarriage (i.e. fetal loss within 20 weeks of gestational age) comparing the miscarriage rate in pregnancies conceived within 89 days of Cervarix vaccination to the miscarriage rate in unexposed pregnancies, i.e. pregnancies conceived anytime since vaccination with the control Havrix vaccine and in the unvaccinated cohort. We also performed a random-effects meta-analysis of the current findings with those of published studies. A total of 3,394 pregnancies, of which 451 (13.3%) ended in miscarriage, were exposed to Cervarix. A total of 3,227 pregnancies were unexposed of which 414 (12.8%) ended in miscarriage; 2,507 pregnancies occurred in women who received Havrix with 316 (12.6%) ending in miscarriage, and 720 pregnancies with 98 (13.6%) miscarriages occurred in the unvaccinated cohort. The RR of miscarriage ranged from 1.02 (95% confidence intervals, CI, 0.78-1.34; 1-sided P=0.436) in unadjusted analyses to 1.15 (95% CI, 0.86-1.54; 1-sided P=0.17) when adjusting for the calendar year of vaccination. Results were similar when we adjusted and/or stratified for age at vaccination, age at conception, gestational age of miscarriage, and age at trial enrollment. The meta-analysis did not show any increased risk either. More studies using data from the Vaccine Adverse Event Reporting System and the Vaccine Safety Datalink are important to monitor any association between HPV vaccination and miscarriage.

201-S/P

SIMULATION STUDY COMPARING TWO METHODS FOR ANALYSIS OF OPEN LABEL TRIAL DATA. Heidi Moseson*, Khaled Sarsour, Eric Vittinghoff (UCSF)

Background: Observational data is increasingly used to estimate treatment effects in real-world settings. Marginal structural models (MSMs) were developed to estimate causal effects without bias in the presence of time dependent confounder mediators (TDCMs) that both confound and mediate the effect of treatment. However, MSMs may be less efficient than simpler methods. **Methods:** We use simulation to compare the bias and power of MSMs and adjusted pooled logistic regression (PLR) for assessing the effects of alternative treatment regimens. Our simulation modeled the effects of standard drug only, test drug only, and a combined regimen using both on disease clearance following onset of symptoms. In the simulation, treatment may change in response to the TDCM. Remission is assessed at monthly visits. We simulated 500 samples of 250 patients, followed until remission or censoring at 24 months. **Results:** With a moderately strong TDCM, MSM estimates of the HRs were almost unbiased (-1.5% for study drug on; -5.8% for combined regimen), while PLR badly underestimated both (-18.6%; -26.7%). However, PLR had substantially greater power (63.2% vs 42.4%; 93.6% vs 72.4%), with no inflation of the type-I error rate (4.4% vs 4.2%; 4.6% vs 4.2%). With a weaker TDCM, the PLR was less biased, but remained more powerful. **Conclusions:** MSMs estimate treatment effects almost without bias in the presence of a TDCM, but are less powerful than the simpler adjustment methods that are biased but more precise. When clinical investigators are only interested in the relative performance of treatment regimens, the simpler PLR method may be justifiable for treatment evaluations based on observational data because it preserves the type-I error rate and is biased toward the null.

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DETERMINANTS OF LUNG FUNCTION IN RURAL-DWELLING WOMEN AND MEN. Bonnie Janzen*, Chandima Karunanayake, Louise Hagel, Josh Lawson, Donna Rennie, William Pickett, Ambikaipakan Senthilselvan, James Dosman, Punam Pahwa (University of Saskatchewan)

BACKGROUND: Few studies have examined determinants of lung function in general populations of rural-dwellers, particularly in relation to sex/gender. **OBJECTIVE:** To investigate the association of individual and contextual factors with lung function in rural-dwelling women and men. **METHODS:** Participants were 1609 adults (762 men, 847 women) who were part of the baseline sample of the Saskatchewan Rural Health Study and who volunteered to participate in additional clinical assessment. The lung function outcomes of interest were: forced expired volume in one second (FEV1), forced vital capacity (FVC), and FEV1/FVC ratio. Mobile clinics were set up in participating towns and research nurses trained in spirometry conducted lung function testing, along with other clinical measurements. A mail questionnaire was used to obtain additional information on individual and contextual factors (eg. income, occupational exposures, household exposures). The primary analysis was multiple linear regression, conducted separately for each outcome and by gender. **RESULTS:** Other than age, there was considerable variation in relationships by both gender and lung function measure. Lower income was associated with lower FVC and FEV1 among men, as was lower education among women. Occupational exposures were unrelated to women's lung function; among men, grain dust exposure was associated only with lower FEV1/FVC ratio. Farm/nonfarm residence was unrelated to lung function for both genders. Household smoking was related to lower FEV1 for women and men (and lower FEV1/FVC ratio for men) but unrelated to FVC. Home dampness was not associated with FVC or FEV1 for either gender and associated with lower FEV1/FVC ratio only among women. **CONCLUSION:** In this rural population, the correlates of lung function varied by gender and outcome. Study limitations are discussed, as are challenges in disentangling the role of sex (biological) versus gender (social) in the study of lung function determinants.

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CONSEQUENCES OF THE ASTHMA CALL-BACK SURVEY METHODOLOGY CHANGES ON ESTIMATES OF THE PROPORTION OF WORK-RELATED ASTHMA, 19 STATES, 2007—2012. Katelynn E. Dodd*, Jacek M. Mazurek (Division of Respiratory Disease Studies, National Institute for Occupational Safety and Health, Centers for Disease Control and Prevention (CDC), Morgantown, WV, USA)

The Asthma Call-back Survey (ACBS), a module of the Behavioral Risk Factor Surveillance System (BRFSS), collects detailed information on work-related asthma (WRA) through telephone interview using a sample of landline phone (LLP) users. Because of decreasing BRFSS response rates and increasing proportion of cellular phone (CP)-only households, iterative proportional fitting (raking) replaced the poststratification method to weight BRFSS survey data in 2011 and some states conducting ACBS added the CP user sample to the traditional LLP user sample in 2012. In addition, the wording of the WRA question was revised in 2012. To assess the effect of these three methodology changes on the proportion of asthma that is WRA we analyzed data for ever-employed adults (≥18 years) with current asthma from 19 states that consistently collected data during 2007–2012. Persons with WRA were those with physician-diagnosed WRA. We calculated estimates using poststratification weights (2007–2010) and raking weights (2011–2012) for the sample of LLP users. Also, we calculated estimates using raking weights for 2012 data collected from the combined sample of LLP/CP users. In these 19 states, based on the LLP user sample data, the prevalence of current asthma was 7.6% to 7.8% between 2007 and 2010, was 7.9% in 2011 and 2012. Of those with current asthma, the proportion of asthma that is WRA was 7.8% to 9.7% between 2007 and 2010, was 9.1% in 2011, and 15.4% in 2012. Using the 2012 LLP/CP user sample data, the prevalence of current asthma was 7.6%, of which 15.4% had WRA. Implementation of raking did not substantially change the proportion of asthma that is WRA and the estimates calculated from LLP and LLP/CP user samples in 2012 were comparable. The upward shift in the estimates in 2012 likely was associated with the revision of the ACBS WRA question. Until trends can be established with new data, the survey methodology changes should be considered when interpreting new WRA estimates.

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SMOKING, SERUM COTININE, AND EXHALED NITRIC OXIDE IN U.S. ASTHMATIC AND HEALTHY POPULATION: RESULTS FROM THE NATIONAL HEALTH AND NUTRITION EXAMINATION SURVEY 2007-2012. Hui Hu*, Xiaohui Xu (Department of Epidemiology, College of Public Health and Health Professions & College of Medicine, University of Florida)

Background: Fractional of exhaled nitric oxide (FeNO) has been used as a noninvasive marker of airway inflammation. Previous studies using self-reported smoking status have suggested the association between cigarette smoking and decreased FeNO. However, most of them lacked objective measurements of smoking. Moreover, the effects of passive smoking on FeNO have not been well studied. **Methods:** In this study, we analyzed the 2007-2012 National Health and Nutrition Examination Survey (NHANES) data to examine the association between FeNO and active/passive smoking assessed by both self-reported questionnaire and serum cotinine among 11,160 subjects aged 6-79 years old with asthma or without any respiratory disease. **Results:** A 0.34 lower (95%CI: -0.39, -0.29) and a 0.59 lower (95% CI: -0.74, -0.43) ln(FeNO) was observed among healthy and asthmatic participants with serum cotinine in the highest quartile compared to those in the lowest quartile, respectively. Self-reported smoking status and recent tobacco use were also associated with decreased ln(FeNO). Self-reported passive smoking is significantly associated with a decrease of 0.01(95%CI: -0.02, 0.00) ln (FeNO) among asthmatic subjects but not among healthy subjects. **Conclusions:** Both active and passive smoking were found to be associated with decreased FeNO. The appropriate use and interpretation of FeNO in Clinical practice need to be cautious when passive or active smoking presents.

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IMPLEMENTATION OF A CHILD ABUSE SCREENING ALGORITHM: LESSONS LEARNED. Crystal Silva*, Rebecca Ragar, Summer Magoteaux, David M Notrica, PamelaGarcia-Filion (Phoenix Children's Hospital)

Background: Child abuse remains a major health concern. Early identification is paramount, yet clinicians often miss signs indicating abusive injury at initial presentation. At a pediatric Level I trauma center, a screening algorithm was developed in collaboration with emergency department (ED) providers to identify pediatric injury at high-risk for non-accidental etiology. Purpose: To assess algorithm adherence following implementation in the ED. **Methods:** During a three month study period, patients age ≤24 months presenting to a pediatric ED on the first Tuesday and Saturday were retrospectively reviewed. Primary screening criteria were ascertained from medical record, including a disrobed exam evaluating for unexplained fractures, unexplained intracranial hemorrhage, witnessed abuse, patterned marks, and bruising. If one or more criteria were met, further chart review was conducted to determine algorithm adherence. **Results:** 452 charts were reviewed. The median age was 10.5 months (IQR 5-16 mos), and 57% (n=259) were male. A screening or follow-through failure was identified in 285 (63%) patients . Screening failures included failure to disrobe patient for exam (n=78;17%) and failure to document presence/absence of screening criteria (n= 232;51%). The most common undocumented criteria was bruising (n=231;51%). Positive screening criteria were identified in 9 (2%) patients (median age 17mos; IQR 9-22mos); of these, 5 (56%) had an incomplete screen and 8 (89%) were not further evaluated according to the algorithm. The most common errors were a lack of social work consult (56%;n=5), skeletal survey (67%;n=6), and laboratory testing (56%;n=5). **Conclusion:** Despite ED provider investment in algorithm development, our study found poor adherence to a screening tool for child abuse. Data from this study supports investigating other methods to increase successful implementation, such as first tier screening in the triage phase of care and an automated child abuse order set.

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COMPARISON OF CLINICAL AND STATISTICAL METHODS TO IDENTIFY THRESHOLDS IN RECEIVER-OPERATOR CHARACTERISTIC (ROC) CURVE ANALYSES: AN EXAMPLE USING LABS TO SCREEN FOR PEDIATRIC INTRA-ABDOMINAL INJURY. Crystal Silva,Ramin Jamshidi, Rebecca Ragar, Pamela Garcia-Filion (Phoenix Children's Hospital)

Background: Studies utilizing ROC analyses to define clinical thresholds often rely on subjective criteria to select thresholds. While statistical methods are available which focus on maximizing accurate disease classification, subjective decision making tends to balance accuracy against applicability at the bedside **Purpose:** Using a laboratory screen (ALT and AST biomarkers) for intra-abdominal injury we sought to compare thresholds identified by clinical versus statistical (Youden Index) methods to assess the impact on reported results. **Methods:** Retrospective analysis of pediatric patients presenting January 2011 to December 2013 for evaluation of blunt abdominal trauma that had abdominal CT and ALT or AST evaluation. Biomarker levels were normalized to the upper limit of the reference range. For the clinical method, a physician reviewed sensitivity and specificity ROC tables for biomarker detection of CT-identified intra-abdominal injury. Clinically-selected thresholds were recorded and compared to Youden Index thresholds. Analyses were conducted using Stata13. **Results:** Of 564 patients, CT revealed intra-abdominal injury in 150(27%) and liver injury in 60(10%). Clinician-identified thresholds for distinguishing intra-abdominal injury were 1.3 and 2.7 for ALT and AST, respectively, compared to Youden index thresholds of 1.5 and 2.1, respectively. Clinician-identified thresholds for distinguishing liver injury were 1.4 and 2.7 for ALT and AST, respectively, compared to Youden index thresholds of 2.4 and 4.6, respectively. Differences in thresholds represent a 1.2 to 1.3-fold and 1.7-fold difference in actual lab values for identifying intra-abdominal injury and liver injury, respectively. **Conclusions:** Subjective selection of threshold values in laboratory analyses correlate poorly with described statistical methods. Because clinical input can consider relevance of sensitivity over specificity, clinical input should guide use of statistical methods.

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CANCER SCREENING BARRIERS AND FACILITATORS AMONG UNDER AND NEVER SCREENED IN ONTARIO, CANADA. Dionne Gesink*, Brooke Filsinger, Alanna Mihic, Joan Antal, Lee Vernic (University of Toronto)

Cancer screening is below targeted rates for breast, cervical and colon cancer for the province of Ontario, Canada. Our objective was to identify the barriers and facilitators for screening. Between February 2012 and January 2013, a cross-sectional online survey was used to collect cancer screening behaviours and perceptions from men (≥50 years old) and women (≥18 years old) living in Ontario. Respondents were asked about current cancer screening knowledge and practices, beliefs about barriers and facilitators to screening, and basic demographic information. 3,075 participants completed the entire survey, of which 2,808 were used in the analytic model. Adjusted prevalence odds ratios (POR) and 95% confidence intervals (CI) for barriers and facilitators were estimated for under- and never- screened (UNS) participants compared to regularly screened participants using logistic regression. Respondents were predominantly white, female, and over 45 years of age. 28% of all respondents were UNS: 45% of women 50 years of age and older, 25% of men and 15% of women under 50. Compared to participants up-to-date on cancer screening, UNS participants had a higher prevalence odds of being female (POR: 2.4, 95%CI: 1.8, 3.1), not having a regular doctor (POR: 3.5, 95%CI: 2.5, 4.9), reporting the doctor did not tell them to get screened (POR: 1.6, 95% CI: 1.3, 2.1), feeling uncomfortable talking about cancer (POR: 2.4, 95% CI: 1.3, 4.3), and saying they would get screened if: a family member or friend insisted (POR: 1.6, 95% CI: 1.2, 2.1), they developed symptoms (POR: 1.5, 95% CI: 1.1, 1.9), the test was less scary/painful (POR: 2.0, 95% CI: 1.5, 2.6), or the test was easier (POR: 1.5, 95%CI: 1.1, 1.9). Reducing stress and stigma around cancer and cancer screening may increase cancer screening participation among UNS, especially if interventions include easier tests and increasing knowledge at the individual, familial and community levels.

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CERVICAL CANCER SCREENING IN MONTREAL: SOCIAL INEQUALITIES IN A UNIVERSAL HEALTHCARE SETTING. Geetanjali D Datta*, Alexandra Blair, Lise Gauvin, Marie-Pierre Sylvestre, Mylene Drouin, Marie-Helene Mayrand (The CHUM Research Center and the University of Montreal)

Background: Early detection is critical to decreasing mortality from cervical cancer. Though there is a literature on cervical cancer screening in Canada, very little is published on screening among women residing in Quebec overall and in urban areas such as Montreal specifically. This is an important gap since health care services are planned at provincial and local levels, and Quebec is the only province which has not implemented any component of an organized cervical cancer screening program. **Methods**: Four waves of data from the population-based Canadian Community Health Survey (2003, 2005, 2008, 2012; weighted N=3,780,553) were utilized to estimate cervical cancer screening rate ratios (RR) among women residing in the Montreal Metropolitan Area via Poisson regression. The outcome, non-recent screening (NRS), was defined as reported screening 3 or more years previous to the survey. Models were adjusted by age, immigrant status and time since immigration (recent(R)<5yrs, mid-term(M)=5-9yrs, long-term(L)=10+yrs), income, education, marital status, and access to a primary care physician (PCP). Confidence intervals (CI) were constructed using bootstrap variance weights. **Results:** The prevalence of NRS was 24%. In the fully adjusted model, the two strongest predictors of NRS were immigrant status (RR(R)=2.1, 95% CI=1.6-2.7, RR(M)=1.9, 95% CI=1.5-2.4, RR (L)=1.6, 95% CI=1.3-2.0) and not having access to a PCP (RR=2.0, 95% CI 1.7-2.3). In comparison with women who have graduated from university, those with less than a high school (HS) education (RR=1.8, 95% CI=1.4-2.1) and HS graduates (RR=1.5, 95% CI=1.2-1.8) had higher rates of NRS. An income gradient was observed, but the contrast between the lowest and highest quintiles (RR=1.3, 95% CI=1.0-1.7) was the only marginally significant result. **Conclusion:** In this universal health care setting, social inequalities exist in cervical cancer screening. This suggests a role for population-level and/or targeted interventions.

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CERVICAL CANCER SCREENING IN FIRST NATIONS, MÉTIS, AND INUIT WOMEN IN QUEBEC, CANADA: A POOLED CROSS-SECTIONAL ANALYSIS. Alexandra Blair*, Marie-Hélène Mayrand Mayrand, Marie-Pierre Sylvestre, Lise Gauvin, Mylène Drouin , Geetanjali D Datta (The CHUM Research Center and the University of Montreal)

Background: There are no published data on cervical cancer screening rates of First Nations, Métis, or Inuit women in Quebec, Canada, where no screening program is in place. Grey literature suggests that Aboriginal women living off-reserve report comparable cervical cancer screening rates to non-Aboriginal women in Canada even though inequalities exist on other health indicators. We compared screening rates across these groups. Method: We pooled four waves of the Canadian Community Health Survey (2003, 2005, 2008, 2012; weighted N=7,105,591), which does not sample people on-reserve. The outcome, non-recent screening (NRS), was defined as reported screening 3 or more years prior to the survey. Women who reported First Nations, Métis, or Inuit ancestry, or Cree as their mother tongue (Weighted N=2,529,590) were compared to non-Aboriginal women. Using Poisson regression models, we estimated cervical cancer screening rate ratios (RR) among Aboriginal women in Quebec adjusting for age, income, education, marital status, and access to a primary care physician. Confidence intervals (CI) were constructed using bootstrap variance weights. Results: The overall prevalence of NRS was 24% and did not differ across Aboriginal (26%) and non-Aboriginal women (25%) (RR=1.02, 95% CI 0.84,1.24). In the fully adjusted model, the strongest predictors of NRS were non-access to a primary care physician (RR=2.0, 95% CI 1.81,2.17), lower income (1st quintile RR=1.64, 95% CI 1.34,2.00; 2nd quintile vs. 5th quintile RR=1.41, 95% CI 1.16,1.71), educational achievement of less than high school graduation (vs. university degree, RR=1.62, 95% CI 1.42,1.81), and older age (50-65 years vs. 21-49 years) (RR=1.28, 95% CI 1.17, 1.41). Conclusion: We conclude that there are no inequalities in screening between Aboriginal women living off-reserve and non-Aboriginal women in Quebec. Additional comparative analyses of aboriginal women in other Canadian provinces are warranted.

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IS CHILDHOOD ECONOMIC HARDSHIP ASSOCIATED WITH ADULT HEIGHT AND ADIPOSITY AMONG HISPANIC/LATINOS LIVING IN THE US? RESULTS FROM THE HCHS/SOL SOCIO-CULTURAL STUDY., Carmen R. Isasi*, Molly Jung, Christina Parrinello, Robert Kaplan, Ryung Kim, Noe Crespo, Patricia Gonzalez, Natalia Gouskova , rank J. Penedo, Krista Perreira, Daniela Sotres-Alvarez, Tatiana Perrino, Linda Van Horn, Linda C. Gallo (Albert Einstein College of Medicine)

Prior studies report an association between childhood socio-economic conditions and adult health. Whether childhood or current economic hardship is associated with anthropometric indices in Hispanic/Latino (HL) adults is less well studied. This is of interest because many HL immigrated to the US from countries where socio-economic conditions are harsher than in the US. We analyzed data from the HCHS/SOL Socio-cultural ancillary study (N = 5,084; 3163 women, mean age 46.4±13.7) a subset of the HCHS/SOL population-based cohort of 16,415 HL adults from four communities (Bronx, NY; Chicago, IL; Miami, FL, San Diego, CA). Childhood economic hardship (CEH) was defined as having experienced a period of time when their families had trouble paying basic needs (e.g., food, housing, medical care). Participants were classified in four categories: did not experience CEH, experienced CEH between 0-12 years old (13%), 13-18 years old (4%), or persistent CEH (0-18, 36%). Current economic hardship (54%) was defined as having had trouble paying basic needs for the past year. Anthropometry included height, body mass index (BMI), waist circumference (WC), and percentage body fat (%BF). Complex survey linear regression models were used to test the association of CEH and current economic hardship with adult anthropometric indices, adjusting for potential confounders (e.g., age, sex, HL background, field center). CEH varied by age, HL background, nativity, and adult socio-economic status. Persistent CEH was associated with lower height (β=-0.6 cm; 95%CI -1.2, -0.04) but not with adiposity measures. Current economic hardship was significantly associated with BMI (β=1.2; 95% CI 0.7, 1.8), WC (β=2.7 cm; 95%CI 1.5, 3.8), and %BF (β=1.4; 95%CI 0.7, 2.2), after adjustment for confounders. These findings indicate that, in this cohort, the effect of CEH appears to be more relevant for adult height than for adiposity, whereas current economic hardship is a better predictor of adult adiposity.

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DID THE 'GREAT RECESSION' AFFECT MORTALITY RATES?: THE EFFECTS ON MORTALITY BY AGE, GENDER AND CAUSE OF DEATH IN THE METROPOLITAN U.S. Erin Strumpf*, Thomas J. Charters, Sam Harper, Arijit Nandi (McGill University)

This study estimates the impacts of increases in unemployment rates on both all-cause and cause-specific mortality across U.S. metropolitan regions during the 'Great Recession'. We advance current work in this area by examining mortality by age and gender subgroups, and by estimating plausibly causal effects during this recent and severe recessionary period. We use a fixed-effects framework, estimating multivariable Poisson regression models that include metropolitan statistical area (MSA) and quarter-of-year fixed effects. We therefore isolate the impacts of within-MSA changes in unemployment rates and control for common temporal trends to identify a plausibly causal effect. Using cause-specific mortality data from the National Center for Health Statistics and unemployment data from the Bureau of Labor Statistics we estimate that a one percentage point increase in the MSA unemployment rate decreased all-cause mortality by 3.91 (95% CI -6.40 to -1.41) deaths per 100,000 person years, or 0.51% relative to the mean. Estimated reductions in cardiovascular disease mortality amount to nearly one third of the effect and they were particularly pronounced among women. Motor vehicle accident mortality declined among men by 0.41 (95% CI -0.70 to -0.12) deaths per 100,000, or 2.4% relative to the mean. Increases in the unemployment rate decreased both motor vehicle accident and legal intervention and homicide mortality among those under age 65. After stratifying our sample by age, we find some evidence for increases in suicide mortality in the elderly and accidental drug poisoning in those aged 25-64. Our results contribute to a growing literature suggesting that population health improves during economic downturns.

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HOUSEHOLD AND NEIGHBORHOOD CONDITIONS PARTIALLY ACCOUNT FOR EDUCATIONAL DISPARITIES IN TWO-YEAR PHYSICAL FUNCTION DECLINE. Laura J. Samuel*, Bridget T. Burke, Therri Usher, Karen Bandeen-Roche, Roland J. Thorpe, Jr (Johns Hopkins University Bloomberg School of Public Health)

Greater education is associated with higher physical function. Household and neighborhood conditions partially account for this relationship. We test the hypothesis that these conditions also account for educational disparities in physical function decline over time. Two-year physical function change [walking speed (m/second), grip strength (kg) and peak expiratory flow (L/minute)] was measured in 4116 community-dwelling National Health and Aging Trends Study participants. Education (<high school, high school, some college, and ≥ Bachelor's) and household and neighborhood conditions, using a 16-item interviewer-completed environmental checklist and a 3-item social cohesion scale, were measured at baseline. Structural equation models in Mplus decomposed total educational effects into direct effects and indirect effects via household and neighborhood conditions, using sample weights and adjusting for age, sex, race/ethnicity, marital status, household size, interim moving and baseline physical function. Standardized estimates (to X and Y) are presented. Education was directly associated with less decline in walking speed (β=0.082, p<0.001), grip strength (β=0.146, p<0.001) and peak flow (β=0.072, p= 0.003). Indirect effects were also found, accounting for about 22%, 33% and 41% of the total associations between education and changes in walking speed, grip strength, and peak flow, respectively. Indirect effects included: household disorder with changes in walking speed (β=0.011, p= 0.002) grip strength (β=0.028, p<0.001), and peak flow (β=0.021, 0.001); street disorder with changes in grip strength (β=0.038, p<0.001) and peak flow (β=0.020, p= 0.039); and social cohesion with changes in peak flow (β=0.006, p=0.009). Household disorder, street disorder and social cohesion partially accounted for educational disparities in physical function decline, calling attention to their potential importance. However, disparities in decline persisted, suggesting additional pathways.

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MEXICAN IMMIGRANT SMOKING BEHAVIOR IN A BINATIONAL CONTEXT: UNDERSTANDING THE ROLES OF MIGRATION AND ACCULTURATION. Nancy L. Fleischer*, Annie Ro, Georgiana Bostean (University of South Carolina)

Background: Tobacco use in Mexico has decreased in recent years, but it is unclear how these trends impact tobacco use among Mexican immigrants in the US. This paper investigates if: 1) Mexican immigrants have lower smoking prevalence than Mexican non-migrants, as differentiated by their likelihood to migrate to the US; 2) the length of US residence impacts changes in smoking prevalence among Mexican immigrants; and 3) relationships vary over time. **Methods:** Using nationally-representative datasets from Mexico and the US, we examined smoking among adults (20-64 years) according to migration status by gender, in 2000 and 2012. We calculated predicted probabilities of current smoking from logistic regression models, and examined how associations differed over time between non-migrants in Mexico with varying likelihood of migration and Mexican immigrants in the US. **Results:** Among men, there were no differences in current smoking among Mexican non-migrants with varying likelihood of migration in 2000 or 2012. However, recent US immigrants (≤10 years) had sharply lower prevalence of being a current smoker than Mexican non-migrant men with highest likelihood of migration (19.0% versus 35.8%; p<0.0001). The same patterns held for 2012, although the contrast was less pronounced (18.2% versus 30.1%; p<0.01). Non-migrant women with higher migration likelihood had a lower probability of current smoking compared to those with lower migration likelihood, and these patterns were stronger in 2012 than in 2000. Contrary to men, there were no differences between recent immigrants or Mexican non-migrants who were most likely to immigrate in either 2000 or 2012. There were no differences between recent and longer-term immigrants in 2000 or 2012, for men or women. **Conclusions:** Among men, the most salient differences in current smoking occur between Mexican non-migrants and recent US immigrants. For Mexican women, migration likelihood differentiates smoking among non-migrants.

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DISPARITIES IN DIABETES BY EDUCATION AND RACE/ ETHNICITY IN THE UNITED STATES, 1973-2012. Nancy L. Fleischer*, Yun-Hsuan Wu, Andrea K. Henderson, Angela D. Liese, Alexander C. McLain (University of South Carolina, Arnold School of Public Health)

Background: The incidence of diabetes mellitus has doubled in the United States over the past two decades. Not all sectors of the population have experienced the increase equally. The goal of this study was to determine if disparities in diabetes by education and race/ethnicity increased over time, and if there were differences by gender and birth cohort. **Methods:** We used repeated cross-sectional data from 1973 to 2012 of adults aged 25 to 84 years from the National Health Interview Survey. Educational attainment was measured with five categories and race/ethnicity was captured using four groups. The outcome was self-reported diabetes. We ran a series of four logistic regression models and calculated predicted probabilities to determine if inequalities in diabetes by education and race/ethnicity changed over time, by gender and birth cohort (birth before 1946, 1946-1970, 1971+). **Results:** Relationships between education or race/ethnicity and diabetes were modified by time for all birth cohorts for women and men ($p<0.0001$ for all models). For people born in the earliest cohort, the disparities in diabetes prevalence grew over time, and were stronger among women than men. The magnitude of the disparities decreased for the 1946-1970 cohort. For example, in 2005-2012, the gap in diabetes prevalence for women with the highest and lowest level of education was smaller in the 1946-1970 cohort (13.0% for pre-1946 versus 7.9% for 1946-1970). Similar trends were seen for differences between non-Hispanic Whites and non-Hispanic Blacks or Hispanics. Results are inconclusive for the youngest cohort due to the relatively young age of people born after 1970. **Conclusions:** Disparities in diabetes prevalence between groups with differing educational attainment and race/ethnicity are evident. Smaller differences in later cohorts may indicate that large structural changes in society (e.g., Civil Rights movement, increased educational opportunities) have benefited later generations.

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ADVERSE CHILD EXPERIENCES AND SOCIOECONOMIC STATUS IN A NATIONALLY REPRESENTATIVE SAMPLE OF YOUNG ADULTS. Shakira F Suglia*, Cari J Clark, Bruce Link, Karestan C Koenen (Mailman School of Public Health Columbia University)

Introduction: Recent studies have examined the consequences of adverse child experiences (ACEs) for both short and long term health outcomes. However, few studies have examined the relation between socioeconomic status (SES) during childhood and ACEs as well as the influence of ACEs on adult educational attainment. **Methods:** The study sample is part of the National Longitudinal Study of Adolescent Health, a nationally representative sample of US high school adolescents (N=8676). Participants reported on their experiences of child neglect, physical and sexual violence, dating violence, other experiences of violence, homelessness, parental alcoholism, incarceration or death between waves 1 (1994-95, mean age 15) and 3 (2001-02, mean age 21) except for parental incarceration, which was assessed at wave 4 (2008-09, mean age 29). An ACE index was created as a sum of the 9 items and was truncated for analyses at 5 or more experiences. Childhood SES was characterized as, parental highest education level and occupational status. Adult SES was characterized as highest education level attained. **Results:** Seventy percent of participants endorsed at least one ACE. Adjusted for age, race and gender, lower parental education and occupational status were associated with a higher number of ACEs. In regression models adjusted for participant's demographics and parental education, a dose-response effect was noted: experiencing one ACE (Odds Ratio (OR) 1.5 95%CI 1.2, 1.9), two (OR 2.2 95%CI 1.7, 2.9), three (OR 3.4 95%CI 2.4, 4.9), four (OR 6.4 95%CI 3.8, 10.9) or 5 or more (OR 7.4 95%CI 3.8, 14.4) was associated with higher odds of having a high school diploma or less as the highest education level attained compared to having a college degree in adulthood. **Conclusions:** Childhood SES is associated with ACEs. In turn, ACEs are associated with lower educational attainment in adulthood, independent of childhood SES. ACEs should be considered a pathway in the reproduction of inequality.

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HETEROGENEITY OF TREATMENT EFFECTS OF HOUSING POLICY ON ADOLESCENT MENTAL HEALTH: AN APPLICATION OF MODEL-BASED RECURSIVE PARTITIONING . Theresa L. Osypu*, Quynh C. Nguyen, David H. Rehkopf, Nicole M. Schmidt (Department of Health Promotion and Education, College of Health, University of Utah)

Purpose: Moving to Opportunity (MTO) was a large, randomized trial that assigned Section 8 housing vouchers to assist neighborhood relocation of low-income families residing in high-poverty public housing. Main effects have been documented, but understanding how treatment varied for subgroups may guide the next generation of this affordable housing policy. **Methods:** We employed model-based recursive partitioning to optimally identify heterogeneous MTO treatment effects on psychological distress and behavior problems measured 4-7 years after randomization in 2002 for 2,829 adolescents. This modeling approach can identify higher-order interactions defined by multiple effect modifiers, which is generally limited by power in traditional regression-based methods that utilize treatment interaction terms. We tested 35 theoretically-supported potential baseline treatment modifiers operationalizing developmental health, household characteristics, and residential history. **Results:** Overall, we found that gender, site, age, and adolescent developmental health were important for differentiating variation in MTO treatment effects on mental health. For example, treatment effects on psychological distress were beneficial (vs. controls) for girls living outside the Chicago site, with educational problems, without a teen parent. Treatment effects on distress were harmful for the subgroup defined by these same characteristics, except that girls had a teen parent. For behavioral problems, treatment was most beneficial for adolescents older than 10 years, without learning problems, without a family history of violent crime victimization, whose family moved for better schools, with an unmarried household head. **Conclusion:** Housing voucher programs may improve the health of vulnerable subgroups even further by supplementing services from outside the housing sector.

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INCARCERATION AND ADULT WEIGHT GAIN IN THE NATIONAL SURVEY OF AMERICAN LIFE (NSAL). Zinzi D. Bailey*, David R. Williams Ichiro Kawachi, Cassandra Okechukwu (McGill University (Institute for Health and Social Policy/Montreal Health Equity Research Consortium)

Introduction: The United States has the "distinction" of having both the highest obesity rate among OECD countries and the highest incarceration rate in the world. Furthermore, both are socially patterned by race/ethnicity and socioeconomic position. Incarceration involves various health behaviors that could influence adult weight trajectory. We evaluated the associations between history and duration of adult incarceration and weight gain using the National Survey of American Life. **Methods:** Since incarceration is non-random, we used a GREEDY macro with nearest neighbor matching within a 0.01 caliper distance in propensity score to one-to-one match individuals with prior incarceration to individuals without prior incarceration by gender. To investigate the relation between prior incarceration and adult weight gain, we fit gender-stratified generalized estimating equations with weights accounting for complex survey design and controlling for propensity of incarceration history as well as for age, education, income, race/ethnicity, and marital status. We also conducted sensitivity analyses separately for tobacco smoking and parity. **Results:** Approximately 12% had a history of incarceration, with increased risks associated with being African-American, male, between 45 and 54 years old, lower income, lower education and having family history of drug abuse and history of mental illness. For males, incarceration was associated with about 1.77 kg/m2 lower gain in BMI during adulthood (95% CI: -2.63, -0.92). For females, no significant relationship was found between a history of incarceration and adult weight gain. In subgroup analyses among those with an incarceration history, we found no overall association between duration of incarceration and adult weight gain in men or women. Neither tobacco smoking nor parity changed the results. **Conclusions:** The results indicate that incarceration is associated with a lower trajectory of weight gain in males, but not females.

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LIFECOURSE SOCIAL MOBILITY AND BIOLOGICAL MARKERS OF INFLAMMATION, KIDNEY FUNCTION, BLOOD GLUCOSE, AND CHOLESTEROL IN A NATIONALLY REPRESENTATIVE SAMPLE OF OLDER ADULTS . Anusha M Vable*, Ichiro Kawachi, M Maria Glymour, David Canning, Paola Gilsanz, S V Subramanian (Harvard School of Public Health)

Numerous studies have examined the relationship between childhood and adult socio-economic status (SES) and biological health markers, however the association between lifecourse social mobility and biomarkers is less well documented. We examined data on 9,122 participants in the nationally representative Health and Retirement Study. Childhood socio-economic status (cSES) was assessed with a previously validated scale, dichotomized at the median. Adult socio-economic status (aSES) was operationalized by wealth in 2004, equivalized for household size, and dichotomized at the median. Data on C-reactive protein (CRP), hemoglobin A1c, high density lipoprotein cholesterol, and cystatin C were obtained in either 2006 or 2008. Linear regression models were adjusted for age, childhood health, gender, race, maternal investment during childhood, father's presence during childhood, southern birth, foreign birth, and outcome year. Models examined cSES and aSES separately as well as lifecourse social mobility through a cSES*aSES interaction term. High cSES [$\hat{I}^2$ = -0.05, 95% CI: (-0.10, -0.01), p = 0.017] and high aSES [$\hat{I}^2$ = -0.28, 95% CI: (-0.33, -0.23), p < 0.001] predicted lower adult CRP levels, but only aSES remained statistically significant when both variables were considered simultaneously. Interaction models revealed that upwardly mobile individuals had statistically equivalent CRP levels as individuals who experienced high SES at both time points (p = 0.637); downwardly mobile individuals had equivalent CRP levels as individuals who experienced low SES at both time points (p = 0.353). Results were substantively similar across different biomarkers. Although cSES is a significant predictor of adult biologic functioning, aSES has a stronger association, suggesting the deleterious effects of a low SES childhood may be ameliorated by upward social mobility for these outcomes.

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ASSOCIATION BETWEEN APPEARANCE DISCRIMINATION AND POOR SELF-RATED HEALTH AMONG YOUNG ADULTS IN SOUTH KOREA: A LONGITUDINAL COHORT STUDY. Hyemin Lee*, Hyoju Sung, Inseo Son, Ja Young Kim, Seung-Sup Kim (BK21PLUS Program in Embodiment: Health-Society Interaction, Department of Public Health Sciences, Graduate School of Korea University)

Although there is a growing body of evidence that experiences of discrimination harm health, the association between appearance discrimination and health has been understudied. We analyzed the 5th-9th (2008-2012) waves of a longitudinal data of Korean Education Employment Panel (N=6,143) to investigate the association between appearance discrimination and self-rated health. The respondents were divided into two groups who were in their last year of middle (aged 15) and high (aged 18) school at the 1st wave of the survey. Lifetime experiences of appearance discrimination have been annually assessed using a question, "Have you ever experienced discrimination due to your appearance?" since the 5th wave. The question could be answered 'Yes' or 'No'. We excluded the people who reported appearance discrimination at 5th wave of the survey, indicating that they have experienced the discrimination before the 5th wave to properly examine the temporal changes in health status after experiencing discrimination. After adjusting for potential confounders including sex, age, BMI, and self-rated health measured at the 5th wave of the survey, logistic regression was applied to examine the association between reported appearance discrimination during the 6th-9th waves and self-rated health at the 9th wave. We created two distinct variables for appearance discrimination: the number of reported discrimination and whether they have ever reported discrimination across the 6th-9th waves. The odds ratios for poor self-rated health for those who reported appearance discrimination once, twice, and three times or more were respectively 1.06 (95% CI: 0.83-1.37), 1.59 (95% CI: 1.07-2.35), and 2.50 (95% CI: 1.63-3.84). Also, those who ever reported discrimination across 6th-9th waves have higher odds ratio of having poor self-reported health (OR: 1.28, 95% CI: 1.06-1.53). Our findings suggest that appearance discrimination is associated with poor self-rated health among Korean young adults.

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THE EFFECT OF INTERGENERATIONAL SOCIAL MOBILITY ON DEPRESSIVE SYMPTOMS IN A LATINO COMMUNITY. Julia Ward*, Mary N. Haan, Maria Garcia, Tu My To, Allison E. Aiello (Department of Epidemiology, University of North Carolina at Chapel Hill)

Low parental education and socioeconomic trajectory over the life course have been associated with depressive episodes among Latinos. However, intergenerational transmission of socioeconomic position, cultural behaviors, and other risk factors have not been well studied, and most existing studies of these risk factors rely on self-report of prior generations. Our intergenerational study linked a cohort of participants in the Sacramento Area Latino Study on Aging with novel data from 591 of their adult children in the Niños Lifestyle and Diabetes Study, to assess the impact of intergenerational education on depressive symptoms. We classified educational attainment for individuals as low (<12 years) or high (≥12 years) and across generations as: low-low (low parent education, low offspring education), low-high (low parent education, high offspring education), high-high (high parent education, high offspring education), or high-low (high parent education, low offspring education). We defined high depressive symptoms (HDS) as scoring ≥10 on the CESD-10. Logistic regression was used to examine the odds of HDS for each level of intergenerational education, adjusting for age, sex, and generational cohort. We used general estimating equations to account for family clustering. Compared to participants with low-low education, those with high-high education had 0.51 (95% CI:0.29,0.90) times the odds of HDS and those with low-high education had 0.53 (95%CI:0.30,0.95) times the odds of HDS. The high-low education group was too small (n=5) to make meaningful comparisons using this category. Those with low-low education were the most likely to suffer from depressive symptoms. Maintaining high socioeconomic position and increasing socioeconomic mobility across generations were equally protective against depressive symptoms. Improving educational opportunities for children with low parental education may counteract detrimental intergenerational socioeconomic impacts on mental health.

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SURVIVORS OF SEXUAL ABUSE: DO THEY DIFFER IN SEXUAL BEHAVIOR, ATTITUDES, AND PERCEPTIONS TOWARDS SEXUALITY? FINDINGS FROM A CROSS-SECTIONAL SURVEY CONDUCTED AMONG UNIVERSITY STUDENTS IN LEBANON. Lilian Ghandour*, Noura El Salibi, Rola El Yasmine, Faysal El Kak (American University of Beirut)

Myths and misconceptions about sexual abuse place an added burden on women through negative attributions and social stigmatizations. This study used anonymous online survey data to investigate whether female university students who reported sexual abuse vary in their sexual practices, attitudes, and perceptions from those who did not (adjusting for sociodemographics). One in five females (21%) reported lifetime sexual abuse. Compared to females with no history of sexual abuse, female survivors were 2-3 times as likely to report penetrative sexual experiences ($p<0.0001$), but were equally likely to report ever engaging in oral or anal sex to avoid hymen-breaking. Survivors of sexual abuse were more likely to report engaging in sexual activities they did not really want to (OR=7.44, $p<0.0001$), coercion at sexual debut (OR=3.42, $p<0.0001$), and ever being in a relationship where things were moving too fast physically (OR=2.57, $p<0.0001$). Reported reasons for engaging in sexual intercourse were similar for both groups whereby 68% would have sex if they are going to marry their partner and 87% would do so if they had a partner they loved and were comfortable with. Both female groups were also equally likely to agree that sexual intercourse is an intimate experience (94%) and that only two people who trust each other completely should have sexual relations (81%).Reasons for delaying sexual debut were also similar where the majority reported that it is against their belief or religion (75%), that their parents would disapprove (76%), or felt concerned about their reputation, losing self-respect, feeling guilty, or social repercussions (67%). Contrary to social misconceptions, our findings suggest that survivors of sexual abuse do not necessarily have more open practices and views about sexuality. Understanding gender norms and breaking sex role stereotyping is crucial to prevent sexual abuse and victim blaming and enable survivors to reach out for support and counseling.

251-S/P

PREGNANCY-ASSOCIATED HOMICIDE AND SUICIDE IN THE UNITED STATES: 2005-2010. Maeve Wallace*, Donna Hoyert, Corrine Williams, Pauline Mendola (NICHD)

Pregnant and postpartum women may be at increased risk of violent death including homicide and suicide relative to non-pregnant women, but prior US national data have not been reported. We analyzed death records for US women aged 10-54 from 2005-2010, inclusive, to compare mortality among four groups of women: pregnant, early postpartum (pregnant within 42 days of death), late postpartum (pregnant within 43 days to 1 year of death) and non-pregnant/non-postpartum women. We estimated pregnancy-associated (pregnant/postpartum combined) homicide and suicide ratios and compared these to non-pregnant/non-postpartum ratios in order to identify differences in risk after adjusting for three previously reported levels of pregnancy misclassification on death records. Young women, non-White, and undereducated women bore the greatest burden of homicide, while suicide was more likely to occur in older and non-Hispanic White women. Pregnancy-associated homicide risk ranged from 3.2-5.2 per 100,000 live births, depending on degree of misclassification, compared to a non-pregnant/non-postpartum rate of 2.9 per 100,000 women aged 10-54. Pregnancy-associated suicide risk ranged from 2.2-3.7 per 100,000 live births compared to 5.7 per 100,000 women aged 10-54 among non-pregnant/non-postpartum women. After adjustment for the most conservative estimate of misclassification, risk of homicide among pregnant/postpartum women was 1.11 times that of non-pregnant/non-postpartum women (95% CI: 1.03, 1.19) while the risk of suicide was decreased during pregnancy/postpartum (RR=0.39, 95% CI: 0.36, 0.43). Pregnant and postpartum women in the US women appear to be at increased risk for homicide and decreased risk for suicide. Prevention of violent death during pregnancy warrants greater vigilance.

252-S/P

HETEROGENEITY OF AGGRESSIVE ACTS AMONG INPATIENTS WITH SCHIZOPHRENIA: FROM CONCURRENT RELATIONSHIP TO WEIGHTING APPROACH FOR PERSISTENT PREDICTION WITH VIOLENCE HISTORY. Shing-Chia Chen*, Hai-Gwo Hwu, Wen-I Liu (School of Nursing, College of Medicine, National Taiwan University and National Taiwan University Hospital, Taipei City, Taiwan, R. O. C.)

Background: Aggressive acts of patients and the prediction are important concerns in psychiatric service. The heterogeneity of aggressive acts was agreed but still not specific. A history of recent aggressive acts was predictive of occurrence. There is lack of study to explore the heterogeneity in terms of the concurrence and persistence of aggressive acts among psychiatric patients for prediction with violence history. **Methods:** A prospective panel study was designed to recruit 107 adult patients with schizophrenia who consecutively admitted in an acute psychiatric ward of a university hospital. Their violence history one month prior to admission was interviewed on admission, and their aggressive acts in the first week after admission were daily observed. The counts data of aggressive acts and weighted aggressiveness which was adjusted by the counts and severity of aggressive acts using the Chinese modified version of Violence Scale were applied to explore the heterogeneity and the prediction model with the demographic items, clinical variables, and violence histories. Descriptive statistics, Spearman's and Pearson's correlation, and multiple regression models were used to analyze the data. **Results:** Outward aggression (toward properties and other persons) and inward aggression (toward self) in the concurrence were significantly distinct. Both had the tendency of persistence over time with same category of violence history and it was found as the only one best predictor. R square is 0.36 and 0.32, and the beta score was highest of 0.60 and 0.57 in the two prediction models ($p<0.001$). **Conclusion:** A new approach was applied in measuring the aggressive acts using counts and weighted aggressiveness. The finding offers an important evidence of the heterogeneity and the prediction model for the aggressive acts among inpatients with schizophrenia. Valid precursors of the violence history could be applied for prevention and prediction of aggressive acts.

253-S/P

PERINATAL VIOLENCE AND POSTPARTUM CONTRACEPTIVE USE: THE NEED FOR INTEGRATED FAMILY PLANNING AND VIOLENCE PREVENTION SERVICES. Susan Cha*, Saba W. Mash (Department of Family Medicine and Population Health, School of Medicine, Virginia Commonwealth University)

Background: Intimate partner violence (IPV) is a major public health problem affecting nearly 1 in 4 women. Women's reproductive decision-making may be adversely affected by abusive partners. The aim of this study is to examine the association between IPV and contraceptive use and assess whether the association varies by receipt of prenatal birth control counseling and race/ethnicity. **Study Design:** This study analyzed data from the national Pregnancy Risk Assessment Monitoring System (2004/08) which included 193,310 women with live births in the U.S. IPV was determined by survey items that addressed physical abuse by a current or former partner in the 12 months before or during pregnancy. The outcome was contraceptive use after delivery (yes vs. no). Multi-logistic regression analysis was conducted to assess the influence of IPV during the preconception, prenatal, preconception and prenatal, or preconception and/or prenatal periods on postpartum contraceptive use. Data were stratified to assess differential effects by race/ethnicity and receipt of birth control counseling. **Results:** Approximately 6.2% of women reported experiencing some form of IPV. Abused women were significantly less likely to report contraceptive use after delivery, regardless of the timing of abuse. This was particularly true for Hispanic women who reported no prenatal birth control counseling (OR=0.52, 95% CI=0.35-0.76) and all other racial/ethnic groups who received birth control counseling (ORwhite=0.59, 95% CI=0.51-0.67; ORblack=0.63, 95% CI=0.53-0.73; ORother=0.68, 95% CI=0.49-0.93). **Conclusions:** IPV adversely affects the use of contraceptive methods following delivery. Birth control counseling by health providers may mitigate these effects, however, the quality of counseling need further investigation. Health providers should educate women on effective family planning options and discuss long-acting reversible contraceptives that are not partner-dependent within abusive relationships.

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PREGNANCY OUTCOMES IN WOMEN INFECTED WITH HEPATITIS B OR C VIRUS: RESULTS FROM SURVEILLANCE AND BIRTH REGISTRY DATA IN SOUTH CAROLINA. Afiba Manza-A. Agovi*, Wayne Duffus, Melinda Forthofer, Jihong Liu, Jaija Zhang, Wilfried Karmaus (Arnold School of Public Health, University of South Carolina, Columbia, South Carolina)

Our aim was to estimate the association between maternal hepatitis B or C (HBV, HCV) infection status during pregnancy and preterm birth, small for gestational age (SGA), low birth weight (LBW) and neonatal intensive care unit (NICU) admission. We utilized data from a cohort of singleton pregnancies from women, aged 15-49, whose births were recorded in the South Carolina birth registry between 2004 and 2011. Restricting our analysis to women who contributed more than one pregnancy over the study period, we used logistic regression to analyze pregnancy outcomes after a subsequent pregnancy after considering infection status in a prior pregnancy. A total of 438,208 singleton pregnancies in women aged 15-49 years were recorded in the SC birth registry over the 8-year study period. Of these, 211,457 (48.3 %) pregnancies were from women who contributed two or more consecutive pregnancies prospectively and 95,291 (21.7%) pregnancies were subsequent pregnancies that were used for the analysis. Among pregnancies that were studied, 276 (0.29%) were HCV-infected and 236 (0.25%) were HBV-infected. After adjusting for known confounders, babies born to HCV-infected mothers whose status changed from a non-diseased state, in their previous pregnancy, to a diseased status in their subsequent pregnancy had higher odds of LBW (OR=2.07, 95% CI 1.28- 3.37) after being compared to non-infected cases. No increase in odds was identified for HBV-infected mothers. Our results support an association between LBW and HCV infection, specifically for mothers who transitioned from a non-infected status state in their previous pregnancy, to an infected status during their subsequent pregnancy in our study.

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RECURRENT YEAST INFECTIONS AND VULVODYNIA: ASSESSING THE TEMPORAL ASSOCIATION. Bernard L Harlow*, Rachel Caron, Ruby HN Nguyen (University of Minnesota School of Public Health)

Vulvodynia is a highly prevalent and debilitating disorder defined as vulvar burning pain or pain on contact that occurs in the absence of visible findings or clinically identifiable disorders. Many studies have suggested an association between vulvodynia and recurrent yeast infections perhaps due to genetic susceptibility to candida antigens or abnormal sensory processing as a result of repeated candidiasis infections. However, there is little evidence that Candida infections are causally related to new onset of vulvodynia, largely due to the failure of prior studies to elicit the temporality of the yeast infections in relation to vulvodynia onset. We assessed new and recurrent yeast infections prior and subsequent to age at first vulvar pain onset among 208 clinically confirmed cases of vulvodynia and 187 general population controls with assigned reference ages comparable to first vulvar pain age in cases. Although crude findings suggested a strong association of yeast infections prior to onset of vulvodynia, after adjustment for age at first intercourse, depression, anxiety, and history of urinary tract infections, this association was substantially attenuated (OR=3.5, 95%CI 1.0-11.4). However, post vulvodynia occurrence of either new or recurrent yeast infections was nearly 15 times more likely among cases relative to controls after adjustment for the same covariates above (95%CI 5.2-41.7). When women with a history of pre-vulvodynia/reference age yeast infections were excluded, the odds of post-onset yeast infections in women with vulvodynia was significantly higher (OR=23.2, 95%CI 4.5-120.4). Earlier research suggests that recurrent vulvovaginal candidiasis may be associated with innate immunity which lends support to our hypothesis that vulvodynia may occur in some women as a consequence of altered immune function.

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ASSOCIATION OF POOR SUBJECTIVE SLEEP QUALITY AND SLEEP PATTERNS WITH SUICIDAL IDEATION AMONG PREGNANT WOMEN. Bizu Gelaye*, Yasmin V. Barrios,, Qiu-Yue Zhong,, Marta B. Rondon, Christina P.C. Borba, Sixto E. Sanchez, David C. Henderson, Michelle A. Williams (Department of Epidemiology, Harvard T. H. Chan School of Public Health, Boston, MA)

Objective: To examine the independent and joint relationships of poor subjective sleep quality, and depression with suicidal ideation among pregnant Peruvian women. **Methods:** A cross-sectional study was conducted among 641 pregnant women attending prenatal care clinics in Lima, Peru. Early pregnancy antepartum depression and suicidal ideation were assessed using the Patient Health Questionnaire-9 (PHQ-9) scale. Antepartum sleep quality was assessed using the Pittsburgh Sleep Quality Index (PSQI). Logistic regression procedures were performed to estimate odds ratios (aOR) and 95% confidence intervals (95% CI) adjusted for confounders. **Results:** Overall, the prevalence of suicidal ideation in this cohort was 16.8% and poor sleep quality was more common among women endorsing suicidal ideation as compared to their counterparts who did not (47.2% vs. 24.8%, p5 vs. $\leq$ 5) was associated with a 1.7-fold increased odds of suicidal ideation (aOR=1.67; 95% CI 1.02-2.71). When assessed as a continuous variable, each 1-unit increase in the global PSQI score resulted in an 18% increase in odds for suicidal ideation, even after adjusting for antepartum depression (aOR=1.18; 95% CI 1.08-1.28). Women with both poor sleep quality and depression had a 3.5-fold increased odds of suicidal ideation (aOR=3.48; 95% CI 1.96-6.18) as compared with those who had neither risk factor. **Conclusion:** Poor subjective sleep quality was found to be associated with increased odds of suicidal ideation, even after adjustment for depression. Replication of these findings may promote investments in studies designed to examine the efficacy of sleep-focused interventions to treat pregnant women with sleep disorders and suicidal ideation.

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LONGEVITY OF FASHION MODELS, 1921-2012. Robert J Reynolds*, Steven M Day (Mortality Research & Consulting, Inc.)

In spite of the common perception that female fashion models are at high risk of substance abuse and eating disorders there is little epidemiological research in this area. Existing studies have focused on the prevalence of such disorders but give no consideration to long-term effects such as mortality. Research on the health of models is complicated by the difficulty in objectively delineating and tracking cohorts of models over time. Here we analyzed data from several groups of models: all Miss America Pageant winners, all Miss USA Pageant winners, all U.S.-born Sports Illustrated Swimsuit Edition cover models, and all of Playboy Magazine's "Playmates of the Month", between September 1921 and December 2012. We used these data to compute all-cause standardized mortality ratios (SMRs) comparing the models to the general population of women in United States. The 859 models contributed 25,304 person-years and 71 deaths in the study period. All-cause SMRs by decade showed that Playboy Playmates were at substantially (and statistically significantly) increased risk of death in the 1960s (SMR=4.48, 95% CI=1.45-10.45), non-significant increased risk in the 1970s, and non-significant decreased risk in all subsequent periods. Miss America and Miss USA pageant winners displayed no significant SMRs in individual decades, but, taken together, pageant winners were shown to be at reduced risk of mortality (SMR= 0.65, 95% CI=0.40-1.00) compared to the general population. The entire cohort together was found to be at decreased risk of mortality in comparison to the general population (SMR= 0.77, 95% CI=0.60-0.97). The increased risk of death for Playboy Playmates in the 1960s may be related to lifestyle choices, as the SMR is driven by 5 deaths, 4 of which were due to external causes such as trauma or drug overdoses. The overall reduced risk of death for the cohort may be due to good health and fitness habits, as well as favorable socio-economic status across the lifespan. The increased risk of death for Playboy Playmates in the 1960s may be related to lifestyle choices, as the SMR is driven by 5 deaths, 4 of which were due to external causes such as trauma or drug overdoses. The overall reduced risk of death for the cohort may be due to good health and fitness habits, as well as favorable socio-economic status across the lifespan.

264-S/P

A PROSPECTIVE STUDY OF CAFFEINE INTAKE AND PREMENSTRUAL SYNDROME. Alexandra Purdue-Smithe*, JoAnn E Manson, Susan E Hankinson, Elizabeth Bertone-Johnson (Division of Biostatistics and Epidemiology, School of Public Health and Health Sciences, University of Massachusetts, Amherst, MA)

Premenstrual syndrome (PMS) affects an estimated 20% of premenopausal women, resulting in the disruption of normal life activities and relationships. A small number of cross-sectional studies have reported a positive association between caffeine intake and prevalent PMS, especially among women experiencing breast tenderness. Consequently, women with PMS are often counseled to minimize caffeine intake. However, retrospective studies of the caffeine-PMS association may be influenced by women increasing caffeine intake in response to symptoms, such as fatigue and insomnia. Prospective studies are needed to minimize reverse causation bias. We evaluated the association between caffeine intake and PMS diagnosis among participants of the prospective Nurses' Health Study II PMS Sub-Study. Participants were free from PMS at baseline (1991). Cases were women reporting a new clinician diagnosis of PMS from 1993-2005 confirmed by menstrual symptom questionnaire (n=1,257). Controls were women experiencing few symptoms with limited personal impact (n=2,463). Caffeine intake was measured by food frequency questionnaire four times during follow-up. After adjustment for age, smoking, body mass index, and other factors, total caffeine intake was not associated with risk of PMS. The odds ratio (OR) comparing women with the highest caffeine intake (quintile median = 524 mg/day, equivalent to the amount of caffeine in five 8 oz. cups of caffeinated coffee) to the lowest (quintile median = 14 mg/day) was 0.83 (95% confidence interval (CI) = 0.63-1.09). High caffeine intake was also not associated with risk of breast tenderness (OR for quintile 5 vs. 1 = 0.75; 95% CI = 0.52-1.09). Our findings suggest that caffeine intake does not appear to increase risk of PMS and that recommendations for symptomatic women to limit caffeine intake may be unwarranted.

265-S/P

DOES HUMAN PAPILLOMAVIRUS (HPV) AFFECT PREGNANCY OUTCOMES? A RETROSPECTIVE COHORT STUDY BASED ON HOSPITAL DATA, 2012-2014. Harpriya Kaur*, Delf Schimdt-Grimminger, Steven Remmenga, Baojiang Chen, KM Islam, Shinobu Watanabe-Galloway (University of Nebraska Medical Center, Omaha, Nebraska)

Objective: To estimate the rate of Human Papillomavirus (HPV) among pregnant women and its impact on the pregnancy outcomes. **Methods:** This was a retrospective cohort study based on data obtained from Nebraska Medical Center from 2012-2014. This study included pregnant women who sought prenatal care and later delivered at Nebraska Medical Center during the study period. HPV exposure was based on laboratory reports. Patients with atypical squamous cells of undetermined significance on Papanicolaou smear were included in the exposed group if their HPV DNA was positive. Bivariate and multivariable analysis was performed using SAS 9.3. **Results:** Of the total sample size of 5,022 women, 221 (4.4%) were HPV positive. Women with HPV exposure had increased risk of preeclampsia (adjusted OR: 2.83 95%CI: 1.28-6.26) and were also 1.8 times more likely to deliver preterm compared to women with no HPV exposure (adjusted OR: 1.8, 95%CI: 1.15-2.83). Addtionally, HPV exposure was found to be significantly associated with low birth weight (adjusted OR: 2.58; 95%CI: 1.56-4.27). **Conclusion:** HPV infection is associated with adverse pregnancy outcomes. This may indicate the health benefits of HPV vaccination for young girls and adolescents females prior to pregnancy. From clinical standpoint, one of the of the priorites should be to improve HPV vaccination rates through better education and awareness campaigns among patient population. In addition, policy makers should consider mandating HPV screening among pregnant women. Conjointly, there should be close follow-up of HPV positive women and their fetus.

266-S/P

DIOXIN LEVELS AND WORKING MEMORY IN THE SEVESO WOMEN'S HEALTH STUDY. Jennifer Ames*, Marcella Warner, Paolo Mocarelli, Paolo Brambilla, Brenda Eskenazi (University of California, Berkeley)

2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD) is neurotoxic in animals but few studies have investigated its effects on the human brain. Related dioxin-like compounds have been linked to poorer cognitive function in adults, with effects more pronounced in women, perhaps due to the loss of neuroprotective estrogen in menopause. The Seveso Women's Health Study is an historical cohort of women residing near Seveso, Italy in 1976, at the time of an industrial explosion that resulted in the highest known population exposure to TCDD. SWHS comprised 981 women who were 0 to 40 years in 1976, resided in the most contaminated areas, and had TCDD concentration measured in archived sera collected soon after the explosion. In 2008, we measured working memory via the Wechsler Memory Scale digit span and spatial span tests in a random sample (n=459) of the cohort. Odds ratios of the association between 1976 serum TCDD and dichotomized spatial span and digit span test scores were evaluated by four estimation methods: conventional stepwise multivariate regression, G-computation, inverse probability-of-treatment weighting, and doubly robust targeted maximum likelihood estimation (TMLE). In the study sample, 85% had 1976 serum TCDD levels above background. The average age in 2008 was 52.3(Â±11.3) years, with 53% post-menopause. The proportion of women scoring below the age -scaled median on the digit span (7) and spatial span (8) tests was 34% and 41%, respectively. Adjusting for a priori confounders, we found no significant independent associations between 1976 serum TCDD and working memory (digit span or spatial span) forward or backward scores or their sum using three semi-parametric estimators or traditional logistic regression. We found no effect modification by menopause status. This is the first study of the exclusive effects of TCDD on cognition in women. Our findings do not indicate an adverse effect of dioxin exposure on working memory function in adult women in Italy.

268-S/P

SELF-REPORTED REPRODUCTIVE TRACT INFECTIONS AND ULTRASOUND DIAGNOSED UTERINE FIBROIDS IN AFRICAN-AMERICAN WOMEN. Kristen Moore*, Donna Baird (Department of Epidemiology, Gillings School of Global Public Health, University of North Carolina at Chapel Hill, Chapel Hill, NC US)

Background: For decades it has been hypothesized that reproductive tract infections (RTIs) are risk factors for uterine fibroids. However, only 2 recent studies have been conducted. This study aimed to investigate the relationship between RTIs and fibroids in a large study using ultrasound screening for fibroids. **Methods:** We used cross-sectional enrollment data from African-American women ages 23-34 with no previous fibroid diagnosis. RTI history was measured by self-report and fibroid status by standardized ultrasound. Secondary fibroid outcomes were size, number, and total volume. Age- and multivariable-adjusted logistic regression were used to estimate odds ratios (ORs). **Results:** In total, 1,656 women were included; 22% had fibroids. Bacterial vaginosis (BV) was associated with a 21% increased odds of fibroids [aOR: 1.21 95% confidence interval (CI) (0.93-1.58)]. Chlamydia infection and pelvic inflammatory disease were associated with a 38% [aOR: 0.62 95%CI (0.40-0.97)] and a 46% [aOR: 0.54 95% CI (0.25-1.17)] reduced odds of having 2 or more fibroids, respectively. Those with a previous BV diagnosis had a 47% increased odds of having 2 or more fibroids [aOR: 1.47 95%CI (0.98-2.21)] and a 41% increased odds of having a larger total fibroid volume [aOR: 1.41 95%CI (0.98-2.04)]. **Conclusions:** Our study was the first to explore the relationship between RTIs and fibroid size, number and total volume. There appeared to be no strong associations between self-reported RTIs and fibroids. Studies using serology, a biochemical measure of past infection, are needed to better investigate associations between RTIs and fibroids.

269-S/P

EARLY LIFE FACTORS AND UTERINE FIBROIDS IN A COHORT OF YOUNG AFRICAN AMERICAN WOMEN, Kristen Upson*, Donna D Baird (National Institute of Environmental Health Sciences, Research Triangle Park, NC,, US)

Uterine fibroids are common in reproductive-age women and may confer substantial morbidity. Laboratory animal studies demonstrate that select intrauterine and infant exposures increase the risk of fibroid development in adulthood. However, two prior studies evaluating early life factors and fibroids yielded inconsistent results. We examined this relationship using data from the Study of Environment, Lifestyle & Fibroids (SELF), a study of 1,696 African American women ages 23-34 years who were screened by ultrasound for fibroids at enrollment. Early life factors were ascertained by questionnaire, with most participants receiving assistance from their mothers. We estimated the relative risk (RR) and 95% confidence interval (CI) using log-binomial regression, adjusting for confounding factors. The factor most strongly associated with fibroids was mother's birth decade. Participants whose mothers were born in the 1950s had a 40% increased risk of fibroids compared to those with mothers born in the 1960s (RR 1.4, CI: 1.1-1.8); the association was modest for those with mothers born in the 1940s (RR 1.3, CI: 0.9-1.9). The associations appeared stronger if the participant was the mother's firstborn child (1940s/firstborn, RR 1.7, CI:0.9-3.4; 1940s/later-born RR 1.5, CI:0.9-2.4; 1950s/firstborn RR 1.8, CI:1.2-2.7; 1950s/later-born, RR 1.6, CI:1.1-2.4; 1960s/firstborn, RR 1.4, CI:0.9-2.1; vs. 1960s/later-born). Our results may be consistent with the broad application of persistent pesticides during these decades, particularly the 1950s. Body burden decreases with parity and breastfeeding, possibly explaining the association with participants' birth order. Our results suggest that early life may be a critical exposure window for fibroid development in adulthood.

270-S/P

SOY-BASED INFANT FORMULA FEEDING AND MENSTRUAL PAIN IN A COHORT OF YOUNG AFRICAN AMERICAN WOMEN. Kristen Upson*, Donna D. Baird (National Institute of Environmental Health Sciences, Research Triangle Park, NC, US)

Phytoestrogen exposure from soy formula feeding may disrupt reproductive system development, resulting in menstrual problems after menarche. A greater risk of menstrual discomfort with soy formula feeding was reported in a prior study conducted among young adults who participated as infants in a clinical trial and were assigned to soy or cow-based formula feeding. We investigated this relationship using data from the Study of Environment, Lifestyle & Fibroids (SELF), a study of 1,696 African American women ages 23-34 years in Detriot, MI. Data on infant soy formula feeding, 89% retrospectively reported by the participants' mothers, and several indicators of menstrual pain were available for 1,553 participants. We estimated the relative risk (RR) and 95% confidence interval (CI) using log-binomial regression, or log multinomial regression, adjusting for participant age and maternal education. Soy formula feeding was associated with 40% increased risk of ever use of a contraceptive method for menstrual pain (RR 1.4, CI: 1.1-1.9). Women fed soy formula were more likely than unexposed women to report moderate/severe menstrual discomfort/pain with "most periods", but not "every period", during early adulthood (ages 18-22 when not using hormonal contraception) (RR 1.5, CI: 1.1-1.9). Our data suggested only a modest association between exposure and women reporting a big/medium problem with menstrual cramps/discomfort in the prior 12 months. Consistent with dysmenorrhea decreasing with age, associations were generally stronger among women ages ≤30 years. Our observations suggest that infancy may be a critical exposure window for biological changes influencing menstrual pain in early adulthood.

271-S/P

ANTI-MÜLLERIAN HORMONE IS NOT ASSOCIATED WITH FECUNDABILITY. Shvetha M. Zarek*, Emily M. Mitchell, Lindsey A. Sjaarda, Robert M. Silver, Jean Wactawski-Wende, Janet M. Townsend, Anne M. Lynch, Laurie L. Lesher, Joseph B. Stanford, Noya Galai, David Faraggi, Karen C. Schliep, Torie C. Plowden, Rose G. Radin, Robin A. Kalwerisky, Neil J. Perkins, Alan H. DeCherney, Sunni L. Mumford, Enrique F. Schisterman (Epidemiology Branch, Division of Intramural Population Health Research, Eunice Kennedy Shriver National Institute of Child Health and Human Development, National Institutes of Health)

Background: The impact of anti-Müllerian hormone (AMH), a marker of ovarian reserve, on fecundability in fertile women is understudied. **Methods:** Fertile women (n=1228) attempting pregnancy with one to two prior pregnancy losses participated. Preconception AMH levels were categorized as low (4.0 ng/mL) based on clinically relevant cut-points. Cox proportional hazard regression models assessed fecundability odds ratios (FOR), adjusting for age and BMI and accounting for left truncation and right censoring. Analyses were repeated within three domains of reproductive history, stratified across 1) history of 1 or 2 prior pregnancy losses, 2) time since most recent loss of ≤ 1 or >1 year, and 3) history of 0 or ≥1 prior live birth. **Results:** There were no significant associations observed between AMH level and fecundability among women with 1 (Low AMH: FOR, 0.98, 95% CI 0.7, 1.3; High AMH: FOR 1.13, 95% CI 0.9, 1.4) or 2 (Low: FOR, 1.14, CI 0.8, 1.7; High: FOR 1.04, CI 0.8, 1.4) prior pregnancy losses. Similarly, no associations were observed when women were stratified by time since most recent loss or by history of live birth, with the exception of a marginally higher fecundability in women with higher vs. normal AMH (FOR 1.16, CI 0.9, 1.4) among women with a pregnancy loss within ≤1 year. **Conclusion:** In fertile women with a history of pregnancy loss, AMH was not consistently associated with fecundability.

272-S/P

PREDICTING THE RISK OF PRETERM BIRTH BY BIOLOGICAL AND SOCIOECONOMIC FACTORS IN THE PRESENCE OF PSYCHIATRIC DISORDERS: IMPLEMENTATION OF RANDOM FOREST WITH EMCIEN BIG DATA ANALYTICS. Taehyun Jung*, Haiqun Lin, Kimberly Ann Yonkers (Yale University)

Psychiatric disorders, such as Major depressive episode (MDE) or Posttraumatic stress disorder (PTSD), are known as predisposing factors that increase the risk of preterm birth. Researchers have been studying the role of biological and socioeconomic factors besides psychiatric disorders. The recent studies, however, have shown inconsistent identification of risk factors and have not fully explained the complexity between these risks with preterm birth. In this study we used Random Forest and compared the selected variable subsets to the results from the Automated Pattern Discovery by Emcien© Big data Analytics and investigated what subset of factors was relevant to preterm birth. The random forest substantially improved prediction accuracy in comparison to classification tree and provided variable importance measures that reflect the impact of each variable. Results showed that antidepressant medication use during pregnancy being the strongest predictor of preterm birth followed by preterm history, and education level. If preterm birth was stratified by preterm history we found that race was the strongest predictor followed by smoking, and education level. When the forest was stratified by race, antidepressant medication use and MDE were the most important factor for white women; while black, Hispanic, and other women were mostly affected by their preterm history and education level. Emcien© Analytics found 487 predictive clusters for core connection. When a white woman has panic, PTSD, and MDE experience during pregnancy, preterm birth was predicted with 56% probability. When there is no concern of race, but the woman has experienced panic, PTSD, and MDE, the probability of preterm birth is predicted at 44%. The top 10 predictive clusters are characterized by white women, preterm history, age, and psychiatric illnesses. These results indicate that biological or socioeconomic factor also important factors linked to preterm birth as well as psychiatric illnesses.

273-S/P

STRESSFUL LIFE EVENTS IN PREGNANCY AND POSTPARTUM DEPRESSIVE SYMPTOMS. Timothy O. Ihongbe*, Saba W. Masho (Virginia Commonwealth University)

Introduction Postpartum depression (PPD) affects 10–20% of women in the US. PPD can lead to serious health risks for both the mother and infant and cause long-term effects on child development. Stressful life events (SLE) in pregnancy have been shown to predict PPD with the presence of symptoms. However, majority of studies have either examined SLEs individually or cumulatively. This study aims to examine the association between SLE in pregnancy and postpartum depressive symptoms (PDS), utilizing 4 different constructs of SLE derived from a principal component analysis. **Methods** Data come from the 2009-2011 national Pregnancy Risk Assessment Monitoring System and linked birth certificate data. Study population included women (N=97,197) who had singleton births and provided valid responses to questions on SLEs and PDS. Multiple logistic regression models were used to examine the relationship between SLE in pregnancy and PDS, adjusting for potential confounders and accounting for the complex survey design. SLEs were categorized into 4 maternal stressor constructs: financial, partner-associated, emotional and traumatic stressors, and PDS was defined as a dichotomous variable based on 3 PDS survey questions. **Results** Women who experienced partner-associated stress had the highest odds of having PDS (OR, 2.05; 95% CI, 1.92-2.19) while women who experienced emotional stress had the lowest odds of having PDS (OR, 1.26; 95% CI, 1.19-1.34). The odds of PDS in women who experienced financial and traumatic stress were 1.35 (95% CI, 1.27-1.44) and 1.43 (95% CI, 1.33-1.54), respectively. **Conclusion** This study supports evidence that women who experience SLEs during pregnancy are at higher risk of having PDS. Healthcare providers should therefore pay special attention to this high risk population of women who experience SLEs during pregnancy for PPD screening during the postpartum period.

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SELF-REPORTED SYMPTOMS ASSOCIATED WITH OVARIAN CANCER AMONG PERI- AND POSTMENOPAUSAL WOMEN- Zhuoyu Sun*, Lucy Gilbert, Antonio Ciampi, Olga Basso (Department of Epidemiology, Biostatistics and Occupational Health, McGill University)

Women with pelvic, abdominal, or urinary symptoms are advised to undergo assessment to rule out ovarian cancer. A ten fold higher prevalence of ovarian cancer has been reported in women >50 years reporting these symptoms than in women taking part in screening trials. However, little is known about the prevalence and distribution of these symptoms in a similar-aged general population. We carried out a survey among 3000 women aged 50+ in Montreal, randomly sampled from those covered by Provincial Health Insurance. Women were asked about symptoms lasting for >2 weeks but<1 year. Despite two reminders, only 823 women (27%) returned completed questionnaires (375, 312, and 136 in the 1st, 2nd, and 3rd wave, respectively). The response rate was similar between Anglophone and Francophone, but differed by age (30.5% responded among 50-59 year-olds, 32.1% among 60-69 year-olds, and 19.1% among women 70+ years). Here, we present preliminary results based on 300 questionnaires from the 1st wave. Overall, about 50% of responders reported at least one symptom, and 30% reported 3+ symptoms. Experiencing symptoms was less frequent in the older age group, with 41.7% of women over 70 reporting at least one symptom, compared with 54.4% in those aged 50-59 and 60-69 years. Having ever used hormone replacement therapy was associated with reporting symptoms (RR=1.3, 95%CI: 1.0-1.7), as was having given birth to 3+ children, compared with none (RR=1.5, 95%CI: 1.1-2.0). The symptoms considered as most commonly associated with ovarian cancer-abdominal bloating, increased urinary frequency, and early satiety-were reported by 13.3%, 12.7%, and 6.3% of women, respectively. Given the low response rate, the above figures most likely overestimate the prevalence of symptoms in this population-an issue that we will address in future analyses.

280-S/P

G-COMPUTATION AND INVERSE PROBABILITY OF TREATMENT WEIGHTED ESTIMATION OF AVERAGE TREATMENT EFFECTS AMONG THE TREATED AND THE UNTREATED. Aolin Wang*, Roch A. Nianogo, Onyebuchi A. Arah (Department of Epidemiology, The Fielding School of Public Health, University of California, Los Angeles, Los Angeles, California, USA)

Average treatment effects among the treated (ATT) and the untreated (ATU) are of interest in the presence of treatment heterogeneity or when projecting potential outcomes in a new subpopulation (using ATU for example). There are still no accessible demonstration of g-computation of ATT and ATU. Furthermore, although there are inverse-probability-of-treatment-weights (IPTW) for fitting marginal structural models of ATT and ATU, those weights analytically double the number of treated or untreated respectively, without normalizing back to the observed sample size. For students and practitioners, the link between g-computation and IPTW is also underappreciated and how different estimation approaches influence the standard errors remains unclear. In this study, we demonstrate the steps involved in the g-computation as well as IPTW fitting of ATT and ATU using real and simulated data. We derive and apply new inverse-probability-of-treatment weights that analytically maintain the observed sample size of the total (treated and untreated) population. For the g-computation, we implement an easy-to-use Monte Carlo simulation protocol that simulated the potential outcomes and a new treatment variable. By regressing the potential outcome on the simulated treatment variable, we obtained consistent point estimates and standard errors that matched those from IPTW fitting of marginal structural models of the ATT and ATU using both unstabilized and stabilized weights. G-computation and IPTW both break the link between confounders and treatment but via different means, namely simulated randomization of a new treatment variable and weighting of the observed treatment variable respectively. Given its flexibility in dealing with both time-varying confounding and effect heterogeneity, g-computation should be seen as a powerful tool for estimating ATT, ATU and projecting potential outcomes and should be included in routine teaching and practice.

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BOUNDING THE PER-PROTOCOL EFFECT OF COLORECTAL CANCER SCREENING. Sonja A. Swanson*, Oyvind Holme, Magnus Loberg, Mette Kalager, Michael Bretthauer, Geir Hoff, Eline Aas, Miguel A. Hernan (Department of Epidemiology, Harvard School of Public Health, Boston, MA)

When there is non-compliance in a randomized trial, the per-protocol effect – i.e., the effect that would have been observed had everybody followed the protocol – may be of interest. Unfortunately, a point estimate for the per-protocol effect is only achievable under similar untestable assumptions as those used to identify causal effects in observational studies. However, it is possible to sometimes attain lower and upper bounds for the per-protocol effect under weaker but more plausible assumptions. These strategies for obtaining bounds consistent with data and a set of assumptions, known as "partial identification" methods, are rarely used by epidemiologists. Here we present an example of the estimation of bounds for the per-protocol effect. Specifically, we estimated bounds for the effect of colorectal cancer screening on cancer incidence in the Norwegian Colorectal Cancer Prevention Trial, a randomized trial of sigmoidoscopy screening including 98,792 men and women aged 50-64 years. In this trial, 62% of those randomized to screening were screened; nobody in the control arm received screening. Under the assumption that randomization had no effect on the outcome except through screening, we obtained bounds for the risk difference (RD): $-0.64\% \leq RD \leq 36.98\%$. These bounds appear helpful for quantifying the maximum possible effectiveness, but are less helpful in quantifying the minimum effectiveness or to rule out harm. On the other hand, these bounds are valid without resorting to untestable "no confounding" assumptions. We will further show that these bounds can be viewed as summarizing partially-identifiable effects in subgroups of the population, and that for 62% of the population we can obtain a point estimate (RD=-0.36%) while for the remaining 38% we have less informative bounds ($-1.24\% \leq RD \leq 98.86\%$). We will describe narrower bounds that can be obtained under additional assumptions, and will discuss the application of this methodology to observational studies.

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MEDIATION ANALYSIS FOR HEALTH DISPARITIES RESEARCH. Ashley I Naimi*, Mireille E Schnitzer, Erica EM Moodie, Lisa M Bodnar (McGill University)

A large body of research is devoted to understanding mechanisms that underlie racial health disparities. This work is often based on mediation procedures that may not be justified with race as the object of study. We explore the consequences of using this common approach, often referred to as the difference method. We compare the difference method to more general methods including inverse probability weighted marginal structural models, the structural transformation method (also known as sequential g-estimation), doubly robust g-estimation of a structural nested model, and doubly robust targeted minimum loss based estimation. We use simulation data, and an empirical dataset of nearly 1 million pregnancies to assess the role of pre-pregnancy obesity in explaining the racial disparity in infant mortality. Using the difference method, we estimated that pre-pregnancy obesity explained between 6.5% and 10.5% of the racial disparity in infant mortality. In contrast, using more general methods, these estimates increased to between 12.9% and 18.8%. Our findings suggest that inappropriate use of the difference method can have important consequences on empirical findings.

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AUGMENTING CAUSAL DIAGRAMS WITH EFFECT MODIFICATION, INTERACTION AND OTHER PARAMETRIC INFORMATION. Onyebuchi A. Arah* (Department of Epidemiology, UCLA Fielding School of Public Health, Los Angeles, CA, US)

Causal diagrams have become ubiquitous in epidemiology. Despite this widespread use, students and researchers have not been able to use them to depict effect modification and interactions. This study introduces and demonstrates how to augment directed acyclic graphs (DAGs) with parametric information on product terms typically used in modeling effect modification and interactions. Guiding principles for expanding or suppressing edges and nodes are also developed. Several applications illustrations are developed to depict total effects, effect decomposition, joint effect models, and longitudinal data settings with time-varying interactions. Existing graphical rules continue to be applicable to augmented DAGs. Several important implications can be read off the augmented DAGs. For example, one result shows when and how effect modification requires only uncontrolled confounding of the main exposure. The augmentation also allows for an intuitive visual depiction of the structural classification of effect modification. Augmented DAGs are also used show how the total effect of an exposure in the presence of mediation and interaction decomposes in the controlled direct effect, mediated interaction, reference interaction and pure natural indirect effect that can be traced along specific directed paths. Finally, parametric augmentation is shown to extend to different functional forms for in path diagrams and their implications for confounding control and residual confounding.

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DOES MAXIMIZING COVARIATE BALANCE ACHIEVE THE BEST ESTIMATE? COMPARATIVE PERFORMANCE OF MATCHING METHODS FOR ESTIMATING TREATMENT EFFECTS. Jennifer Ahern*, K. Ellicott Colson, Kara Rudolph, Scott Zimmerman, Dana Goin (Division of Epidemiology, School of Public Health, University of California, Berkeley)

Matching is a common method for addressing confounding in observational studies, particularly when there are substantial differences in covariate distributions between exposed and unexposed groups. Standard practice is to select the matching approach that achieves the best covariate balance between exposed and unexposed after matching. However, it is not known whether use of covariate balance to select a matching approach results in the lowest bias and/or variance for the parameter of interest. We conducted simulations comparing matched and unmatched analyses with parametric and semi-parametric substitution estimators, to assess whether the matching approach with the best covariate balance resulted in the lowest mean squared error (MSE = bias² + variance) for the parameter of interest. We then illustrated a comparison of these approaches in an applied example. In the simulations, the best covariate balance was achieved through genetic matching (MSE = 9.5). However, the lowest MSE for the parameter of interest was achieved by retaining all of the data, and applying semi-parametric substitution estimation or targeted minimum-loss based estimation (TMLE) (MSE = 6.9). After matching, bias and variance were substantially reduced for all estimators, and adjustment for confounding offered additional benefit for nearest neighbor and optimal matching. Overall, our results suggest that while selecting a matching approach based on covariate balance led to an estimate with relatively low MSE, better results could be achieved by applying a semi-parametric substitution estimator without matching.

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USE OF ABACAVIR AND RISK OF CARDIOVASCULAR DISEASE AMONG HIV-INFECTED INDIVIDUALS: A MARGINAL STRUCTURAL MODEL APPROACH. Julia L. Marcus*, Wendy A. Leyden, Romain Neugebauer, Chun R. Chao, Lanfang Xu, Charles P. Quesenberry, Jr., Daniel B. Klein, William J. Towner, Michael A. Horberg, Michael J. Silverberg (Kaiser Permanente Northern California, Oakland, CA)

Background. Abacavir use in antiretroviral therapy (ART) may be associated with cardiovascular disease (CVD) among human immunodeficiency virus (HIV)-infected individuals, but evidence is conflicting. Prior studies may have been biased by the preferential use of abacavir in patients with renal dysfunction, a potential source of time-dependent confounding. **Methods.** We conducted a cohort study in Kaiser Permanente California during 1998-2011, following HIV-infected adults initiating ART until the earliest of CVD, loss to follow-up, death, or end of study. CVD included coronary heart disease (CHD; International Classification of Disease codes, version 9 [ICD-9]: 410-414) and ischemic stroke (ICD-9: 433.x1, 434 excluding 434.x0, 436). We used inverse probability weighting to fit marginal structural models to estimate the risk of CVD comparing abacavir-containing with abacavir-sparing regimens in intention-to-treat (ITT) and per-protocol analyses. Propensity score models included age, sex, race/ethnicity, CD4, HIV RNA, any prior ART use, years HIV-infected, calendar era, alcohol/drug use, smoking, overweight/obesity, diabetes, lipid-lowering and hypertension therapy, and renal dysfunction as measured by serum creatinine. **Results.** There were 182 CVD events (88 myocardial infarction, 60 other CHD, 34 ischemic stroke) among 8200 subjects, with 24/709 (3.4%) in the abacavir group and 158/7491 (2.1%) in the abacavir-sparing group. Abacavir users had more renal dysfunction at ART initiation (6.4% vs. 3.5%, P<0.001). Abacavir was associated with a 2-fold higher risk of CVD in ITT analysis (95% CI: 1.3-3.1; P=0.001), with a 2.4-fold higher risk when subjects remained in their initial treatment group for ≥1 year (95% CI: 1.4-4.2; P=0.001). Results were similar but not significant in per-protocol analysis (RR 1.9, 95% CI: 0.8-4.7; P=0.14). **Conclusions.** Abacavir use was associated with a greater risk of CVD independent of renal dysfunction and the other risk factors evaluated.

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IMPROVING DEPRESSION AMONG HIV-INFECTED ADULTS: ARE OUR RESULTS GENERALIZABLE? Angela M. Bengts*, Brian W. Pence Julie K. O'Donnell , Michael J. Mugavero, Byrd E. Quinlivan, Amy D. Heine, Heidi Crane, Bradley N. Gaynes (University of North Carolina, Chapel Hill)

Randomized controlled trials (RCTs) have demonstrated the efficacy of depression management interventions for HIV-infected adults. Whether these results generalize to depressed adults in routine HIV care is unknown. Generalizability weights are a recently proposed method to quantitatively extrapolate RCT findings to broader clinic populations, accounting for possible selection bias in RCT participants. We generalized effect estimates from participants with 6-month outcomes in SLAM DUNC (RCT of a measurement-based depression treatment intervention relative to usual care among depressed HIV-infected adults, n=190) to the CNICS cohort (HIV patients in routine care at 8 US sites. In CNICS, 1,474 adults met modified SLAM DUNC inclusion criteria (likely major depression; no bipolar/psychotic disorders). SLAM DUNC participants were more likely female, African American, and men who have sex with men (MSM); more likely on antiretrovirals (ART); and less likely to have panic disorder or problematic alcohol/drug use than CNICS patients. Generalizability weights were calculated as the inverse odds of being in SLAM DUNC (vs CNICS, in a pooled dataset) conditional on predictors, stabilized by the marginal odds. Intervention effect was estimated as the mean difference between arms in 6-month Hamilton Rating Scale for Depression (HAMD) score. We compared trial results to generalizability-weighted results. In the trial, the intervention led to a 3.3-point relative HAMD improvement (95% CI:0.9,5.6). The generalizability-weighted estimate indicated an attenuated effect in CNICS (1.7 points; 95% CI:-2.1,5.5). Demographic and HIV clinical differences influenced the attenuation, while psychosocial differences had little impact. The trial may have had an over-representation of participants, such as women, MSM, or those on ART, for whom the intervention was more effective. The impact of measurement-based depression care may be less pronounced in general HIV care than observed in the trial.

292-S/P

THE IMPACT OF ANALYSIS METHOD AND MODEL SPECIFICATION FOR HANDLING MISSING COVARIATE DATA IN SURVIVAL ANALYSIS: A CASE STUDY OF THE EFFECT OF HYPERTENSION ON MORTALITY AMONG HIV-INFECTED PERSONS IN KENYA. Evon A. Okidi*, Joseph W. Hogan, Chanelle J. Howe, Gerald S. Bloomfield, Sylvester Kimaiyo (Academic Model Providing Access to Healthcare (AMPATH), Eldoret, Kenya.)

Missing data due to non-response are commonly handled using inverse probability weighting (IPW). This method relies on the missing at random assumption and on a correctly specified non-response model. Logistic regression is a common choice for the non-response model. We compare two IPW techniques for handling missing data when estimating the association between blood pressure and mortality among HIV+ people without AIDS. The data used to define AIDS (World Health Organization [WHO] stage and CD4 cell count) are often incomplete. Using medical records of 77,280 patients from 2005-2010 within the Academic Model Providing Access to Healthcare (AMPATH) program in western Kenya, a Cox proportional hazards regression model was used to estimate the mortality hazard rate (HR) for different systolic and diastolic blood pressure (SBP, DBP) categories adjusting for WHO stage and CD4 cell count. We first compared two IPW techniques for handling missing data to complete case (CC) analysis. Stabilized weights were estimated using logistic regression and regression tree models. Second, we used multiple imputation (MI) to handle missing covariate data based on a multinomial logistic regression model that predicted missing WHO and CD4 values. CD4 cell count and WHO stage were missing for 20.3% and 17.9% of patients, respectively. Compared to normal values, lower SBP and DBP were associated with higher hazard of mortality for all examined approaches. Mortality HRs (95% Confidence Limit [CL]) for DBP<60mmHg versus ≥60mmHg using IPW via logistic and regression tree techniques were 3.19 (2.56, 3.97) and 3.32 (2.85, 3.82), respectively. IPW based on regression trees gave the narrowest CLs likely because assumptions about functional forms were not made. MI had wider CL compared to both IPW methods. Our future work will consider additional more flexible estimation methods including ensemble learning of IPW and doubly robust estimation.

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THE EFFECT OF DEPRESSION ON ADHERENCE TO DAILY ORAL HIV PRE-EXPOSURE PROPHYLAXIS IN THE IPREX OLE COHORT: A MARGINAL STRUCTURAL MODEL. Megha Mehrotra*, David Glidden, Patricia Defechereux, Robert M Grant(University of California, San Francisco)

Background Pre-exposure prophylaxis (PrEP) is an important method to prevent HIV acquisition in men who have sex with men and transgender women (MSM/TGW). Depression is common, and may contribute to reduced adherence to PrEP. iPrEX OLE was a 72 week study following 1603 HIV-negative MSM/TGW, of whom 1225 (76%) received PrEP. We hypothesize that depression has a direct effect on PrEP adherence in iPrEx OLE. Methods Data were analyzed from all incident HIV cases and a site-stratified random sample cohort of those who elected to take PrEP. Drug concentration in dried blood spots--the primary outcome--was measured at all timepoints after PrEP initiation. Drug concentrations were categorized to reflect estimated frequency of dosing. The Center for Epidemiologic Studies Depression Scale (CESD), a validated 20-item tool to screen for symptoms of depression and anxiety, was completed every 24 weeks. Sexual practices were recorded every 12 weeks. A marginal structural ordinal logistic model was used to estimate the effect of CESD score on drug concentration, adjusting for confounding by sexual practices over time, prior adherence, and demographic characteristics. Results When controlling for baseline and time-varying confounders, those with CESD scores ≥16 and <27 (moderate depression/anxiety) had 1.47 times the odds of being in a higher drug concentration category than those with CESD scores <16 (95%CI 1.0- 2.0). Those with CESD scores ≥27 (severe depression/anxiety) trended towards lower drug concentrations (OR 0.70 95%CI 0.44-1.12). Conclusion The effect of depression on adherence appears to be non-linear. Moderate anxiety about becoming infected with HIV may enhance PrEP adherence while severe depression may impair adherence by decreasing agency and focus on self-preservation.

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PREVALENCE AND DETERMINANTS OF HIGH BLOOD PRESSURE AMONG ADULTS IN DAR ES SALAAM, TANZANIA. Rachel Zack*, Kahema Irema, Patrick, Kazonda, Festo Kayandabila, Enju Liu, Germana Leyna, Marina Njelekela, Wafaie Fawzi, Japhet Killewo, Goodarz Danaei (Harvard T.H. Chan School of Public Health)

Objective: To determine the prevalence and correlates of high blood pressure in Dar es Salaam, Tanzania. **Methods:** The Dar es Salaam Urban Cohort Hypertension Study was conducted in Ukonga, a ward in Dar es Salaam, from March to June 2014. This cross-sectional analysis included 2,045 non-pregnant adults aged 40 years and older. Descriptive statistics on blood pressure distribution, hypertension prevalence, and its awareness, treatment, and control were calculated. Adjusted mean differences in systolic blood pressure (SBP) by potential risk factors were estimated by multivariable linear regression. **Results:** Median age was 51 years and median BMI was 26.4 kg/m2. Median systolic/diastolic blood pressure was 131/81 mmHg overall, 128/80 mmHg in women, and 134/81 mmHg in men. Hypertension (defined as systolic blood pressure ≥140 mmHg and/or diastolic blood pressure ≥90 mmHg and/or current anti-hypertensive use) prevalence was 37% overall, 35% in women, and 40% in men. Men had higher SBP (adjusted mean difference 6.91 (95% confidence interval 4.6, 9.2) mmHg) compared with women, as did those aged ≥70 years (14.9 (10.3, 19.5) mmHg) compared with 40-44 years, as did those who were retired or unemployed (3.0 (0.7, 5.3) mmHg), and Muslims (2.3 (0.3, 4.2) mmHg) compared with Christians. Compared to normal weight (18.5≤BMI<25 kg/m2) individuals, overweight (25≤BMI<30 kg/m2) was associated with 4.4 (2.2, 6.5) mmHg higher SBP and obesity (BMI ≥30 kg/m2) was associated with 7.7 (5.3, 10.2) mmHg higher SBP. Among the 774 hypertensive participants, 47% were aware of their hypertensive status, 22% were on treatment, and 11% had controlled their blood pressure to <140/90 mmHg. **Conclusion:** This population has a high prevalence of hypertension - similar to levels in the United States - and limited hypertension awareness, treatment and control. Increased screening and treatment for high blood pressure and education on healthy weight would improve the health of adults in Dar es Salaam.

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DOES A SOUTH AFRICAN ANTI-POVERTY PROGRAM INFLUENCE FERTILITY? TRIANGULATING EVIDENCE FROM NON-EXPERIMENTAL AND QUASI-EXPERIMENTAL STUDY DESIGNS. Molly Rosenberg*, Nadia Nguyen, Jacob Bor, Paul Mee, Rhian Twine, Daniel Westreich, Audrey Pettifor (Center for Population and Development Studies, Harvard University)

Background: Anti-poverty programs issuing cash stipends to caregivers of young children may unintentionally incentivize childbearing. In the absence of evidence from randomized controlled trials, observational data on self-reported program exposure and quasi-experimental data resulting from changes to program eligibility criteria can provide a better understanding of the relationship between anti-poverty programs and fertility. **Methods:** We constructed a retrospective cohort of 4845 women living in Mpumalanga Province, South Africa, who became eligible for the Child Support Grant for their first child between 1998 and 2008. Data were collected by the Agincourt Health and socio-Demographic Surveillance System. We fit Cox proportional hazard models to compare the hazard of second pregnancy in women who reported grant receipt after the birth of their first child, compared to non-recipients, controlling for time-fixed and time-varying covariates. In addition, exploiting a natural experiment created by an April 2003 expansion of the program's age eligibility criterion, we compared second pregnancy rates between (i) women with a child who aged out of grant eligibility in 2002 to (ii) women with children of the same age who remained grant-eligible in 2003. **Results:** Overall, 70% of women received the grant after the birth of their first child and 33% experienced a second pregnancy during follow-up. The adjusted HR for the association between grant exposure and second pregnancy was 0.66 (95% CI: 0.58, 0.75). Women with first children who age out of grant eligibility in 2002 had similar second pregnancy rates to women with first children who remained grant eligible in 2003 [IRR (95% CI): 0.9 (0.5, 1.4)]. **Conclusions:** Taken together, the results of the non-experimental and quasi-experimental analyses suggest that an anti-poverty grant provides no perverse incentive for pregnancy among rural, South African women and may encourage longer spacing between pregnancies.

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DIPSTICK PROTEINURIA TYPES AS PREDICTORS OF ALL AND CARDIOVASCULAR DISEASE MORTALITY IN ARAIHAZAR, BANGLADESH: A POPULATION-BASED LONGITUDINAL STUDY. Gene R. Pesola*, Maria Argos, Yu Chen, Faruque Parvez, Alauddin Ahmed Rabiul Hasan, Mohammed Rakibuz-Zaman, Tariqul Islam, Mahbubul Eunes, Golam Sarwar, Vernon M. Chinchilli, Alfred I. Neugut, Habibul Ahsan (Dept. of Epidemiology, Mailman School of Public Health, Columbia University, New York, N.Y.)

Background: Baseline (prevalent) dipstick proteinuria, persistent proteinuria, incident, and remittent proteinuria have never been validated as predictors of mortality in a developing country. The study objective was to evaluate these hypotheses. **Methods:** Dipstick proteinuria was obtained at baseline in 11,122 adult participants. Vital status was ascertained over a period of 11-12 years. Cox proportional hazards models were used to evaluate proteinuria in relation to all-cause and cardiovascular disease (CVD) mortality. CVD mortality was evaluated only in those with baseline proteinuria. Persistent, remittent, and incident proteinuria were determined at the 2-year exam. **Results:** Baseline proteinuria of 1+ or greater was significantly associated with all-cause (hazard ratio (HR) 2.87; 95% C.I., 1.71 – 4.80) and CVD mortality (HR= 3.55;95% C.I., 1.81-6.95) compared to no proteinuria, adjusted for age, gender, arsenic well water concentration, education, hypertension, body mass index, smoking status, and diabetes. Persistent baseline trace proteinuria was associated with a 1.31 (0.79-2.17)-fold greater mortality. Persistent baseline 1+ proteinuria had a stronger risk of death of 3.49 (1.64 – 7.41)-fold greater than no proteinuria. Incident 1+ proteinuria had a 1.87 (0.92 – 3.78)-fold greater mortality risk followed for 9-10 years with a weak dose-response with incident trace proteinuria. Remittent proteinuria revealed no increased mortality. **Conclusions:** Baseline, persistent, and incident dipstick proteinuria were all predictors of all-cause mortality in a rural Bangladesh population with persistent proteinuria having the greatest risk. Baseline 1+ proteinuria had a greater risk of CVD than all-cause mortality. From a public health perspective, repetitive testing to detect persistent proteinuria (eliminate false positives) is preferable to better detect disease and determine treatment.

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ASSOCIATED WITH CHANGING CIGARETTE CONSUMPTION PATTERNS AMONG LOW-INTENSITY SMOKERS: RESULTS FROM THE ITC MEXICO SURVEY. Kamala Swayampakala*, Nancy L. Fleischer, James W. Hardin, Jihong Liu, Geoffrey T. Fong, James F. Thrasher (Department of Epidemiology and Biostatistics, University of South Carolina)

Introduction: Research from high-income countries shows that as smoking prevalence declines in response to tobacco control policies and programs, the proportion of smokers who smoke less than daily increases and the number of cigarettes smoked by daily smokers decreases. This study aims to understand changes in smoking behavior such as quitting/reducing and increasing cigarette consumption and the factors that account for these changes in Mexico, a middle-income country, during the time of rapid implementation of tobacco control policies. **Methods:** Data were analyzed from adult smokers (N = 2,066) who participated in the ITC Mexico Survey, part of the 22-country ITC Project. Four waves of data were collected from 2008 to 2012, with data from adjacent waves (i.e., time t, t+1, and t+2) used to estimate probabilities of changes in cigarette consumption. Independent variables of interest at time t such as addiction, social norms, quit attempts, and quit intentions were used to predict changes in cigarette consumption at time t+1. All analyses were stratified by smoking status at time t: non-daily (ND), daily-light (DL) (≤ 5 cigarettes per day (CPD), and daily-heavy (DH) (> 5 CPD). **Results:** Among the three groups of smokers, initial ND smokers were more likely to quit by time t+1 (NDprob = 25%; DLprob = 14%; & DHprob = 9%). Compared to initial DH smokers who continued smoking at the same level by time t+1, initial DH smokers who became ND by time t+1 were marginally more likely to quit by t+2. For initial ND and DH smokers, weak social norms were associated with increasing cigarette consumption by time t+1, while reports of not being addicted were associated with quitting/reducing cigarette consumption for initial DL smokers. **Conclusions:** Among DH smokers, reducing smoking intensity can be a stepping stone towards cessation. Future research should focus on understanding the impact of tobacco control policies on cigarette consumption patterns in Mexico.

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MEDICAL COMPLICATIONS OF PREGNANCY IN WOMEN WITH INTELLECTUAL AND DEVELOPMENTAL DISABILITIES. Hilary K. Brown*, Virginie Cobigo, Yona Lunsky, Simone Vigod (Women's College Hospital; University of Toronto)

Women with intellectual and developmental disabilities (IDD) have high rates of metabolic and cardiovascular disease. However, the state of their health during pregnancy is relatively unknown. Our objective was to determine whether women with IDD are at increased risk, compared to women without IDD, for medical complications of pregnancy. In this population-based retrospective cohort study using linked Ontario (Canada) health and social services administrative data, we identified singleton obstetrical deliveries to women with (N=3,932) and without (N=382,774) IDD (2002-2011 fiscal years). Primary outcomes included complications for which women with IDD were hypothesized to be at increased risk due to their metabolic and cardiovascular vulnerability: gestational diabetes, gestational hypertension, preeclampsia/eclampsia, and venous thromboembolism. We also examined several secondary outcomes. Multivariable modified Poisson regression was used to assess risk, adjusted for measured confounders (maternal age, parity, baseline social and health characteristics); we used target-adjustment sensitivity analyses to explore the impact of unmeasured confounders (maternal smoking, BMI). Compared to women without IDD, women with IDD were not at increased risk for gestational diabetes or gestational hypertension. After adjusting for confounders, they were at increased risk for preeclampsia/eclampsia (1.7% vs. 1.1%; aRR=1.47, 95% CI 1.14-1.89) and venous thromboembolism (1.1% vs. 0.7%; aRR=1.64, 95% CI 1.21-2.23). They were also at increased risk for peripartum hemorrhage (6.1% vs. 4.6%), severe obstetric morbidity (e.g., uterine rupture; 2.7% vs. 1.9%), and systemic maternal complications (e.g., cardiac failure; 0.5% vs. 0.2%). Findings were robust to the impact of residual confounding. The increased risk for serious medical complications of pregnancy among women with IDD suggests the need to mobilize accessible supports to improve perinatal outcomes for this vulnerable group.

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DISPARITIES IN INFANT MORTALITY, STILLBIRTH, AND PRETERM BIRTH AMONG FIRST NATIONS, INUIT, AND MÃ©TIS POPULATIONS IN CANADA. Amanda J. Sheppard*, Seungmi Yang, Tracey Bushnik, Mourad Dahhou, Serenity Perry, Jay S. Kaufman, Russell Wilkins, Michael S. Kramer (The Hospital for Sick Children)

Introduction: Birth outcomes have been reported to be significantly poorer among Canada's Aboriginal peoples compared to their non-Aboriginal counterparts but are limited by the absence of Aboriginal birth identifiers on birth registrations in most provinces and territories. Moreover, the term "Aboriginal" comprises three constitutionally recognized populations in Canada: First Nations, Métis and Inuit, each with unique cultural identities, social determinants of health, and health care funding inequities. Objective: To compare risks of infant mortality, stillbirth, and preterm birth (<37 completed weeks) among the 3 Aboriginal populations. **Methods:** We analyzed a cohort of births between May 2004 and May 2006 created by linking the Canadian perinatal health database with the long form of the 2006 Canadian census, which includes an Aboriginal self-reported identifier. **Results:** The crude infant mortality rate for the overall Aboriginal population was 9.8 (95% CI 8.3-11.4) per 1000, and was 8.6 (7.1-10.2), 10.8 (6.6 -15.1), and 11.9 (6.8-17.0) per 1000 live births among First Nations, Métis, and Inuit, respectively. For stillbirths, the corresponding rates were 8.9 (7.5-10.4) per 1000 total births overall and 9.2 (7.6-10.8), 6.1 (CI 2.9-9.2) and 8.5 (4.2-12.8) in the 3 groups. Preterm birth rates were 9.9 (9.4-10.4)% overall and 9.6 (9.1-10.1), 8.2 (7.0-9.3), and 12.4 (10.9-14.0) in the 3 groups. **Conclusions:** The pan-Aboriginal approach to birth outcome reporting in Canada has masked substantial disparities across Canada's 3 Aboriginal populations, with higher stillbirth rates among First Nations and higher rates of preterm birth and infant death among the Inuit. These data demonstrate the need for targeted maternal and infant health programs to reduce adverse birth outcomes in these populations.

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PARENTAL PRECONCEPTION EXPOSURE TO NON-PERSISTENT ENDOCRINE DISRUPTING CHEMICALS AND BIRTH OUTCOMES: THE LIFE STUDY. Melissa M Smarr*. Katherine Laughon ,Grantz, Rajeshwari Sundaram, José M Maisog ,Kurunthachalam Kannan, Germaine M Buck Louis (Division of Intramural Population Health Research, Eunice Kennedy Shriver National Institute of Child Health and Human Development, National Institutes of Health)

Bisphenol A (BPA) and phthalates are ubiquitous, non-persistent endocrine disrupting chemicals associated with fetal growth and development. Little is known about preconception exposures of couples in relation to birth size. In a cohort of couples (n=501) recruited prior to conception, we examined associations between maternal and paternal (n= 211 and 209, respectively) urinary concentrations of total BPA and 14 phthalate metabolites from one preconception sample and birth size for 233 infants born to couples. Missing chemical and covariate data were imputed (~10%). Using multiple linear regression analysis, we estimated parental quartiles of BPA and individual phthalates in relation to birth weight, length, head circumference, and ponderal index with separate models run for each parent adjusting for age, smoking, body mass index (BMI) education, alcohol, conditional parity, and creatinine. We included an interaction term for exposure*infant sex, given the seemed vulnerability of male infants, and the Σ of phthalates for the other parent in light of pregnancy being a couple dependent outcome. Distinct patterns were observed by parental exposure and infant birth size. Most notably were reductions observed in birth weight (174-262 g) for the 2nd quartile of maternal monomethyl phthalate (MMP) and mono-n-octyl phthalate (MOP) ($p<0.05$) and increases of 210 g ($p=0.01$) and 271 g ($p=0.002$) with 3rd and 4th quartiles of monoethylhexyl phthalate (MEHP) compared to 1st quartiles of exposure. Paternal 2nd and 3rd quartiles of MOP were associated with reductions of 177 g ($p=0.02$) and 205 g ($p=0.04$), respectively. Relative to the 1st quartile, a 1.42 cm decrease in birth length was observed for 2nd quartile of paternal MOP ($p=0.01$); an increase of 1.09 cm was observed for 4th quartile of BPA ($p=0.04$). Findings of this exploratory analysis suggest the importance of considering exposures of both parents when assessing birth outcomes.

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TRANSGENERATIONAL BODY MASS INDEX (BMI) AS A PREDICTOR OF BIRTHWEIGHT: THE BOGALUSA HEART STUDY. Emily W. Harville*, Marni Jacobs (Tulane University School of Public Health and Tropical Medicine)

Background: Since the development of the Barker hypothesis, interest has focused on how in utero metabolism may alter epigenetics or other systems in ways that program long-term health. Such changes could affect not only the fetus, but also future generations. **Methods:** Data from the Bogalusa Heart Study were linked to Louisiana vital statistics data, leading to an analysis file including 202 grandmother-mother-infant triads, with cardiovascular risk factor information available on the grandmother and mother and birthweight information available on the mother and infant. As an initial analysis of how metabolism in pregnancy might affect later generations, we examined the grandmother's pre-pregnancy BMI as a predictor of grandchild's birthweight using linear regression, adjusted for mother's birthweight, age, and smoking during pregnancy. **Results:** In bivariate analysis, grandmother's BMI was correlated with mother's BMI ($r=0.39$, $p<0.01$), but not infant's birthweight ($r=0.01$, $p=0.85$). Mother's pre-pregnancy BMI ($r=0.24$, $p<0.01$) and own birthweight ($r=0.21$, $p<0.01$) were correlated with infant's birthweight. In multivariable analysis, mother's BMI was positively associated with infant birthweight (adjusted beta=30 g, $p=0.01$), while grandmother's birthweight was negatively associated (-35 g, $p<0.01$). **Conclusions:** Studies of in utero exposures should explore mechanisms by which intergenerational exposures might produce metabolic risk.

314-S/P

ETHNICITY-SPECIFIC CHANGES IN LOW BIRTH WEIGHT AFTER A MAJOR IMMIGRATION RAID. Nicole Novak*
(University of Michigan)

Background: Low birth weight (LBW, birth weight <2500g) is associated with poor perinatal health and higher risk of chronic disease in adulthood. LBW is sensitive to maternal stress and rates of LBW have been linked to population-level stressors such as terrorist attacks and natural disasters. The federal immigration raid on a meat processing facility in Postville, Iowa in 2008 was the largest single-site immigration raid in U.S. history. We examined patterns in LBW before and after the Postville raid with the hypothesis that, compared to before the raid, being born in the 9 months after the raid would be associated with a higher risk of LBW among infants born to immigrant and US-born Hispanic mothers, but not to White mothers. **Methods:** We used birth-certificate data from infants born to Hispanic and Non-Hispanic White mothers in Iowa to compare risk of LBW in the nine months following the raid to the same nine-month period the previous year (n=52909). We used modified Poisson regression to estimate RRs by ethnicity and nativity (country of birth). **Results:** There was no change in risk of LBW among infants born to White mothers after the immigration raid, but infants born to Hispanic mothers had a 29% greater risk of LBW after the raid when compared to the same period one year earlier (RR [95% CI]=1.29 [1.01,1.64]). This effect was evident among infants born to both immigrant and US-born Hispanic mothers and persisted after adjustment for confounders and traditional risk factors for LBW (maternal smoking and prenatal care utilization). **Conclusions:** Changes in ethnicity-specific patterns of LBW after a major immigration raid were consistent with the effects of other population-level stressors. These patterns occurred in infants born to both US-born and immigrant Hispanic mothers. The mechanisms of this effect require further investigation, but a potential pathway includes psychosocial stress caused by immigration enforcement.

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STROKE PREDICTS POSTTRAUMATIC STRESS DISORDER (PTSD) IN A MULTI-ETHNIC COHORT OF STROKE SURVIVORS: EVIDENCE FROM THE DISCHARGE EDUCATIONAL STRATEGIES FOR REDUCTION OF VASCULAR EVENTS (DESERVE) TRIAL. Emily Goldmann*, Eric Roberts, Veronic Torrico, Nina Parikh, Heather Kuczynski, Bernadette, Boden-Albala (Global Institute of Public Health, New York University)

Introduction: PTSD can occur after stroke and is associated with reduced quality of life and poor medication adherence in stroke survivors. Although prior traumatic events have been linked to elevated PTSD risk from a subsequent event, no study has examined whether prior stroke experience increases PTSD risk following a subsequent stroke. **Methods:** Data come from DESERVE, a randomized controlled trial of discharged mild stroke/transient ischemic attack (TIA) patients prospectively enrolled in a behavioral intervention to reduce vascular risk. Patients were evaluated at baseline for prior stroke or TIA. Symptoms of partial or full PTSD related to the index stroke/TIA were assessed for 241 patients at six month follow-up using the PTSD Checklist. PTSD was defined as meeting DSM-IV criterion B and either criterion C or D. Chi-square tests and logistic regression were used to examine the association between prior stroke/TIA experience and PTSD related to the index stroke. Regression models were adjusted for age, race/ethnicity and disability at discharge. **Results:** Almost one-third (32.7%) of patients had experienced a prior stroke/TIA. The prevalence of PTSD six months after discharge was 9.4% and was significantly higher among those with a prior stroke/TIA compared with those without (17.3% vs. 5.6%, p=0.02). Patients with prior stroke/TIA had 3.5 times greater odds of developing PTSD from the index stroke compared with those without (95% CI: 1.2-10.5); the association was even stronger after controlling for selected variables (OR=5.5, 95% CI: 1.2-25.1). **Conclusion:** Mild stroke/TIA patients who experienced a previous stroke/TIA had significantly greater odds of developing PTSD than those who had not. Given the substantial proportion of stroke survivors who experience a recurrent stroke and the negative mental health consequences highlighted in this study, interventions that focus on prevention are critical for promoting mental and physical well-being in stroke survivors.

321-S/P

NONLINEAR RELATION BETWEEN DEPRESSED MOOD AND CORONARY ARTERY CALCIFICATION: THE RANCHO BERNARDO STUDY. John Bellettiere*, Donna Kritz-Silverstein, Gail A. Laughlin, Andrea LaCroix, Elizabeth Barrett-Connor (University of California, San Diego / San Diego State University)

Coronary artery calcification (CAC) is a measure of subclinical atherosclerosis that independently predicts coronary heart disease (CHD) risk, coronary events, and stroke. Depressed mood is also associated with cardiovascular events. However, studies linking depressed mood and CAC have yielded mixed results, with no studies examining men over age 60. This cross-sectional analysis includes 417 men and women (mean age=67±7) with no history of heart disease who attended a research clinic visit in 1997-99 when mood was assessed using the Beck Depression Inventory (BDI) and CAC was assessed by electron beam computed tomography in 2000-02. Median BDI was 3, range 0-37. Based on established criteria, 33% had minimal, 21% had mild, 22% had moderate and 24% had severe CAC burden. Ordinal logistic regression models were fit to examine the odds of greater CAC severity compared to less severity in persons grouped by quartiles of depressed mood. A nonlinear, U-shaped association was observed; persons in the first and fourth BDI quartiles had 2.8 and 2.0 times higher odds of greater CAC severity than persons in the second quartile (95%CI; 1.6-4.8 and 1.1-3.7, respectively), even after adjusting for CHD risk factors. Gender-specific analyses showed this association was stronger for men when considered alone, and not present in women. This nonlinear, gender-specific association should be investigated using larger cohorts of elderly men and women.

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HORMONE-RELATED FACTORS AND POST-MENOPAUSAL ONSET DEPRESSION: RESULTS FROM HEALTH EXAMINEE STUDY (HEXA) 2004-2012. Sun Jae Jung*, Aesun Shin, Daehee Kang (Seoul National University College of Medicine)

Background: Higher prevalence of depression in women than men might result from female hormone fluctuation during reproductive period. We aimed to examine the association between hormone-related events in earlier life and postmenopausal depression. **Methods:** A total of 60,114 postmenopausal women were enrolled from Health Examinee Study (HEXA) between 2004 and 2012. Women with valid information on reproductive factors and age of depression diagnosis were included in the final analysis. By using multivariable logistic regressions, odds ratios were calculated to evaluate associations between each reproductive factors and post-menopausal onset depression. **Results:** A total of 1,339 women (2.2%) were diagnosed with depression after menopause. Longer duration of reproductive years were associated with decreased likelihood of depression (for more than 37 reproductive years vs. 30 years or less: OR = 0.41, 95 % CI: 0.35-0.48, P-trend <0.001). The lowest OR was observed among women with their menopause at 53 years and older compared to their counterpart with menopause age of 46 years or younger: (OR 0.43, 95% CI: 0.36-0.51). Higher numbers of abortion (both spontaneous and artificial combined) and exogenous hormone use were also associated with the higher likelihood of depression. **Conclusion:** The likelihood for post-menopausal depression increased in women who had early menopause or used exogenous hormones. Due to potential higher risk for depression among these women, attentive concern for mental health and screening for depressive disorders may need to be considered.

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SYMPTOMS AND RISK OF COGNITIVE DECLINE IN OLDER COMMUNITY-DWELLING MEN: RESULTS FROM THE OSTEOPOROTIC FRACTURES IN MEN STUDY. Ahmed M. Kassem*, Mary Ganguli, Kristine Yaffe, Joseph T. Hanlon, Oscar L. Lopez, John W. Wilson, Jane A. Cauley (University of Pittsburgh)

Background: Research investigating anxiety as a predictor of future cognitive decline in older adults is limited and findings conflict. Depression, a commonly comorbid condition with anxiety, has been shown to be a potential risk factor for cognitive decline. We examined the independent relationship between anxiety symptoms and subsequent cognitive decline. **Methods:** We included 2,818 community-dwelling older men (mean age = 76.1, SD Â±5.3 years) who were followed on average for 3.4 years. We assessed anxiety symptoms at baseline using the Goldberg Anxiety Scale (GAS; range = 0-9). We assessed cognitive function at baseline and at two subsequent visits using the Modified Mini-Mental State examination (3MS; global cognition) and the Trails B test (executive function). Clinically significant cognitive decline was defined as a reduction of 5 points or more in 3MS score or having worst decile of change in Trails B completion time. Participants with probable cognitive impairment (3MS score <80, use of dementia medication) at baseline were excluded. **Results:** At baseline, there were 690 (24%) men with mild anxiety symptoms (GAS 1-4) and 226 (8%) men with moderate/severe symptoms (GAS 5-9). Men with anxiety symptoms were more likely to have depressed mood, poor sleep, more chronic medical conditions and more impairment in activities of daily living compared to those with no anxiety symptoms. Compared to those with no anxiety symptoms at baseline, men with any anxiety symptoms were more likely to have clinically significant worsening in Trails B completion time (OR = 1.41, 95% CI 1.18, 1.69). The association was attenuated after adjusting for potential confounders, including depression and poor sleep, but remained significant (OR = 1.25, 95% CI 1.02, 1.52). No significant association was observed between anxiety symptoms and clinically significant decline in 3MS. **Conclusion:** In older men, anxiety appears to be a potential independent predictor of decline in executive function.

324-S/P

TESTOSTERONE AND COGNITIVE FUNCTION IN MEN: A SEPARATE-SAMPLE MENDELIAN RANDOMIZATION ANALYSIS IN OLDER CHINESE MEN, Jie Zhao*, Tai Hing Lam, Chaoqiang Jiang, Stacey S Cherny, Bin Liu, Kar Keung Cheng, Weisen Zhang, Gabriel M Leung, C Mary Schooling (The University of Hong Kong)

Objective: Testosterone replacement for older men is increasingly common, with some observations suggesting a protective effect on cognitive function. We examined the association of endogenous testosterone with cognitive function among older men using a Mendelian randomization analysis with a separate-sample instrumental variable (SSIV) estimator to minimize reverse causality. **Method:** A genetic score predicting testosterone was developed in 289 young Chinese men from Hong Kong based on selected testosterone-related single nuclear polymorphisms (rs10046, rs1008805 and rs1256031). The association of genetically predicted testosterone with the delayed 10-word recall score and Mini-Mental State Examination (MMSE) score was assessed among 4212 older Chinese men from the Guangzhou Biobank Cohort Study. **Results:** Predicted testosterone was not associated with the delayed 10-word recall score (-0.01 per nmol/L testosterone, 95% confidence interval (CI) -0.06 to 0.04) or MMSE score (0.09, 95% CI -0.02 to 0.21). These estimates were similar after additional adjustment for age, education, smoking, use of alcohol, body mass index and the Framingham score. **Conclusion:** Our findings do not corroborate observed protective effects of testosterone on cognitive function among men.

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ASSESSING NONIGNORABLE LOSS TO FOLLOW-UP IN A LONGITUDINAL BIRTH COHORT STUDY OF BODY FAT IN CHILDHOOD. Jessie P. Buckley*, Stephanie M. Engel, Amy H. Herring (University of North Carolina at Chapel Hill)

Few birth cohort studies have examined nonignorable (missing not at random) loss to follow-up, as might occur in studies of childhood obesity if the decision to attend a follow-up visit depends on body size concerns. We explored this potential bias in a study of prenatal phthalate exposures and childhood fat mass in a birth cohort enrolled in New York City during 1998-2002. We used selection models to assess: 1) whether visit attendance depended on fat mass at the time of follow-up, and 2) the degree of resulting bias in estimates of association between prenatal phthalate exposures and childhood fat mass. Of 380 members of the birth cohort with measured phthalate exposures, percent fat mass was ascertained via bioelectrical impedance for 181 children at multiple visits between ages 4 and 9 years (N=367 visits). We first estimated adjusted associations between phthalate metabolite concentrations and percent fat mass in the complete data using a linear mixed model. We then used a selection model approach to model this association among all 380 children under a potentially nonignorable missing data mechanism. For this analysis, we jointly fit the outcome model with a logistic mixed model for a binary indictor of outcome missingness at each follow-up visit conditional on (possibly unobserved) percent fat mass as well as covariates associated with loss to follow-up. Results indicate that missing fat mass outcomes may indeed be nonignorable; children with more fat mass were less likely to be lost to follow-up. For each 1 percent increase in fat mass, the OR for loss to follow-up was 0.81 (95% CI: 0.69, 0.94). However, associations between phthalate metabolites and percent fat mass were similar to the complete data analysis. Although we did not observe evidence of biased associations in this sensitivity analysis, our findings suggest that missing obesity outcomes may be nonignorable in studies of other prenatal exposures that are more strongly related to follow-up.

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IMPLICATIONS OF USING A FETUSES-AT-RISK APPROACH WHEN FETUSES ARE NOT AT RISK. Olga Basso* (McGill University, Montreal, Canada)

The fetuses-at-risk (FAR) approach is generally accepted for examining endpoints such as birth and stillbirth, but its extension to postnatal endpoints is controversial. FAR analyses are appealing because gestational time is treated as time at risk, and because they generally avoid "paradoxes" seen with the conventional approach that conditions on birth, whereby exposures that are overall harmful seem protective at preterm weeks. However, understanding the behavior of FAR rates when applied to postnatal outcomes is important to avoid misinterpretation. At each week, the FAR rate is the product of the probability of being born alive multiplied by the probability of the outcome among live births. Because the probability of birth is low at early gestation and increases rapidly towards the end (about 90% of births take place in the last 5-6 weeks of pregnancy), FAR rates necessarily rise late in gestation. However, such a rise does not imply that length of gestation directly increases risk –rather, the rise is a consequence of the higher number of infants that, having been born, can experience the endpoint of interest. Conversely, FAR rates will mask a strong direct adverse effect of gestational age at early weeks, as the low probability of birth will result in a low FAR rate. Furthermore, the second term of the product represents the conventional rate (i.e., the empirical risk of outcome given live birth), which may be biased by unmeasured factors. Finally, given that FAR rates for postnatal outcomes depend crucially on the proportion of babies born alive at any given week, the rate for an "exposed" group may be higher only because more babies among the exposed are born at that particular week, without either the exposure or gestational age having any direct effect on the outcome. These limitations should be considered when considering the FAR approach for postnatal outcomes.

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NEIGHBORHOOD RACIAL SEGREGATION INFLUENCE PRETERM BIRTH ACROSS THE LIFE COURSE? AN APPLICATION OF MARGINAL STRUCTURAL MODELS. Theresa L. Osypuk*,Nicole M. Schmidt, Rebecca Kehm, Robert Platt, Dawn P. Misra, (University of Minnesota School of Public Health)

Racial residential segregation and neighborhood racial composition are linked to birth outcomes. However few studies focus on preterm birth (PTB), and most evidence is based on cross-sectional evidence at the time of the birth, despite that context earlier in life might be influential. We leverage data from the Life-course Influences on Fetal Environments (LIFE) birth cohort, of 394 Black women who gave birth 2009-2011 in a Detroit-area hospital, linked to survey data from their mothers (the grandmothers). We use medical records, survey data, and geocoded residential histories linked to historical Census data (1970-2010), to reconstruct key elements of women's earlier life course. We test whether neighborhood racial composition, operationalized as census tract % black (dichotomized at 75%), at various times, is associated with that woman's risk of having a PTB (birth before 37th completed week of gestation), using marginal structural models and inverse probability weights in poisson regression. Such methods accommodate time-varying exposures as well as covariates that are simultaneously confounders and mediators. We model time-varying tract % black at 4 times: woman's own birth, age 10, age 18, and her child's birth. We adjust for time-varying covariates (at birth, age 10, age 18, prepregnancy), including body weight, socioeconomic status (use of welfare, Medicaid, food stamps, WIC, perceived income), and tract % poverty, as well as for confounders at childbirth (prenatal care, parity, age, drinking, smoking in pregnancy). After testing different life course models, we find support for a trigger effect; living in high (vs. low) % black neighborhoods at the time of her child's birth is associated with 89% higher PTB risk (RR= 1.89, 95%CI: 1.14-3.12). Yet segregation at any other time period is not associated with PTB. Our results suggest that neighborhood segregation is most relevant for PTB at the time of the birth as opposed to at earlier life course periods.

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DEALING WITH BIAS IN TIME-TO-EVENT ANALYSES: AN APPLICATION TO TIME TO PREGNANCY. Emily Mitchell*, Karen Schliep, Enrique Schisterman (NICHD)

Background: Time-to-event studies are an important aspect of epidemiological research, but are often plagued by issues that, if not properly accounted for, can result in statistically biased estimates and invalid inference. Methods: In this study, we review potential sources of bias such as left truncation, measurement error, and missing data, and demonstrate the capacity to mitigate these issues using current available software. A Monte Carlo sensitivity analysis is conducted to test the robustness of the fecundability odds ratio (FOR) estimates to measurement error, and multiple imputation is applied to mitigate the potential biasing effects of missing data as well as to verify the results of the sensitivity analysis. These techniques are applied in the EAGeR trial to compare time to pregnancy, using discrete Cox proportional hazards models, among couples who wait ≤3 versus >3 months after a pregnancy loss before trying to conceive. Results: A naive analysis ignoring selection bias yields a non-significant FOR of 1.15 (95% CI: 0.93, 1.43) among couples who wait ≤3 versus >3 months. After a comprehensive analysis correcting for left truncation (via delayed entry option) and multiple imputation to correct for mis-measured time-at-risk and missing data, couples who try to conceive ≤3 versus >3 months have a significantly higher FOR of 1.37 (95% CI: 1.09, 1.71). Conclusions: The ability to perform sensitivity analyses is a vital tool to help verify study results and reveal underlying population characteristics in imperfect data.

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BMI HIERARCHICAL SEMI-BAYES METHODS FOR MISCLASSIFICATION OF MATERNAL PREPREGNANCY BMI. Richard F MacLehose*, Lisa M Bodnar, Craig Meyer, Timothy L Lash (University of Minnesota)

We estimated the effect of prepregnancy BMI on preterm birth risk using self-reported weight and height derived from birth certificates, and then adjusted for misclassification of BMI using Bayesian hierarchical models. We studied 1,128,034 singleton births in Pennsylvania from 2003-2010. Prepregnancy BMI was based on maternal recall at delivery. A validation study collected prepregnancy BMI through medical record review of 1,212 of those births, selected by simultaneous stratification on prepregnancy BMI, gestational weight gain, race, and preterm status. Adjustments for misclassification were made using the predictive value of medical record BMI conditional on birth certificate BMI and strata of gestational weight gain, race, and preterm delivery status. Because there were sparse data in some of these strata, we used Bayesian hierarchical models to stabilize predictive value estimates and shrink those estimates within strata of preterm status, race and gestational weight gain. Markov chain Monte Carlo methods were used to fit a multinomial-Dirichlet hierarchical model. A thinned sample of 10,000 Monte Carlo results for each of the stratum-specific predictive values was retained. These were used to adjust birth certificate BMI in a frequentist logistic regression model as in a standard probabilistic bias analysis. Results suggest an elevated risk of preterm birth among severely obese women (Odds Ratio (OR)=1.4; 95% Confidence Interval (CI): 1.2-1.6) as well as among underweight women (OR=1.3; 95% CI: 1.0-1.7) compared with normal weight. These results incorporated uncertainty in the validation data regarding the predictive values, but reduced that uncertainty through hierarchical regression, resulting in more precise estimates. The semi-Bayes approach of estimating the predictive values and the adjusted ORs in separate models allowed easy implementation while a fully-Bayes model would have been difficult or impossible to realize due to the vast size of the data.

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MEDICAL MARIJUANA LAWS, STATE-LEVEL MARIJUANA USE AND TRAFFIC FATALITIES. Julian Santaella-Tenorio*, Christine M. Mauro, June Kim, Magdalena Cerda, Katherine M. Keyes, Deborah S. Hasin, Sandro Galea, Silvia S. Martins (Department of Epidemiology, Mailman School of Public Health, Columbia University)

Marijuana use (MU) and driving safety is major public health concern given that MU has been linked to reduced driving performance. To inform prevention, it is important to identify if the enactment of medical marijuana laws (MML) has had an effect on MU and how this, in turn, may have influenced the occurrence of traffic fatalities. We estimated the association between MML and state-level MU, and we examined whether the implementation of MML was associated with the state-level traffic fatality rates. Further, we tested whether this association was mediated by the prevalence of MU. We used data on past month MU from the 2002-2013 National Survey on Drug Use and Health (aged 12 or order), data on traffic fatalities from the 2002-2013 Wide-ranging Online Data for Epidemiologic Research, and data on the date of enactment of MML across the 50 U.S. states. Longitudinal analyses with a random effect for state and a fixed linear trend for year were used to compare the prevalence of MU and the traffic mortality rates in 1) pre vs. post-MML years in states enacting MML; 2) states enacting MML vs. those never enacting MML. Adjusted models for national year trends showed that the state-level prevalence of past-month MU after states enacted MML was higher than in the pre-enactment period ($\hat{I}^2$=0.61, SE= 0.16, p-value<0.001) and higher than in states without MML ($\hat{I}^2$=2.75, SE=0.31, p-value<0.001). The rate of traffic fatalities after states enacted MML was not different than in the pre-enactment period ($\hat{I}^2$=0.50, SE=0.35, p-value=0.15), but was lower than in states without MML ($\hat{I}^2$=-4.28, SE=1.25, p-value<0.001). The prevalence of MU was not associated with traffic fatalities rates ($\hat{I}^2$=0.001, SE=0.09, p-value=0.98) and did not modify the MML-traffic fatalities association when added to the model. Findings suggest that the prevalence of past month MU is not a mediator of the MML-traffic fatalities association, and that other state-level factors may explain, in part, this association.

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HEALTH AND CRIMINAL JUSTICE APPROACHES TO REDUCING URBAN VIOLENCE: A SET OF SIMULATED EXPERIMENTS. Magdalena Cerda*, Melissa Tracy, Ava Hamilton, Katherine M Keyes (Department of Epidemiology, Columbia University)

Cities such as New York and Chicago are investing millions in CeaseFire, a public health approach to reducing urban violence. Its core element involves hiring "violence interrupters," former gang members who establish a rapport with at-risk youth and redirect conflict. The impact of such a program, compared to criminal justice responses, is unknown. We simulated experiments to test the influence of two interventions on absolute levels and racial inequalities in violence: a) an interrupter intervention, including mediators who intervened in violent conflicts and outreach workers who reduced the probability of violence among high-risk youth; and b) directed police patrol in small areas with high levels of violence. We used an agent-based model to simulate a 5% sample of the NYC adult population. Agent behaviors were governed by parameters drawn from NYC data sources and published estimates, and influenced by network and neighborhood features. Under no intervention, 4.28% (95% CI 4.26-4.29) of agents were victimized per year; the prevalence was 1.96 (95% CI 1.92-1.99) times higher among Blacks than Whites. Implementing the violence interrupter intervention for 5 years decreased victimization by 5% (to 4.04% [4.02-4.06]). Increasing the intervention duration to 10 years, or adding an additional mediator in each high-violence neighborhood resulted in a 10% decrease in victimization. To reduce Black-White inequalities, it was necessary to add an additional mediator per neighborhood and focus the intervention in the 14 most violent neighborhoods for 20 years (15% reduction to 1.65 [95% CI 1.62-1.67]). In contrast, implementing hot-spots policing for 5 years reduced annual victimization by about 30% (to 2.87% [2.86-2.88]), but did not affect racial inequalities in violence. While hot-spots policing may effectively reduce population rates of urban violence, reduction of racial inequalities may require long-term public health investment in the most violent communities.

342-S/P

AN EXAMINATION OF RANDOM BREATH TESTING AND ALCOHOL-RELATED TRAFFIC CRASH RATES IN AUSTRALIA: 2000-2012. Jason Ferris*

Introduction: Australia introduced Random Breath Testing (RBT) in 1976. Australian jurisdictions generally apply a 1:3 ratio of random breath tests per registered licensed drivers (LD); suggested by Homel in 1989. Our research examines the relationship between the RBT rate and alcohol-related traffic crash (ARTC) rate for all Australian jurisdictions. **Methods:** The research draws on three administrative data sources spanning 1 January, 2000 to 30 December, 2012: the number of RBTs conducted per month, the number of crashes where an individual's recorded BAC reaches or exceeds the legal limit of 0.05g/ml of alcohol in blood and the number of licensed driver drivers. We use Joinpoint Regression software to model the relationship between RBTs and ARTCs and quantify significant deviations in trends over time. **Results:** We will present a full score-card for the eight Australia jurisdictions. Four jurisdictions are presented in the abstract. New South Wales maintained a stable RBT rate whilst the ARTC rate was stable or declining over time. Victoria showed significant increases in RBT rates prior to 2011, the ARTC rate declined after 2005. Queensland had consistently stable RBT and ARTC rates. By contrast, Western Australia showed substantial declines in RBT rates mirrored by substantial increases in ARTC rates. **Conclusions:** International research considers Australia to have the most successful RBT program in terms of alcohol-related traffic crash reductions compared to other countries. This paper demonstrates the relationship between RBT and ARTC rates varies substantially over time and between Australian jurisdictions.

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MODELING THE EFFECTS OF ALCOHOL TAXATION ON RATES OF VIOLENCE AND HOMICIDE IN NEW YORK CITY: AN AGENT-BASED MODELING APPROACH. Katherine Keyes*, Melissa Tracy, Ava Hamilton, Magdalena Cerda (Columbia University)

Taxation is one public health approach to reducing consumption of unhealthy products. Alcohol taxes have been demonstrated to reduce alcohol consumption and alcohol-associated mortality at the population level, thus considering market regulation of alcohol sales through taxation is an important component of a systematic public health program. Increasing alcohol taxation may also have benefits for other health outcomes for which alcohol is often implicated, such as assault and homicide. We assessed how increasing beer, wine, and/or spirit taxes in New York City would influence rates of victimization 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, drink alcohol, engage in violence, as well as other model-determined behaviors. Agents were assigned beverage preferences (wine, beer, and spirits), and we simulated various interventions to increase taxation, including a universal tax on all alcohol, and then wine/beer/spirits separately. Based on empirical data, we estimated the effects of these taxation policies on transitions from heavy drinker to light or non-drinker. All interventions decreased the prevalence of heavy drinking. The changes in drinking in turn influenced overall rates of violence and homicide. There were substantial reductions (35-40%) in violence and homicide, and even larger reductions in alcohol-related violence and homicide. For example, a universal alcohol tax decreased alcohol-related violent victimization from 1.89% per annum (95% C.I. 1.81-1.94) to 1.78% per annum (95% C.I. 1.72-1.79). Alcohol taxation should be considered a potentially viable component of a public health response to violence and homicide, by reducing the population prevalence of heavy drinking, especially for specific types of beverages.

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NEIGHBORHOOD GREENNESS AND AGGRESSIVE BEHAVIORS OF ADOLESCENTS IN SOUTHERN CALIFORNIA: A LONGITUDINAL ANALYSIS. Diana Younan*, Catherine Tuvblad, Leo Lee, Fred Lurmann, Jun Wu, Meredith Franklin, Laura Baker, Jiu-Chiuan, Chen (University of Southern California)

Background: Neighborhood greenness has been associated with better mental health in unban-dwelling populations, but its putatively protective effect against aggressive behavior in children and adolescents remains unclear. **Methods:** We used longitudinal data on aggressive behaviors from age 8-20 assessed by the parent-reported Child Behavior Checklist (CBCL) and self-reported Youth Self-Report (YSR) at 4 occasions among 1,573 subjects enrolled in the Risk Factors for Antisocial Behavior (RFAB) Study. Participants were twin pairs born 1990-1995 living in LA County and surrounding areas. Normalized Difference Vegetation Index (NDVI) was used as a proxy for neighborhood greenness. Using the 16-day GeoTIFF V2 250-meter MODerate-resolution Imaging Spectroradiometer (MODIS) data in 1999-2014 from the Global Agriculture Monitoring (GLAM) Project, we estimated residential exposures at 1-, 3-, and 6-month and 1-, 2-, and 3-year intervals preceding behavioral assessment. Multilevel mixed effect modeling was used to estimate the effect of NDVI on total aggression scores, adjusting for within-family correlation and potential confounders. **Results:** CBCL scores decreased significantly (all $p<0.05$) with increased NDVI exposures at multiple time-scales (e.g., 2-year exposure: $\beta = -3.16$; $p = 0.0195$). Consistent associations with YSR scores were observed, although only the effect estimates for ≥1-year NDVI exposures were statistically significant. There was no strong evidence of confounding by age, gender, race, socioeconomic status, or perceived neighborhood quality of associations between NDVI and CBCL scores. The effect estimates were not sensitive to further adjustment for traffic density or proximity to roads. **Conclusions:** These preliminary results support the hypothesized protective effects of neighborhood greenness in reducing aggressive behaviors of urban-dwelling adolescents. Further analyses will examine NDVI exposures at school locations and evaluate other sources of biases.

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ARE DISPARITIES IN ADOLESCENT OBESITY ATTRIBUTABLE TO ENVIRONMENTAL CHARACTERISTICS?: AN ILLUSTRATION OF OAXACA-BLINDER DECOMPOSITION. Daniel R. Taber*, Whitney R. Robinson (University of Texas School of Public Health)

Background: Oaxaca-Blinder decomposition is an econometric method of analyzing disparities. It separates disparities attributable to group characteristics ("endowment effects") versus group differences in effects of characteristics ("coefficient effects.") This study applied Oaxaca-Blinder decomposition to analyze obesity disparities in Hispanic versus non-Hispanic White adolescents. **Methods:** Height and weight were objectively measured in a nationally representative sample of 9th-12th grade students in the 2010 National Youth Physical Activity and Nutrition Study. Our analyses focused on obesity prevalence differences (PD) between Hispanic (n=3085) and non -Hispanic White students (n=3860). Predictors included 13 weight-related behaviors and 7 school, home, and neighborhood environmental measures, measured via student self-report. **Results:** Obesity prevalence was higher among Hispanic students (23.0% vs. 17.3%, PD=5.7, 95% CI: 1.7, 9.6). Home fruit/vegetable (FV) access was inversely associated with obesity status but had a complex association with disparities, as the endowment effect suggested that lower Hispanic FV access accounted for a small portion of the PD (0.35, 95% CI: 0.00, 0.70), but the coefficient effect suggested lower FV access had a greater association with obesity among Whites. Ethnic differences in obesity were also associated with endowment effects of activity behaviors and students' lunch source. **Conclusions:** The complex role of FV access illustrates the value of the Oaxaca-Blinder method. Hispanic students had less FV access at home, which was associated with obesity disparities to some extent. However, the coefficient effect suggests that even in a counterfactual scenario in which Hispanic and White students had equal FV access, disparities may be unchanged. Applying Blinder-Oaxaca gives insight into how interventions would affect disparities when groups differ in both exposure level and unmeasured ways that affect response to exposures.

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FETAL GROWTH AND DURATION OF GESTATION ON CHILDHOOD OBESITY. Hyojun Park, Maureen Durkin (University of Wisconsin-Madison)

Background: The inconclusive evidence for developmental origins of obesity may be partly explained by the use of birthweight (BW), gestational age (GA), and weight for gestational age (WGA) interchangeably and as categorized rather than continuous measures of fetal growth. This study evaluated the interchangeability of BW, GA and WGA as predictors of child growth or obesity using nationally representative longitudinal data. Methods: Data were from the Early Childhood Longitudinal Study, the 2001 Birth Cohort (n=6,650). Multivariate regression and logistic modeling, accounting for the complex survey design, were used to estimate the impacts of BW, GA and WGA percentiles, singly or in combination, on the BMI percentiles and the risk of obesity in childhood, after adjusting for other covariates. **Results:** The model using both WGA (b=0.11, s.e.=0.01, p<0.01) and GA (b=0.03, s.e.=0.01, p<0.03) appropriately identified the positive and independent effect of each fetal growth and duration of gestation on child growth and the risk of childhood obesity, while the model using both BW (b=0.75, s.e.=0.06, p<0.01) and GA (b=-0.08, s.e.=0.02, p<0.01) introduced qualitative bias on the effect of GA. Modeling BW alone provided the mixed but valid effect of both fetal growth and duration of gestation. **Conclusion:** Modeling WGA and GA as the continuous variables allows evaluation of the independent impacts of fetal growth and duration of gestation on child growth and risk of obesity. Use of BW alone as an indicator of fetal growth is a reasonable strategy when reliable measures of GA are not available.

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EPIGENOME-WIDE STUDY OF BODY MASS INDEX SHOWS METHYLATION CHANGES AT OBESITY-RELATED GENES. Lauren E Wilson*, Zongli Xu, Sophia Harlid, Dale P. Sandler, Jack A. Taylor (Epidemiology Branch, NIEHS)

Obesity is an established risk factor for many chronic diseases and may act to increase risk via multiple biological pathways. Recent studies have identified epigenetic differences in blood from people of normal weight versus those who are overweight or obese, which suggests that body mass may affect or be affected by the epigenome. To further explore the relationship between obesity and the epigenome, we conducted a genome-wide analysis of DNA methylation and body mass index (BMI) using data from a subset of women in the Sister Study cohort. The Sister Study is a prospective cohort of 50,884 U.S. women who had a sister with breast cancer but were free of breast cancer themselves at enrollment. Study participants completed in-person examinations which included measurements of height and weight, and provided blood samples. Blood DNA methylation data from the Illumina Infinium HumanMethylation27 Beadchip array covering 27,589 CpG sites was available for 871 women from a prior case-subcohort study of breast cancer and DNA methylation. These 871 women served as the discovery set. A replication set was comprised of a non-overlapping group of 128 women from the Sister Study who had DNA methylation data generated using the Infinium HumanMethylation450 Beadchip array, which covers methylation at 485,512 CpG sites. Differentially methylated CpG sites associated with body mass index were identified using robust linear regression, and associations that passed the false discovery threshold ($q \leq 0.05$) in the discovery set were confirmed in the replication set. We identified four previously unreported CpG sites that were differentially methylated with increasing body mass index. Three of the CpG sites are in gene regions that have previously been linked to obesity, birth weight, and obesity-related conditions including insulin resistance, supporting the hypothesis that obesity may be associated with epigenetic alteration.

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THE CAUSAL EFFECT OF OBESITY ON MULTIPLE SCLEROSIS: A MENDELIAN RANDOMIZATION STUDY. Milena Gianfrancesco*, Xiaorong Shao, Brooke Rhead, Ling Shen, Hong Quach, Alan Berstein, Cathy Schaefer, Lisa Barcellos

Multiple sclerosis (MS) is an autoimmune disease affecting over 2.5 million people worldwide, thought to involve both genetic and environmental risk factors. Recently, childhood and adolescent obesity has been associated with a two-fold increased risk of MS. However, the relationship between obesity and MS may be confounded by lifestyle and socioeconomic factors that were not appropriately adjusted for in previous studies. We utilized Mendelian randomization to estimate the causal relationship between obesity and MS using a weighted obesity genetic risk score (oGRS). The oGRS incorporates the cumulative effect of 32 variants associated with obesity identified from 16 published studies in European-descent samples. A split-sample instrumental variable (IV) analysis was used by summing all minor alleles times the estimated effect of each minor allele on the phenotype, as reported in the literature. Weighted sub-scores based on functional groups of genes, as well as pathway derived from the DAVID Bioinformatics database, were calculated and regressed against MS status controlling for established risk factors and confounders. Participants included non-Hispanic Caucasian members of Kaiser Permanente (1,104 MS cases, 10,536 controls). Instrumental variable estimates demonstrated a significant association between oGRS and MS (causal odds ratio [OR] = 1.23, 95% CI 1.07, 1.42) after adjusting smoking, year of birth, sex, education, ancestry and HLA-DRB1*1501, the strongest genetic predictor of MS. When stratified by gender, the association remained significant in females (1.27, 95% CI 1.09, 1.49), but not males (1.05, 95% CI 0.76, 1.46). Sub-scores based on functional group indicated a significant role for genes associated with cardiopulmonary factors; no significant results were found for scores based on pathway. MS risk conferred by obesity may involve predisposing genetic factors for obesity, suggesting that specific mechanisms may mediate disease onset.

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DO BODY MASS NORMS AMONG DEMOGRAPHIC GROUPS INFLUENCE PERCEPTIONS OF OVERWEIGHT? A STUDY OF ADULTS IN THE UNITED STATES. Abdulrahman M. El-Sayed*, Caroline G. Rutherford, Ava Hamilton, Katherine M. Keyes (Columbia University)

Minorities and the disadvantaged suffer high burdens of obesity relative to their counterparts in the United States (US). Efforts to address this have focused on motivating individual improvements in diet and physical activity. Just as body mass may differ systematically by demographic subgroups, so may normative values about ideal body size, shaping how individuals classify their own body size, regardless of objective assessment based on body mass index (BMI) standards. In a population representative sample of the US, those with BMI>=25 kg/m2 based on self-reported height and weight (N=18,483) were screened into a section on weight-based discrimination. Among them, 18% did not perceive themselves to be overweight. We stratified the sample into 54 groups based on cross-classification of age, sex, race, and education. We then estimated mean BMI for each of these groups, and then compared perceptions of overweight relative to both objective BMI obesity standards and group means. We then calculated two estimates of 'false negatives' (FNs): 1) the proportion who were obese based on standard BMI cut-offs of >=30 kg/m2 who did not perceive themselves to be overweight; and 2) the proportion who had BMI greater than their own group mean who did not perceive themselves to be overweight. We then directly calculated the difference in the false negatives across these comparisons. Generally, there was a higher proportion of false negatives when compared to BMI>=30 than compared with the group mean. The correlation coefficient between group means and the difference in FNs was 0.68 (<0.01) in males and 0.83 (<0.01) in females. As group means increased, the proportion who falsely perceived themselves not to be obese by the BMI standard increased relative those who falsely perceived themselves not to be obese by the group mean. Norms may thus be more important in shaping perceptions of obesity than BMI standards.

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INCIDENT ISCHEMIC HEART DISEASE AFTER LONG-TERM OCCUPATIONAL EXPOSURE TO FINE PARTICULATE MATTER ACCOUNTING FOR TWO FORMS OF SURVIVOR BIAS. Sadie Costello*, Andreas Neophytou, Mark R. Cullen, Ellen A. Eisen(UC Berkeley)

Recent exposure to particulate matter (PM2.5) is recognized as a major contributing factor for heart disease but there has been less focus on risk from longer term exposures. We examined long-term PM2.5 exposure and incident ischemic heart disease (IHD) risk in cohorts of aluminum smelter and fabrication workers, followed for 15 years, addressing two forms of survivor bias. One form, left truncation bias, was addressed by restricting to subcohorts hired closer to the start of follow up. The other form, healthy worker survivor bias characterized by a time-varying confounder affected by prior exposure, was documented only in the smelters; marginal structural Cox models were therefore used in that stratum. There were 441 cases of IHD in the full cohort of smelter workers and 69 cases among those hired after the start of follow up. We compared always exposed above versus below the 10th percentile of annual daily average exposure. Results indicated elevated risk in the full cohort of smelter workers (HR=1.67 (95% CI 1.11, 2.52)) and a stronger risk in the sub cohort hired after the start of follow up (HR=3.95 (95% CI 0.87, 18.00)). There were 554 cases of IHD in the full cohort of fabrication workers and 135 cases among those hired after the start of follow up. Results for cumulative PM2.5 were null for the full cohort but indicated increased risk of IHD among those fabrication workers hired after the start of follow up. Based on models with a spline function of exposure, the HR near the median exposure, 1mg/m3-year, was 0.98 (95% CI 0.94, 1.02) and 1.17 (95% CI 1.00, 1.37), in the full and restricted fabrication subcohorts respectively. Long-term exposure to occupational PM2.5 was associated with an increased risk of IHD among aluminum manufacturing workers, particularly in smelters, after adjustment for survivor bias.

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ORGANOPHOSPHATE INSECTICIDE USE AND CANCER INCIDENCE AMONG SPOUSES OF PESTICIDE APPLICATORS IN THE AGRICULTURAL HEALTH STUDY. Catherine C. Lerro*, Stella Koutros, Gabriella Andreotti , Michael C. Alavanja, Aaron Blair, Jane A. Hoppin, Dale P. Sandler, Xiaomei Ma, Yawei Zhang, Laura E. Beane Freeman (Occupational and Environmental Epidemiology Branch, Divison of Cancer Epidemiology and Genetics, National Cancer Institute)

Background: Organophosphates (OP) are among the most commonly used insecticides. OPs have been linked to cancer risk in some epidemiologic studies, which have been largely conducted in predominantly male populations. We evaluated personal use of specific OPs and cancer incidence among female spouses of pesticide applicators in the prospective Agricultural Health Study cohort. **Methods:** At enrollment (1993-1997) spouses provided information about ever use of specific pesticides, including ten OPs, demographic information, reproductive health history, and other potential confounders. We used Poisson regression to estimate relative risks (RRs) and 95% confidence intervals (95% CIs) for all cancers diagnosed through 2010 for North Carolina and 2011 for Iowa. **Results:** Among 30,003 women, 25.9% reported OP use, and 718 OP-exposed women were diagnosed with cancer during the follow-up period. Any OP use was associated with an elevated risk of breast cancer (RR = 1.20, 95% CI: 1.01, 1.43). Malathion, the most commonly reported OP, was associated with increased risk of thyroid cancer (RR = 2.04, 95% CI: 1.14, 3.63) and decreased risk of non-Hodgkin lymphoma (RR = 0.64, 95% CI: 0.41, 0.99). Diazinon use was associated with increased risk of ovarian cancer (RR = 1.87, 95% CI: 1.02, 3.43). **Conclusions:** We observed increased risk with OP use for several hormonally-related cancers, including breast, thyroid, and ovary, suggesting potential for hormonally-mediated effects. This study represents the first comprehensive analysis of OP use and cancer risk among women, and thus a need for further evaluation.

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SOCIOECONOMIC STATUS AND ASTHMA AMONG WTC RESPONDERS. Hyun Kim*, Marlene Camacho, Francine Smith, Sherry Baron, David Kriebel, Jacqueline Moline (Hofstra North Shore-LIJ School of Medicine)

Although studies have reported health problems among WTC responders, the consequent socioeconomic impact has not been studied. We investigated whether WTC responders diagnosed with Asthma were more likely to experience a change in their full-time job status. Job status change from full-time to lower status (part-time, disabled, laid off, or retired) was used as a surrogate of lowered socioeconomic status (SES). Only responders who had at least 2 visits and held full-time status at visit 1 were included. Association with asthma was assessed after adjusting for known risk factors of socioeconomic status. Stratified modeling by asthma status was performed with robust Poisson regression. Among total 26,768 responders who participated the WTC Health Program by 2010, 8,132 responders met the inclusion criteria and included in the analysis. Asthma incidence was 5 per 100 responders. 41% with asthma and 33% without asthma lost their full-time status since the first visit. 8% changed to disabled, 15% were laid off/unemployed, 36% retired/became students and 41% changed to part-time. Asthma was strongly associated with status changed to disabled (Incidence rate ratio (IRR)=1.86(1.13-3.06)) followed by changed to retired (IRR=1.40(1.12-1.75)) and changed to any lower status (IRR=1.24(1.09-1.42)). Stratified analysis by asthma showed significant associations with only WTC exposures when responders developed asthma since 9/11 while only demographic factors were associated with job status changes among non-asthmatics. Our study found that asthma was an independent determinant of job status changes among WTC responders and no demographic characteristic affected job status changes if responders developed asthma. It is possible that asthma plays a role of mediator between WTC exposures and job status changes if asthma was a consequence of WTC exposure. Lowered SES should be considered as an important adverse effect of WTC exposure, especially when lowering SES impacts developing health problems.

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OCCUPATIONAL EXPOSURE TO SOLVENTS AND ACQUIRED COLOR VISION DEFECTS IN SAN FRANCISCO BAY AREA AUTOMOTIVE MECHANICS. Stella Beckman*, Michael N. Bates, Sa Liu, Gunilla Haegerstrom-Portnoy, Ellen A. Eisen, S. Katharine Hammon (University of California, Berkeley, School of Public Health)

Occupational exposures to solvents, including n-hexane, are associated with acquired color vision defects, particularly blue-yellow defects - possibly from neurotoxicity, retinal damage or lens coloration. The prevalence of blue-yellow defects in the general population is low but increases with age, beginning at approximately 50. Acetone may potentiate the neurotoxicity of n-hexane. We investigated these associations in a cross-sectional study of 817 automotive mechanics with exposure to cleaning solvents; active and retired mechanics ≤ 60 years old who worked during the period hexane was used in these products (1989-2002) were eligible. Cumulative exposure to all solvents and to hexane, with or without acetone, was estimated from self-reported work histories. Acquired color vision defects were identified using the Lanthony desaturated D-15 panel test. Among all subjects, 27% had an acquired color vision defect, of which 70% were blue-yellow defects. Among workers 50 years or younger, the prevalence of any color vision defect was 21%, of which 74% were blue-yellow defects-- an unusually high prevalence in this age group. In subjects ≤ 50 years, an elevated PR (prevalence ratio) of 1.73 for all color vision defects was found in both the third (95% CI 1.02, 2.94) and fourth (95% CI 0.97, 3.08) exposure quartiles for total solvents. For blue-yellow defects, the PR was 2.17 (95% CI 1.03, 4.56) in the highest total solvent exposure quartile. There was no association between hexane only and any color vision defect. However, for hexane with acetone there was an association with above-median exposure for blue-yellow defects (PR=1.68 (95% CI 1.01, 2.79)). In summary, cumulative exposure to either total solvents or hexane with acetone were associated with elevated PR for all color vision defects and for blue-yellow defects specifically in younger subjects.

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CAUSAL DIAGRAMMING WITH COMPARTMENTAL MODEL DIAGRAMS: ILLUSTRATING A PARAMETRIC ALTERNATIVE TO DAGS. Sarah F. Ackley*, Elizabeth R. Mayeda, Wayne T. A. Enanoria, M. Maria Glymour, Travis C. Porco (University of California, San Francisco)

Compartmental model diagrams (CMDs) have been used for nearly a century to depict causal relationships in infectious disease epidemiology, but rarely in chronic disease epidemiology. Causal directed acyclic graphs (DAGs) have been used more broadly in epidemiology since the 1990s to guide analyses of a variety of public health problems. Little previous research has attempted to show the correspondence between CMDs and DAGs. Using an example from chronic disease epidemiology, the effect of type II diabetes (T2D) on dementia incidence, we illustrate how CMDs can represent the same concepts as causal DAGs, including causation, mediation, confounding, and collider bias. We show how to use CMDs to explicitly depict interaction and feedback cycles, using the example of treatment as a modifier of the effect of T2D on dementia. In addition, we explore the benefits and tradeoffs of using both types of causal diagrams for specific research efforts. While DAGs imply a set of conditional independencies, they do not define conditional distributions parametrically. CMDs parametrically (or semiparametrically) describe state changes based on known biological processes or mechanisms. Because CMDs invoke parametric assumptions, they also impose additional constraints, providing more stringent criteria on which to evaluate hypothesized causal structures against observed data. Additionally, while DAGs facilitate proper use of G-methods, stratification, and adjustment in regression analyses, CMDs facilitate simulation with differential equations, difference equations, or agent-based simulation. CMDs are part of a long-term tradition of causal thinking in epidemiology and can parametrically express the same concepts as DAGs, as well as parsimoniously depict temporal relationships and interactions. As causal inference efforts in epidemiology increasingly draw on agent-based simulations and quantitative sensitivity analyses, CMDs may be of use to a wider audience.

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RECESSIONS AND COGNITIVE FUNCTION IN OLDER AMERICAN WORKERS. Philipp Hessel*, Mauricio Avendano, Carlos R. Herl, Anja Leist, Lisa Berkman (Harvard University & London School of Economics)

Background: Studies suggest that workers approaching retirement age are particularly vulnerable to the negative effect of economic recessions. This study assesses whether exposure to economic recessions around retirement age leads to poorer cognitive function in older age. **Methods:** Longitudinal data for 13,577 individuals aged >50 years participating in the Health and Retirement Study (HRS) were linked to annual unemployment rates in their state of residence during the years preceding retirement (ages 55-64) to construct a measure of cumulative economic adversity based on the number of years an individual spent in a recession in the pre-retirement years. State and individual fixed effect regression models were used to examine whether the number of years lived in recession at ages 55-64 was associated with cognitive function levels and decline at ages 65 and beyond. **Results:** Longer exposure to recessions in the years leading up to retirement was associated with lower cognitive function levels in the post-retirement years. Experiencing three or more years in recession at ages 55 to 64 was associated with significantly lower total word recall scores at ages 65+ compared to individuals who experience a year or less in recession at these ages. Experiencing two or more years of recession at ages 55-64 was also significantly associated with lower mental status scores at ages 65+. The negative effects of recessions around retirement on cognitive function at age 65 and above was particularly pronounced among individuals with previous experiences of unemployment. However, no evidence was found that exposure to recessions in the pre-retirement years leads to increased rates of declines in cognitive function. **Conclusions:** Longer exposure to recessions during the years leading up to retirement may have long-lasting effects on cognitive function at later-life. Policies that address the negative impact of recessions on older workers may promote cognitive function in older age.

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DEPRESSION FOLLOWING NEGATIVE WEALTH SHOCK DURING LATE MIDDLE AGE: A CROSSOVER STUDY. Lindsay R. Pool*, Belinda L. Needham, Sarah A. Burgard, Michael R. Elliott, Carlos F. Mendes de Leon (Center for Social Epidemiology and Population Health, Department of Epidemiology, University of Michigan School of Public Health)

Background: Previous research demonstrated that loss of assets and accumulation of debt are associated with incident depression. However, the causal impact of wealth shock on depression remains incompletely understood due to potential influence of unmeasured confounders. To better isolate the causal effects of negative wealth shock on depression, we used a crossover study design in a sample of persons in late middle age (51-64). **Methods:** Household net worth and depressive symptoms were measured in each biennial wave of the Health and Retirement Study, from 1992-2012. A negative wealth shock was defined as a loss of 75% or more of net worth over one wave. Depression was defined as a score of ≥3 on the eight-item Center for Epidemiologic Studies Depression scale. A crossover study utilizing time-stratified exposure periods controlled for all time-invariant confounders. The study was therefore limited to those who had a "pre-wealth shock" and "at-wealth shock" observation period in late middle age (N=1,166). Conditional logistic regression was used to estimate the association between negative wealth shock and depression. **Results:** Negative wealth shock was associated with increased odds of depression after wealth shock (OR=1.84, p<0.001). This increase was attenuated somewhat when time-varying covariates including income, marital status, employment, and insurance status were added to the model (OR=1.58; p=0.001). The association was no longer significant after health status variables were added to the model (OR=1.27; p=0.158). These associations were compared with results from a traditional pooled model, which may not control for all potential confounders. **Conclusion:** In a causal model that controls by design for all time-invariant confounders, results suggest that negative wealth shock is associated with increased risk of depression. However, this relationship may be partially driven by upstream triggers of wealth shock, such as declining health and income.

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HEART RATE VARIABILITY AND INCIDENT STROKE: APPROXIMATE BAYESIAN ANALYSIS IN THE ATHEROSCLEROSIS RISK IN COMMUNITIES STUDY. Amber L Fyfe-Johnson*, Clemma J Muller, Alvaro Alonso, Aaron R Folsom, Eric Whitsel, Sunil K Agarwal, Rebecca Gottesman, Wayne Rosamond, Richard F MacLehose (Division of Epidemiology and Community Health, School of Public Health, University of Minnesota)

Background: Low heart rate variability (HRV), a marker of autonomic dysfunction, has been associated with increased all-cause and cardiovascular mortality. The association of HRV with stroke risk has been rarely assessed. We examined the association between reduced HRV and incident stroke in a community-based cohort. **Methods:** The Atherosclerosis Risk in Communities (ARIC) Study measured HRV using 2-minute ECG readings in 10,724 middle-aged men and women at baseline (1987-89). HRV was defined as the standard deviation of beat-to-beat intervals (SDNN). A binary indicator variable was created (low vs. high) based on median SDNN (38 ms). Incident strokes through 2010 were identified using ARIC surveillance; a computer algorithm and study physician adjudicated all events based on National Survey of Stroke criteria. Approximate Bayesian methods combined the one published study of HRV and incident stroke with the current ARIC study. Bayesian Cox regression models were used to estimate hazard ratios (HRs) and 95% credible intervals (CI). **Results:** With a median follow-up of 22 years, 658 (6.1%) participants developed incident stroke. After demographic adjustment, the hazard ratio for incident stroke was 1.26 (95% CI: 1.07, 1.48) for low HRV compared to high HRV. When adjusted for demographics, behaviors, and cardiovascular risk factors the association was nearly identical (HR=1.23, 95% CI: 1.04, 1.45). Bayesian posterior HR estimates were attenuated and standard error was reduced compared to the prior study (HR= 4.3, 95% CI: 1.6-11.4). **Conclusions:** Low HRV was associated with a 23% increased risk of incident stroke in middle-aged adults. Approximate Bayesian methods are easily implemented and strengthened inference. Final effect estimates combine both the current study's data and findings from previous research, similar to a meta-analysis.

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COGNITIVE DECLINE AFTER INTENSIVE CARE (ICU) AND NON-ICU HOSPITALIZATION IN COMMUNITY-DWELLING OLDER ADULTS, Bryan D. James*, Robert S. Wilson, Raj C. Shah, Patricia A. Boyle, E. Wesley Ely, James X. Zhang, Theodore J. Iwashyna, David A. Bennett, Julie A. Schneider (Rush Alzheimer's Disease Center)

Objective: We tested the hypothesis that hospitalization is associated with accelerated rate of cognitive decline in old age. To investigate whether hospitalizations involving intensive care were driving this association, we tested the hypothesis that both ICU and non-ICU hospitalizations are each independently associated with cognitive decline. **Methods:** Annual cognitive assessments were linked to Medicare claims records for older persons enrolled in the Rush Memory and Aging Project with no cognitive impairment at baseline, providing information on hospitalization and cognitive change for up to 11 years. First, change-point mixed effects models adjusted for age, sex, and education were used to test the association of hospitalization with accelerated cognitive decline by allowing rate of cognitive change to shift after first hospitalization. We then tested the association of rate of ICU hospitalizations and rate of non-ICU hospitalizations with rate of cognitive change. **Results:** Among 843 participants with at least 3 assessments followed over a mean of 4.9 (SD=2.7) years, 73% were hospitalized at least once. A total of 2,284 hospitalizations occurred during the study period and participants were hospitalized an average of 3.6 (SD=3.1) times; 23% of hospitalizations involved the ICU. Hospitalization was associated with a 3-fold acceleration in rate of cognitive decline: the global cognitive score declined a mean of 0.125 unit per year after first hospitalization compared to 0.041 unit per year before hospitalization ($p<0.001$). Rates of both ICU (estimate=-0.063, SE=0.021, p=0.003) and non-ICU (estimate=-0.026, SE=0.010, p=0.010) hospitalizations were associated with cognitive decline. **Conclusions:** Hospitalizations were associated with a more than three-fold acceleration in cognitive decline. Both non-intensive and ICU hospitalizations were associated with cognitive decline, though ICU hospitalizations were related to greater decline.

375-S/P

LIFECOURSE SOCIOECONOMIC STATUS AS A PREDICTOR OF COGNITIVE FUNCTION AND DECLINE. Jessica R. Marden*, Eric J. Tchetgen Tchetgen, Ichiro Kawachi, M. Maria Glymour (Harvard T.H. Chan School of Public Health)

Both early life and adult socioeconomic status (SES) are thought to affect late life level of cognitive function, but the relationship between SES and rate of cognitive decline remains controversial. We examine associations between SES at 3 lifecourse periods and late life memory function and decline. Health and Retirement Study participants (n=10,781) were interviewed biennially from 1998-2012. We characterized SES in childhood (a composite score including parents' educational attainment), early adulthood (indicators for high school and college completion), and older adulthood (self-reported income in 2000 at average age 68 years, dichotomized at the median). Memory score was based on immediate and delayed word list recall and the Informant Questionnaire for Cognitive Decline. Hypothesized confounders were measured in 1998. Memory function was modeled using repeated measures from 2002-2012 and decline was modeled for the same years via growth curves, inverse probability weighting to account for the association of SES at successive lifecourse periods. High SES at all 3 ages gave the best outcome for both memory function and decline (β for 10 year memory change=0.55; 95% CI: 0.47, 0.62), compared to low SES at all points. Examining the magnitude of effects for each lifecourse period individually, high school completion (vs less than high school) had the largest estimated effect size on memory function (β=0.19; 95% CI=0.15, 0.22). Conversely, the largest magnitude of effect on memory decline was for high late life income (β for 10 year memory change =0.35; 95% CI=0.24, 0.46), even when compared to the estimated effect of high school completion (β for 10yr change in memory =0.18; 95% CI=0.10, 0.26). Education was the strongest predictor of level of memory function, whereas rate of decline was driven by late life income, suggesting that late life interventions focused on SES or its downstream consequences – like health behaviors – may slow cognitive decline.

380-S/P

NEIGHBORHOOD-LEVEL SOCIOECONOMIC STATUS MODIFIES AIR POLLUTION-ASTHMA ASSOCIATIONS IN ATLANTA. Cassandra O'Lenick*, Andrea Winquist, James Mulholland, Mariel Friberg, Howard H. Chang, Michael Kramer, Stefanie E. Sarnat(Emory University)

Introduction. Previous research indicates strong associations between air pollution and pediatric asthma morbidity. Socioeconomic status (SES) may modify these associations; however, previous studies have found inconsistent evidence on the role of SES. Methods: Effect modification of air pollution-pediatric asthma morbidity by neighborhood SES was examined in Atlanta, GA. We acquired data on emergency department (ED) visits among 5-18 year olds with a primary or secondary diagnosis of asthma or wheeze in 20-county Atlanta during 2002-2008. Daily ZIP code-level concentrations of ozone, nitrogen dioxide, fine particles (PM2.5), and major PM2.5 components were estimated using monitoring data fused with emissions-based chemical transport model simulations. To assess pollutant-asthma associations we used a time-stratified case-crossover model, matching on ZIP code of residence, day, month and year of ED visit while controlling for temporal trends and meteorology. Effect modification by ZIP code-level SES (based on US Census and American Community Survey data) was examined via stratification. Results. We found stronger air pollution-asthma associations in "deprivation areas" (i.e. 20% or more households living below the federal poverty line; 25% or more adults without a high school diploma) compared to non-deprivation areas. Exploration of non-linear trends through quartile analyses indicated strongest associations in the highest and lowest SES quartiles. Results were consistent for multiple pollutants and multiple indicators of SES. Conclusions. Results suggest neighborhood SES to be a factor conferring vulnerability to air pollution-related pediatric asthma morbidity in Atlanta. Observed non-linear trends imply that neighborhood-level factors in Atlanta may act on pediatric asthma differently in high and low SES environments. Our results may inform future research and help elucidate inconclusive or contradictory findings in this field.

381-S/P

GENDER DIFFERENCES IN SOCIAL NETWORKS OF ALCOHOL USE AMONG COLLEGE STUDENTS. Alison R. Walsh*, Allison E. Aiello, Marisa C. Eisenberg (University of Michigan School of Public Health)

The goal of this project was to investigate potential clustering patterns of alcohol use in a social network of college students. Methods: Using baseline survey data and reported face-to-face contacts from the eX-FLU social network study (2012-2013), alcohol use and network characteristics of college students were assessed. Participants reported their average weekly drinking behavior and were defined as drinkers, binge drinkers, or non-drinkers. An undirected multi-network and 3 subgraphs of drinkers, men, and women were constructed using 10 weekly contact surveys. Demographics and drinking behaviors were assessed and tested for differences by drinking status and gender using X2 and Kruskal-Wallis tests. Assortativities and bootstrapped p-values for drinker, binge drinker, number of drinks and days of drinking per week were calculated for networks. Results: 417 of 590 study participants reported their gender and alcohol use. 152(36.5%) were categorized as drinkers (>1 drink/week), 40.8% of which were male. Men and women's alcohol use was not significantly different (all $p>0.05$). In the weekly and drinker networks, participants were significantly positively assortative for drinking status and number of drinks per week (drinker: 0.16, weekly: 0.16, all $p<0.05$). In the gender networks, women had higher assortativities than men for drinking (Female (F): 0.27 ($p<0.01$), Male (M): 0.15 ($p=0.04$)), binge drinker (F: 0.12 ($p=0.02$), M: -0.01 ($p=0.88$)), number of drinks/week (F: 0.23 ($p<0.01$), M: 0.19 ($p=0.01$)) and days of drinking/week (F: 0.24 ($p<0.01$), M: 0.17 ($p=0.03$)). Conclusions: College students exhibited clustering in their contact patterns according to alcohol use. Participants tended to interact with individuals with similar drinking habits and these connections were significantly greater for women than men. Patterns in college student drinking networks may provide important points for public health intervention.

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NEIGHBORHOOD WALKABILITY AND PHYSICAL ACTIVITY IN SOUTH ASIANS IN THE MASALA STUDY. Irene H. Yen*, Elizabeth A. Kelley, Namratha R. Kandula, Alka M. Kanaya (Johns Hopkins Bloomberg School of Public Health)

Engaging in physical activity is influenced not only by individual choice, but by interpersonal, community, and environmental factors; in particular, the built environment can have a strong influence on physical activity. Because South Asians report high rates of cardiovascular disease and overweight and obesity, as well as low levels of physical activity, increasing physical activity could be an important way to improve the health of this population. This study explores the association between neighborhood walkability and physical activity among men and women in the Mediators of Atherosclerosis in South Asians Living in America (MASALA) Study. The MASALA study is a community-based sample of 906 men and women from two sites, the San Francisco Bay Area and Greater Chicago, that investigates subclinical cardiovascular disease in South Asian men and women. Neighborhood walkability was assessed using Walk Score, a publically available global estimate that ascertains multiple objective measures of the built environment. Physical activity was assessed using the Typical Week's Physical Activity questionnaire. After adjusting for age, BMI, income, education, and recruitment site, men engaged in 163 additional MET-min/week of physical activity ($p=0.025$) with each 10-point increase in Walk Score. No association was observed between walkability and physical activity in women in either adjusted or unadjusted models. These results provide new evidence for how the effects of environmental influences on physical activity may vary between South Asian men and women. Environmental factors may have a stronger influence on South Asian men's physical activity, while individual-level or cultural factors may have a stronger influence on South Asian women's physical activity. Understanding how influences on physical activity differ between South Asian men and women in the United States is critical to consider in designing interventions to increase physical activity in this population.

383-S/P

THE GEOGRAPHY OF POST-DISASTER MENTAL HEALTH: SPATIAL PATTERNING OF PSYCHOLOGICAL VULNERABILITY AND RESILIENCE IN NEW YORK CITY AFTER HURRICANE SANDY. Oliver Gruebner*, Sarah R. Lowe, Laura Sampson, Sandro Galea (Mailman School of Public Health, Dept. of Epidemiology, Columbia University)

Only very few studies have investigated the geographic distribution of psychological resilience and associated mental health outcomes after natural or man made disasters. Such information is crucial for location-based interventions that aim to promote recovery in the aftermath of disasters. The purpose of this study therefore was to investigate geographic variability of (1) posttraumatic stress (PTS) and depression in a Hurricane Sandy affected population in NYC and (2) psychological vulnerability and resilience factors among the NYC boroughs. Telephone survey data were collected 13 to 16 months post-disaster from household residents (N=418 adults) in NYC communities that were most heavily affected by the hurricane. The Posttraumatic Stress Checklist for DSM-5 (PCL-5) was applied for measuring posttraumatic stress and the nine-item Patient Health Questionnaire (PHQ-9) was used for measuring depression. We applied spatial autocorrelation and spatial regimes regression analyses, to test for spatial clusters of mental health outcomes and to explore whether associations between vulnerability and resilience factors and mental health differed among New York City's five boroughs. Mental health problems clustered predominantly in neighborhoods that are geographically more exposed towards the ocean indicating a spatial variation of risk within and across the boroughs. We further found significant variation in associations between vulnerability and resilience factors and mental health. Race/ethnicity (being Asian or non-Hispanic black) and disaster-related stressors were vulnerability factors for mental health symptoms in Queens, and being employed and married were resilience factors for these symptoms in Manhattan and Staten Island. In addition, parental status was a vulnerability factor in Brooklyn and a resilience factor in the Bronx. We conclude that explanatory characteristics may manifest as psychological vulnerability and resilience factors differently across different regional contexts. Our spatial epidemiological approach could be used to build resilience against disasters in NYC and other areas with similar settings.

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DESIGNING OPTIMAL OCCUPATIONAL INFRASTRUCTURE FOR POPULATION HEALTH RESILIENCE IN INDIA: A PROBABILISTIC PORTFOLIO DECISION MODEL. Matteo Convertino*, Gurumurthy Ramachandran (University of Minnesota)

Over the past three decades, many emerging economies including India have undergone rapid industrialization and urbanization. Such exponential growth has certainly increased the economic power of India but simultaneously increased prevalence of many infectious and chronic diseases that can be related to old and newly created occupations. In order to provide a tool useful for the design of population health resilience – focused on policy addressing occupational health determinants – we present an integrated modeling approach for the selection of optimal portfolios of occupational and health infrastructure aimed to decrease disease risk incidence and prevalence. The model's decision basis focuses on the optimization of the payoff determined by the trade-off of benefits (GDP and reduction in morbidity/mortality) and costs. Scenarios of capital investment, population growth, and minimum acceptable morbidity/mortality will be considered. At the center of our framework is a portfolio decision model (PDM) that integrates model predictions via a spatiotemporal probabilistic decision model, together with a Pareto optimization framework that maximizes the overall risk-adjusted portfolio value subject to relevant socio-political constraints. Global sensitivity and uncertainty analysis is carried out to explore variable importance and interactions and payoff variability. Preliminary results show a multimodal distribution of the payoff function where current trajectories correspond to low payoff where health is suboptimal with respect Pareto optimal solutionsResults emphasize the need of a systemic and dynamic approach to sustainability where population health is part of the equation dictating new investments in a country which otherwise may collapse on a health-social standpoint. For this purpose the study develops a spatio-temporal epidemiological modeling tool (STEM-OHIndia) that can be both used for the strategic design of infrastructure and for automated surveillance.

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OBESOGENIC ENVIRONMENTS IN CHILDHOOD IN PA: A NETWORK APPROACH. Emily A. Knapp*, Geoff B. Dougherty, Usama Bilal, Bridget Teevan Burke, Thomas A. Glass (Johns Hopkins Bloomberg School of Public Health)

Previous research has examined individual features of the obesogenic environment, ignoring the spatial co-occurrence of many interconnected features. We take a structural approach, modeling 33 aspects of obesogenic environments using network analysis, focusing on three dimensions of connectivity (closeness, between-ness, and degree). Network analysis has been previously applied to infectious disease transmission, social support, information diffusion, and chronic disease clustering, but has not been used to characterize neighborhoods. Data came from secondary sources on food establishments, land use, physical activity promoting features, and crime in 1288 communities in a 37-county area of Pennsylvania. Our goal was to understand the network structure underlying policy-sensitive features and how these may be associated with childhood obesity prevalence. We examined the correlation between the nodal connectivity of all variables and mean BMI-z, percent children above the 85th percentile, and the difference in rates of obesity (85th percentile) in communities that were high and low on each node. First, the network structure was derived and centrality measures computed for all 1288 communities. Next, we examined correlations of centrality and outcomes in the 708 communities with 25 or more children ages 3-18 with measured height and weight from an electronic health record. We identified several central clusters of nodes in the network including food, crime, and physical activity resources. Several community risk factors identified in the literature were entirely unconnected from these clusters and each other. The strongest associations were found between degree centrality and obesity rates, explaining 40% of the variability in percent of children 85th percentile and higher. Identifying highly central nodes in the system of interlocking community characteristics may be important to understanding what makes communities obesogenic or obesoprotective.

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THE ASSOCIATION BETWEEN MAMMOGRAPHIC CALCIFICATIONS AND INVASIVE BREAST CANCER PROGNOSTIC FACTORS IN A POPULATION-BASED MAMMOGRAPHY REGISTRY. Sarah J. Nyante*, Thad Benefield, Tiffany Hoots, Louise M. Henderson (Department of Radiology, University of North Carolina at Chapel Hill)

Mammographic calcifications are often associated with ductal carcinoma in situ (DCIS), but their role in invasive breast cancer is less understood. Studies of patient subgroups have linked calcifications with poor survival. We examined calcifications in the population-based Carolina Mammography Registry to determine their association with breast cancer prognostic markers in a broader population. Demographics and health history were self-reported and mammographic findings were recorded prospectively by a radiologist. Cancer diagnosis data was obtained by linkage to state cancer registry and hospital-based pathology records. We included all screen-detected unilateral primary invasive breast cancers diagnosed from 1996-2011 where calcification data was recorded (N=6,797). Associations between tumor characteristics and the presence of calcifications were estimated using logistic regression. Calcifications were observed in 8.6% of cases. The presence of calcifications was associated with heterogeneously dense or extremely dense breast tissue, prior breast biopsy and use of screen-film mammography (all $\chi 2$ $P<0.01$); there was no association with age, race, menopausal status or hormone use. Calcifications were detected more often with estrogen receptor (ER)- (vs. ER+, OR=1.32, 95%CI 1.03-1.68), high grade (vs. low, OR=1.54, 95%CI 1.15-2.07) or ≤5mm (vs. >5, OR=2.91, 95%CI 2.38-3.57) tumors. Estimates were similar when adjusted for breast density, prior biopsy and mammogram type, but the association with grade was slightly weakened when we excluded cases with associated DCIS. Stage at diagnosis, progesterone receptor expression, lymph node positivity and histology were not associated with calcifications. Our results suggest that calcifications are associated with both poor (ER-, high grade) and good (≤5mm) prognostic factors in screen-detected invasive breast cancer. Analysis of calcification morphology and distribution is needed to better understand these associations.

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ANTI-MÜLLERIAN HORMONE CONCENTRATIONS IN PREMENOPAUSAL WOMEN AND BREAST CANCER RISK. Hazel Nichols*, Donna Baird, Frank Stanczyk, Anne Steiner, Melissa Troester, Kristina Whitworth, Dale Sandler (University of North Carolina Gillings School of Global Public Health)

In laboratory models, increasing anti-Müllerian hormone (AMH) concentrations reduces breast tumor development. Human studies are lacking; one study (N=105 cases, 204 controls) with prospectively-collected serum reported the opposite—a ~10-fold increase in breast cancer risk comparing 4th to 1st quartile AMH levels. We investigated the relation between serum AMH levels and breast cancer risk within the Sister Study prospective cohort. We conducted a nested case-control (N=452 cases, 902 controls) study within the Sister Study cohort of 50,884 women. At enrollment, participants were ages 35-54, premenopausal, and completed questionnaires on medical and family history, lifestyle factors, and demographics. AMH (ng/ml) was measured by ultrasensitive ELISA in serum collected at enrollment and log-transformed for analysis. Multivariate conditional logistic regression was used to calculate ORs and 95% CIs to account for matching on age and enrollment year. Mean age at enrollment was 46.8 years with an average 2.9 years from blood draw to breast cancer diagnosis (SD=1.9). AMH concentrations were below the limit of detection (0.003 ng/ml) for ~25% of samples. Compared with samples below the LOD, women with AMH >2.84 ng/ml (90th percentile among controls) had a 2.25-fold increase in breast cancer odds (95% CI: 1.26-4.02). For each 1-unit increase in lnAMH, overall breast cancer odds increased by 8% (OR=1.08; 95% CI: 1.02-1.15) and ER-positive, invasive disease increased by 15% (OR=1.15; 95% CI: 1.05-1.25). In our study, AMH was positively associated with breast cancer risk. Prior laboratory studies used basal-like breast cancer models such as the C3Tag mouse model or the MCF10A cell line and therefore may not generalize to more common ER-positive breast cancers. A larger study with a younger age distribution or higher proportion of basal-like tumors is needed to conclusively address possible protective effects of AMH on breast cancer.

392-S/P

REPRODUCTIVE RISK FACTORS IN RELATION TO MOLECULAR SUBTYPES OF BREAST CANCER. Julia S. Sisti*, Rulla M. Tamimi, Bernard A. Rosner, A. Heather Eliassen (Harvard T.H. Chan School of Public Health, Channing Division of Network Medicine, Department of Medicine, Brigham and Women's Hospital and Harvard Medical School)

Background: Several intrinsic breast cancer subtypes have been identified on the basis of unique gene expression profiles; these subtypes may represent different etiologic processes. Previous studies have suggested that associations of breast cancer with reproductive risk factors, particularly parity and lactation, may vary by subtype. **Methods:** We used multivariate-adjusted Cox proportional hazard models to examine relationships between age at menarche, parity, age at first birth, age at menopause and postmenopausal hormone (PMH) use and risk of breast cancer subtypes in the Nurses' Health Studies. We also examined whether a derived birth index, incorporating age at each birth, was differentially associated with subtypes. **Results:** Over 4,853,825 person-years of follow-up, we identified 2114 luminal A, 1064 luminal B, 245 HER2-type, 396 basal-like and 118 unclassified tumors. Age at menarche (HR >14 v. <12 years=0.73, 95% CI: 0.61-0.88, ptrend<0.0001) was inversely associated with risk of luminal A tumors only. Increasing age at menopause and current use of both estrogen-only and estrogen + progestin PMH appeared most strongly associated with luminal subtypes. Parity was not associated with risk of any subtype, though increasing age at first birth was associated with risk of luminal A tumors (HR per 1-year increase=1.04, 95% CI: 1.02, 1.05). Birth index was also inversely associated with risk of luminal A tumors, suggesting a protective effect of many births at younger ages. Duration of lactation was inversely associated with risk of basal-like tumors only (HR never v. 7+ months v. never: 0.64, 95% CI: 0.48, 0.84, ptrend=0.02). **Conclusion:** Associations between reproductive risk factors and breast cancer risk appeared to vary by subtype, with several appearing most strongly associated with luminal A. Our results support previous reports that lactation may be protective against basal-like tumors, representing a potential modifiable risk factor for this aggressive subtype.

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A PROSPECTIVE STUDY OF ENDOMETRIOSIS AND RISK OF BREAST CANCER. Leslie V. Farland*, Rulla M. Tamimi, A. Heather Eliassen, Donna Spiegelman, Susan E. Hankinson, Stacey A. Missmer (Department of Epidemiology, Harvard School of Public Health)

Background: Endometriosis, a gynecologic condition that affects approximately 10% of women, has been associated with altered systemic hormonal and inflammatory environments. Previous studies on endometriosis and breast cancer report mixed results, potentially due to limited data on confounding and mediating factors. Additionally, no study has addressed breast cancer heterogeneity across tumor hormone receptor types. To overcome these limitations, we evaluated the association between endometriosis and breast cancer among participants in the Nurses' Health Study II across >20 years of follow-up. **Methods:** We used laparoscopy, the clinical gold standard for endometriosis diagnosis, to define our exposure. Cox proportional hazard models, adjusted for a priori confounding factors, were used to calculate hazard ratios (HR) and 95% confidence intervals (CI). We assessed potential mediators: hysterectomy, oophorectomy, and postmenopausal hormone use. Breast cancer was further classified by menopausal status and tumor hormone receptor status. **Results:** Women with endometriosis were not at higher risk for overall (HR:1.04 [0.94-1.16]), premenopausal (HR:1.10 [0.93-1.29]) or postmenopausal breast cancer (HR:0.97 [0.82-1.15]). However, associations varied significantly by tumor hormone receptor status (P-value, test for heterogeneity: 0.0006). While women with endometriosis were not at increased risk of estrogen/progesterone receptor positive (ER+/PR+) tumors (HR:1.02[0.88-1.17]) or ER-/PR- tumors (RR:0.81 [0.59-1.11]), endometriosis was associated with significant risk of ER+/PR- breast cancers in crude and final models adjusted for confounders and mediators (RR:1.84 [1.36-2.49]). **Conclusions:** A hormonal environment high in estrogen and low in progesterone has been proposed in the pathogenesis of endometriosis, thus this shared environment may contribute to increased risk in ER+/PR- breast cancers. Future work should focus on disease heterogeneity and confirm these relationships.

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POSTTRAUMATIC STRESS DISORDER SYMPTOMS AND PROBLEMATIC OVEREATING BEHAVIORS IN YOUNG WOMEN. Susan Mason*, Bernard Harlow, Bryn Austin, Patricia Frazier, Nancy Raymond, Benita Jackson, Janet Rich-Edward (University of Minnesota)

Background: Posttraumatic stress disorder (PTSD) affects 12% of US women at some point in their lives and appears to increase obesity risk. The mechanisms behind the PTSD–obesity association are not known, but stress has been shown to trigger overeating behaviors in animals; in humans, PTSD is frequently comorbid with binge eating disorder. Less is known about PTSD associations with more common overeating behaviors. We used data from the Growing Up Today Study to examine associations between suggestive PTSD symptoms and three problematic eating behaviors in women: subthreshold binge eating, coping-motivated eating, and disinhibited eating. **Methods:** We used modified Poisson regression to estimate risk ratios for eating behaviors in 2010 (age 23-30 years) as a function of PTSD symptoms in 2007 (age 20-27 years) and covariates. **Results:** Among 4,672 women in the sample, binge eating prevalence ranged from 5% among those with no PTSD symptoms to 13% among those with the maximum number of symptoms; coping-motivated eating ranged from 16% to 35%, and disinhibited eating ranged from 17% to 26%. A greater number of PTSD symptoms was associated with greater risks for all eating behavior outcomes, with the maximum PTSD symptoms associated with adjusted RRs of 2.83 (95% CI: 1.98, 4.04) for binge eating, 2.03 (95% CI: 1.66, 2.47) for coping-motivated eating, and 1.44 (95% CI: 1.16, 1.79) for disinhibited eating. Among 3,063 women who reported no prior bingeing, PTSD symptoms in 2007 predicted new-onset binge eating in 2010 (RR=1.68; 95% CI: 0.79, 3.57), though confidence intervals were wide due to few incident cases. Analyses of PTSD symptoms with and without depressive symptoms indicated that overeating behaviors were elevated in the presence of either mental health disorder—alone or in combination. **Conclusion:** Substantial associations between PTSD symptoms and problematic eating behaviors may help to explain PTSD–obesity associations and offer targets for intervention.

401-S/P

OVERALL AND CENTRAL ADIPOSITY AND BREAST CANCER RISK IN THE SISTER STUDY. Alexandra J. White*, Hazel B. Nichols, Patrick T. Bradshaw, Dale P. Sandler (Department of Epidemiology, University of North Carolina, Chapel Hill, NC,USA)

Background. Greater body mass index (BMI), a measure of overall adiposity, is associated with increased risk for postmenopausal breast cancer. The specific role of central adiposity, often measured by waist circumference, is less well understood, especially among premenopausal women. We aimed to examine multiple measures of adiposity in relation to breast cancer risk in a large prospective cohort study. **Methods**. 50,884 Sister Study cohort participants ages 35-74 were enrolled in 2003-2009. Inclusion criteria for the cohort included having a sister previously diagnosed with breast cancer. Trained study personnel measured height, weight, waist and hip circumference during a home visit and study participants completed a detailed questionnaire. Using Cox regression, we estimated multivariable hazard ratios (HR) and 95% confidence intervals (CIs) for breast cancer risk associated with these adiposity measurements with consideration of tumor subtype and menopausal status. **Results.** In total, 2,009 breast cancers were diagnosed during follow-up (mean=5.4 years). Weight, BMI, waist circumference and waist-hip-ratio were positively associated with overall breast cancer risk and HRs were greater among postmenopausal women and those with hormonally responsive tumors. In models for waist circumference additionally adjusted for BMI, associations persisted among both postmenopausal women (81-88cm vs ≤80cm, HR=1.16, 95%CI 1.01, 1.35; >88cm vs ≤80cm, HR=1.30, 95% CI 1.10, 1.54) and premenopausal women (81-88cm vs ≤80cm, HR=1.56, 95% CI 1.19, 2.04; >88cm vs ≤80cm, HR=1.30, 95% CI 0.91, 1.87). **Conclusions.** This study is one of the largest prospective studies with examiner-measured body size. Our findings indicate that waist circumference is independently and positively associated with both premenopausal and postmenopausal breast cancer risk.

402-S/P

RACIAL DISPARITY ON THE ASSOCIATION BETWEEN PREPREGNANCY BMI AND PREGNANCY COMPLICATIONS. Sandie Ha*, Hui Hu, Xiaomin Lu (Department of Epidemiology, College of Public Health and Health Professions, College of Medicine, University of Florida)

Background: Pre-pregnancy body mass index (BMI) is a major predictor of pregnancy complications including gestational diabetes mellitus (GDM) and hypertensive disorders of pregnancy (HDP). However, the prevalences of obesity, GDM, and HDP are not consistent across races—suggesting that BMI may affect the risk of GDM and HDP differently across races. **Methods:** We conducted a retrospective cohort study to assess the associations between BMI and GDM as well as HDP across different races among mothers who delivered a singleton birth in Florida from 2011-2012 (N=396,488). We further used Levine's formula to determine the percentages of cases that were attributed to overweight and obesity during the study period. **Results:** During the study period, the prevalences of GDM and HDP were 4.7% and 5.1%, respectively. For GDM, Asian/Pacific Islander (PI) women had the highest risk compared to any other races at any given BMI. For HDP, compared to the corresponding normal weight group, the risk was 1.90 (aOR: 1.90; 95% CI: 1.74-2.09) times higher among obese Black women; however, was 3.38 (aOR: 3.38; 95%CI: 2.41-4.75) times higher among obese Asian/PI women. The risk of both GDM and HDP as a function of BMI among Asian/PI women also increased at a much steeper slope compared to other races. If all women were to be normal weight, the percentages of GDM cases that would have been prevented during 2011-2012 in Florida were 38.1%, 43.0%, 40.6%, 23.8%, and 30.3% among White, Black, Hispanic, Asian/PI, and Other races, respectively. Similarly, the percentages of HDP cases that would have been prevented were 41.2%, 35.6%, 34.7%, 26.1%, and 31.3% for the corresponding races. **Conclusions:** Our results suggest potential interactions between race and BMI on pregnancy complications. These findings warrant further investigation.

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DAIRY INTAKE AND FECUNDABILITY IN TWO PRECONCEPTION COHORT STUDIES. Lauren A Wise*, Amelia K Wesselink, Ellen M Mikkelsen, Kristen A Hahn, Kenneth J Rothman, Katherine L Tucker, Vibeke K Knudsen, Elizabeth E Hatch (Boston University School of Public Health, Boston, MA)

A 2007 study of female nurses reported that high-fat dairy intake was associated with reduced risk of ovulatory infertility. We evaluated the relation of dairy intake to fecundability in two preconception cohort studies: Snart Foraeldre (SF) in Denmark and Pregnancy Study Online (PRESTO) in North America. In both cohorts, female pregnancy planners completed a validated food frequency questionnaire at baseline. Total, high-fat, and low-fat dairy in cup equivalents/day (PRESTO) and grams/day (SF) were calculated based on reported frequencies, average serving sizes, and standard recipes for mixed foods. Outcome data were updated every 8 weeks for up to 12 months or until clinically-recognized pregnancy. Analyses were restricted to 2,022 women attempting pregnancy for ≤6 cycles at study entry. Fecundability ratios (FR) and 95% CIs were estimated using a proportional probabilities model adjusted for age, education, BMI, physical activity, smoking, multivitamin use, total energy, and race/ethnicity (PRESTO only). Among 1,117 PRESTO participants, FRs for total dairy intake of 1, 2, ≥3 vs. <1 servings/day were 0.99 (CI: 0.85-1.17), 0.85 (CI: 0.65-1.10), and 1.41 (CI: 1.00-1.99), respectively. Among 905 SF participants, FRs for total dairy intake of 300-449, 450-599, and ≥600 vs. <300 g/day were 1.13 (CI: 0.94-1.37), 1.09 (CI: 0.88-1.35, and 1.34 (CI: 1.08-1.66), respectively. Intake of high-fat dairy was not appreciably related to fecundability in either cohort, but low-fat dairy was associated with increased fecundability in SF (≥400 vs. <100 g/day, FR=1.40, CI: 0.93-2.11). Our findings support the hypothesis that high levels of dairy intake improve fertility, but do not support an association between high-fat dairy and fertility. Results for low-fat dairy were inconsistent. Future analyses will involve examination of dairy subtypes (yogurt, cheese) and micronutrients (calcium, phosphorus, lactose).

404-S/P

LOW PLASMA 25-HYDROXYVITAMIN D IS ASSOCIATED WITH IRREGULAR MENSTRUAL CYCLES. Anne Marie Z. Jukic*, Anne Z. Steiner, Donna D. Baird (National Institute of Environmental Health Sciences)

In animals, diet-induced vitamin D deficiency is associated with menstrual cycle disturbances, but there are virtually no human data. We examined the association of 25-hydroxyvitamin D (25(OH)D) with menstrual cycle characteristics. Women aged 35-44 were randomly selected from a Washington D.C. health plan and invited to participate in the Uterine Fibroid Study (1996 – 1999). Our analysis includes 636 women (57% were Black) who provided a blood sample and completed a telephone interview that included gynecologic history. Women were asked their usual cycle length in the preceding year. Women who reported it was "too irregular to estimate" were classified as having irregular cycles (N=48). Women were excluded if they currently or recently used hormonal contraception or any other medication that influences menstrual cycles. 25(OH)D was measured by radioimmunoassay in stored plasma samples. Polytomous logistic regression was used to estimate the odds of short cycles (<26 days), long cycles (>31 days), or irregular cycles relative to normal cycles (26-31 days). The median 25 (OH)D level was 12.0 ng/mL (interquartile range: 7.6, 19.7 ng/mL). After controlling for age, race, body mass index, education, age of menarche, current smoking, alcohol use, and physical activity, a decrease in 25(OH)D of 10 ng/mL was associated with 1.9 times the odds of irregular cycles (OR (95%CI)): 1.9 (1.0, 3.4), p = 0.04). 25(OH)D was not associated with the occurrence of short cycles (OR(95%CI): 1.08 (0.79, 1.48, p=0.6) or long cycles (OR(95%CI): 1.31 (0.66, 2.60), p=0.4). Lower levels of 25(OH)D were associated with irregular cycles, but not short or long cycles. Vitamin D metabolites may play a role in regulating ovulatory function. Further investigation of potential mechanisms is warranted.

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A COMPARISON OF THE TRAJECTORY OF CHANGE IN BONE MINERAL DENSITY MEASURED AT THE TOTAL HIP AND FEMORAL NECK BETWEEN MEN AND WOMEN FOLLOWING HIP FRACTURE. Alan M. Rathbun*, Michelle Shardell, Denise Orwig, J. Richard Hebel, Gregory Hicks, Thomas Beck, Marc Hochberg, Jay Magaziner (University of Maryland School of Medicine)

Background: Approximately 300,000 older adults per year experience a hip fracture in the US, an event associated with increased morbidity and mortality. However, few studies have assessed sex differences in the sequelae of hip fracture. Women experiencing hip fracture have excess decline in bone mineral density (BMD) in the year following fracture compared to normal decrements due to aging. We examined differences in BMD change between older men and women in the year after hip fracture. **Methods:** The sample (n=286) included persons enrolled in the Baltimore Hip Studies 7th cohort, a study that frequency matched (1:1) men and women on calendar time of fracture and hospital, who underwent dual-energy x-ray absorptiometry measurement. Assessments occurred at entry, 2, 6, and 12 months. Inverse-probability weighted independence estimating equations with robust standard error estimators, which accounted for missing data, selective survival, and within-patient clustering, were used to estimate sex differences in femoral neck and total hip BMD changes (g/cm2). Estimates were adjusted for baseline covariates selected a priori. **Results:** Crude femoral neck and total hip baseline BMD was significantly higher in men. They also had larger average annual adjusted percent decline in BMD at both sites; however, these differences were not significant. Adjusted 12 months percent decreases at the femoral neck were -5.2% (95% CI: -8.3%, -2.1%) in men and -1.4% (95% CI: -4.1%, 1.3%) in women (P=0.07). Men had increasing prospective decrements, while women had a decreasing rate of decline over time. Results for total hip were more similar by sex **Conclusions:** The results suggest that men experience greater decrements in BMD compared to women after hip fracture, even after adjustment for age, body size, and use of bone-active treatments. These findings may be due to a higher baseline BMD among men or because of sex differences in bone turnover, structural geometry, or inflammation.

411-S/P

COGNITIVE **FUNCTION IN MIDDLE- AND OLDER-AGE IN RELATION TO CAUSE-SPECIFIC MORTALITY: FOLLOW-UP OF PARTICIPANTS IN THE ENGLISH LONGITUDINAL STUDY OF AGEING.** G. David Batty*, Ian Deary, Paola Zaninott(University College London & University of Edinburgh)

We examined the little-tested associations between general cognitive function in mid- to older-age and later risk of chronic disease. In the English Longitudinal Study of Ageing (2002-12), 11,391 study members, aged 50 to 100 years at study induction, were administered four cognitive tests representing three acknowledged key domains (memory, executive function, processing speed) and provided a range of collateral data. Study members were linked to a national registry for vital status and, where appropriate, cause of death. In an analytical sample of 9,204 people (4982 women), a mean duration of follow-up of 9.0 years gave rise to 1,488 deaths. Using a summation of the four tests, cognition was inversely associated with mortality rates ascribed to cancer (hazard ratios; 95% confidence interval per one standard deviation lower general cognitive function score: 1.21; 1.10, 1.33), cardiovascular disease (1.71; 1.55, 1.89), other causes (2.07; 1.79, 2.40), and respiratory illness (2.48; 2.12, 2.90). Controlling for a range of covariates which included health behaviours and socioeconomic status, and using left-censoring to explore reverse causality, had very little impact on the strength of these relationships. These findings indicate that cognitive test scores can provide relatively simple indicators of mortality risk for an array of chronic diseases and these associations are independent of other commonly-assessed risk factors. Key words: ageing, cancer, cardiovascular disease, cognitive function, mortality, respiratory illness Abbreviations: ELSA, English Longitudinal Study of Ageing

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LONGITUDINAL ASSOCIATION BETWEEN IL-6 AND GAIT SPEED AMONG OLDER ADULT CAREGIVERS AND NON-CAREGIVERS. Jennifer Lyons*, Lisa Fredman, Sherri Stuver, Timothy Heeren (Boston University)

Higher levels of inflammatory markers, such as interleukin-6 (IL-6), are associated with slower gait speed and decline in gait speed in older adults. However, few studies have examined the role of psychological factors in mediating this association. Furthermore, research on caregivers suggests that caregiving status may modify these associations. We evaluated whether optimism mediated cross-sectional and longitudinal associations between IL-6 and gait speed in a sample of 236 caregivers to persons with Alzheimer's Disease (n=52) or Parkinson's Disease (n=50) and non-caregivers (n=134) in the Health Pathways Study, a prospective study of older adults residing in the Boston area. Serum IL-6 was assayed from a morning fasting blood sample and measured in sample-based quintiles. Usual gait speed (meters/second, m/sec) was averaged over two trials on a straight 6-meter course at baseline and annual follow-up interviews. Optimism was measured by the Life Orientation Task-Revised checklist (LOT-R, range: 0-32). At baseline, mean age of participants was 73.3 (sd=7.9) years, most were white (84.3%) and female (70.3%). Mean gait speed was 1.0 (sd=0.2) m/sec and mean LOT-R was 18.6 (sd=5.1). In multivariate linear regression analyses, compared to persons in the lowest IL-6 quintile, those in the two highest quintiles had significantly slower gait speed in cross-sectional analyses (both β= -0.12 average gait speed, $p<0.01$). Optimism was associated with faster gait speed (β =0.01, p=0.01) and partially mediated the association between Il-6 and gait speed, adjusting for covariables (Q4 β=-0.09, p=0.03, Q5 β=-0.07, p=0.09). Similar results were found for associations between IL-6 and gait speed at follow-up, but associations did not differ by caregiver status in stratified analyses. These results indicate that optimism mediates the cross-sectional and longitudinal association between inflammatory markers and gait speed and is not modified by caregiving.

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MULTIVITAMIN USE AND SERUM VITAMIN B12 LEVELS IN OLDER-ADULT METFORMIN USERS IN REGARDS, 2003-2007. Vijaya Kancherla*, Josh V. Garn, Neil A. Zakai, Rebecca S. Williamson, Winn T. Cashion, Oluwaseun Odewole, Suzanne Judd, Godfrey P. Oakley Jr. (Emory University)

Objective: We investigated whether metformin use was associated with reduction in serum vitamin B12 concentration in older adults and whether concurrent use of multivitamin supplements modified the association. **Methods:** We analyzed data from the REasons for Geographic And Racial Differences in Stroke (REGARDS), a nationally representative cohort study. Survey data on a selective sample of 2,510 participants (aged 50 years and over) were examined to assess diabetes status, metformin use, intake of vitamin B12 containing multivitamin supplements, and other medications. Laboratory tests were conducted to assess serum vitamin B12 concentrations. Odds ratios (OR)s and 95% confidence intervals (CI)s were estimated using multivariable linear and logistic regression, controlling for potential confounders. **Results:** Participants with diabetes who were treated with metformin had significantly lower mean serum vitamin B12 levels than participants with diabetes not on metformin therapy ($p<0.01$), and participants without diabetes (p=0.02). Among the participants with diabetes who were on metformin therapy, multivitamin use was associated with a 50% (or 161 pmol/L) increase in their geometric mean serum B12 levels, compared to the subgroup not using multivitamins. Multivitamin use along with metformin therapy was also strongly protective of combined biochemical vitamin B12 deficiency/borderline deficiency (aOR=0.14; 95% CI=0.04, 0.54) compared to non-multivitamin use among participants with diabetes.**Conclusions:** Multivitamin use is potentially protective against biochemical or borderline vitamin B12 deficiency among older diabetic patients on metformin therapy. Additional studies are warranted to examine this association using prospective data.

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NAPPING FROM WORK TO RETIREMENT, Christine M. Harden*, Erika W. Hagen, Mari Palta, Lauren Hale, F. Javier Nieto, Paul E. Peppard (University of Wisconsin-Madison School of Medicine and Public Health, Department of Population Health Sciences)

Introduction: Napping is associated with both positive and negative health outcomes in older adults and may increase upon retirement. Prospective studies of napping behavior with respect to retirement are lacking. We hypothesized that napping frequency and duration increase with complete or partial retirement (RET) from full employment (FE) (>35 hours/week). To test these hypotheses, we used longitudinal survey data from the Wisconsin Sleep Cohort Study, a prospective study of current and former Wisconsin state employees. **Methods:** Surveys covering sleep, employment, and health were mailed to the target sample (n=2470) in 4 annual waves, starting in 2010. After excluding shift workers and surveys lacking key data, the sample comprised n=6912 observations from 2105 subjects (85% ≥1 survey, 58% all 4 surveys). Generalized estimating equations (GEE) estimated differences in nap characteristics between RET and FE 1) between individuals and 2) within individuals over time. Analyses adjusted for age, gender, partnered status, self-rated health (SF-12), diabetes, and cardiovascular disease. **Results:** In Wave 1, mean(sd) age was 63(7) years (range 46-83), 53% were women, and 74% lived with a partner/spouse. Employment proportions were 34% FE and 66% RET; 68% napped ≥1x for >5 mins in the prior month; among nappers, frequency was 13.0(8.1) naps/mo and duration was 55.9(38.8) min/nap. GEE estimates of between- and within-subject associations did not differ for frequency (p=0.66) or duration (p=0.92); hence, combined estimates are reported. Both nap frequency and duration were greater in RET than in FE: mean frequency was 1.2(95%CI 0.6-1.9) naps/mo higher, and mean duration per nap was 3.6(0.4-0.8) min longer in RET vs FE. **Conclusion:** Retirement is associated with modest increases nap frequency and duration. Comparability of between- and within-person associations suggests findings may be attributable to within-person transition from FE to RET.

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NEIGHBORHOOD VIOLENCE MEDIATES THE EFFECT OF NEIGHBORHOOD POVERTY ON DEPRESSION SYMPTOM SEVERITY. Spruha Joshi*, Stephen J. Mooney, Andrew G. Rundle, James Quinn, Ruth Finkelstein, Ebele Benjamin-Gardner, Gary Kennedy, John Beard, Magdalena Cerdá (Columbia University Mailman School of Public Health Department of Epidemiology)

More disadvantaged neighborhoods have higher rates of depression. Neighborhood disadvantage may have a particularly pronounced effect on older adults, who are less mobile and more dependent on local amenities and sources of social support. In this study, we: (1) investigated the relationship between neighborhood poverty and depression among urban older adults, and (2) identified individual- and neighborhood-level mechanisms through which neighborhood poverty may influence depression. Participants were drawn from the New York City Neighborhood and Mental Health in the Elderly Study II, a 3-year longitudinal study of 2023 adults 65 to 75 years of age. We used generalized estimating equations assuming a Poisson distribution to estimate the relationship between neighborhood poverty at wave 1 and depressive symptomology at waves 2 and 3, and to examine individual- and neighborhood-level mediators. Participants living in areas with higher neighborhood poverty had a higher risk of depressive symptomology at follow-up waves (RR: 3.10, 95%CI: 1.35-7.10), controlling for demographic characteristics, baseline depression and neuroticism. Stressful life events were associated with a higher risk of depressive symptomology (RR: 1.13, 95%CI: 1.05-1.21) and accounted for 2.9% of the effect of neighborhood poverty on depressive symptomology. The neighborhood homicide rate was also associated with a higher risk of depressive symptomology (RR: 1.09, 95%CI: 1.02-1.17) and accounted for 35.2% of the effect of neighborhood poverty on depressive symptomology. No other individual- or neighborhood -level measures explained the relationship between neighborhood poverty and depressive symptomology. Findings from this study suggest that experiencing a greater number of stressful life events and living in a neighborhood with a higher homicide rate may partly mediate the effect of neighborhood poverty on depression.

416-S/P

POOR SLEEP QUALITY IS ASSOCIATED WITH ELEVATED DAYTIME CORTISOL LEVELS. Ethan Morgan*, L. Phil Schumm, Martha McClintock, Linda Waite, Diane S. Lauderdale(University of Chicago)

Disrupted sleep elevates daytime cortisol levels in laboratory studies of young adults, suggesting that cortisol may be on the pathway between sleep and cardiometabolic health during aging. However, prior population-based research has not examined the link between daytime cortisol and objectively measured sleep at any age. A random one-third of respondents in the National Social Life, Health and Aging Project, a nationally-representative cohort of adults aged 62-90, were invited to participate in a sleep sub-study, and 80% did so (N=785). Salivary cortisol was measured with three timed samples at the beginning, middle, and end of a 2-hour in-home interview. Nightly sleep parameters obtained from wrist actigraphy (fragmentation, Wake After Sleep Onset (WASO) and duration) were averaged over three consecutive nights. Individual means and rates of diurnal change in cortisol were estimated by fitting a linear random effects model to the three cortisol measurements, assuming a uniform circadian pattern throughout the day and incorporating both random intercepts (capturing differences in overall level) and random slopes (capturing differences in the rate of change). The resulting random effects were then regressed separately on the sleep measures, adjusting for sociodemographics (age, sex, race/ethnicity, education), health behaviors (alcohol, tobacco, physical activity) and a comorbidity index. Both fragmentation (β=0.014; 95% CI=0.0012-0.026; p=0.03) and WASO (β=0.20; 95% CI=0.017-0.39; p=0.03) were significantly positively associated with mean daytime cortisol level in the full models, while sleep duration was not. Cortisol change during the interview was not significantly associated with any sleep outcomes. These results demonstrate that disrupted sleep is associated with higher overall cortisol levels, consistent with the possibility that cortisol lies on the pathway accounting for the association between disrupted sleep and a diverse set of poor health outcomes.

417-S/P

PREDICTORS OF TELOMERE LENGTH IN THE HEALTH AND RETIREMENT STUDY: EVIDENCE OF SEX-SPECIFIC ASSOCIATIONS. Chenan Zhang*, Diane Lauderdale, Brandon Pierce (University of Chicago)

Background: Telomere length is hypothesized to be a biomarker of aging. Telomere length decreases with age and is influenced by both genetic and environmental factors. While previous studies have found that women have longer average telomere length than men at the same age, no study has comprehensively examined whether correlates of telomere length vary by sex. **Methods:** The Health and Retirement Study (HRS) is a nationally representative longitudinal study involving >26,000 Americans over the age of 50. Telomere length measures were obtained from DNA isolated from saliva for a subsample of the HRS subjects (n = 5,808, male n = 2,286, female n = 3,231) using a quantitative PCR method. We used multiple linear regression models to estimate associations between telomere length and demographic and lifestyle variables among all subjects and stratified by sex. We further analyzed the association of clinical biomarkers and parental factors with telomere length, adjusting for demographic and lifestyle variables, and stratified by sex. **Results:** Telomere length was significantly associated with age, sex, race/ethnicity, body mass index (BMI), smoking, and alcohol use, among other variables. Notably, BMI was positively associated with telomere length in men, but not women (P-interaction = 0.0103), and smoking was inversely associated with telomere length in women, but less so in men (P-interaction = 0.038). **Conclusion:** While multiple predictors of telomere length have previously been described, this is the first to comprehensively assess and identify associations that vary by sex. Furthermore, this is the first analysis of telomere length predictors performed in an older nationally representative population. Findings from this study are potentially relevant in understanding sex-specific disparities in aging-related diseases and future efforts in targeted disease prevention.

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RISK OF PHYSICAL IMPAIRMENT IN POSTMENOPAUSAL WOMEN WHO EXPERIENCE PHYSICAL AND VERBAL ABUSE. Brad Cannell*, Julie Weitlauf, Lorena Garcia, Elena Andresen, Karen Margolis, Todd Manini (University of North Texas Health Science Center)

Violence against women is highly prevalent, but may often go unrecognized in postmenopausal women, as verbal abuse is more common than physical abuse in this population. Nevertheless, interpersonal abuse exposure, including verbal abuse, is associated with a myriad of health consequences. In the present work, we evaluate the association between abuse exposure and physical functioning in a large, national cohort of post-menopausal women. Multivariable logistic regression was used to measure the adjusted association between experiencing abuse and physical function score at baseline in 154,902 Women's Health Initiative (WHI) participants. Multilevel modeling was used to evaluate the contribution of abuse to trajectories of physical function score over time. Abuse was prevalent among WHI participants, with 11% of our study population reporting baseline exposure. Verbal abuse was the most commonly reported abuse type (10%), followed by combined physical and verbal abuse (1%), followed by physical abuse in the absence of verbal abuse (0.2%). Abuse exposure (all types) was associated with diminished physical functioning, with women exposed to combined physical and verbal abuse presenting baseline physical functioning scores consistent with non-abused women 20 years their senior. Results did not reveal a differential rate of decline in physical functioning based on abuse exposure. Abuse exposure is an important, and not uncommon, threat to the health and quality of life of women of all ages – including post-menopausal years. Taken together, our findings suggest a need for increased awareness of the prevalence and health significance of abuse exposure among post-menopausal women. They also underscore the importance of clinician's vigilance in their efforts toward the prevention, early detection and effective intervention with abuse exposure, including verbal abuse exposure, in post-menopausal women.

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SOCIAL ROLES IN HOUSEHOLDS OR LOCAL COMMUNITIES AND DEPRESSION AMONG OLDER JAPANESE: THE AGES LONGITUDINAL STUDY. Koichiro Shiba*, Naoki Kondo(Department of Health and Social Behavior, School of Public Health, The University of Tokyo, Tokyo, Japan)

Background: It is known that social roles may benefit older people on their mental health, while the effects of social roles may differ by its types; roles in households or local communities. We evaluated the associations between these differential social roles and depression among older people. **Methods:** Data were obtained from the 2006 and 2013 waves of the Aichi Gerontological Evaluation Study's longitudinal survey, which targeted people aged ≥65 years in Aichi, a central part of Japan. The response rates for the postal surveys were 65.5% in 2006 and 70.8% in 2013. Depression in 2013 was measured as health outcome by the short version of the Geriatric Depression Scale (GDS-15) using a cutoff point of 5 or above. Possession of social roles in households and local communities were assessed by self-report through questionnaire in 2006. Among 4,828 subjects who responded to the both postal surveys, analysis was carried out on 2,713 subjects who were not single at both time points and did not show depressive symptom at baseline (GDS-15 score ≤ 4). Multivariate logistic regression model was used for the analysis to examine the associations between social roles and depression. **Results:** Even controlling for age, equivalised annual household income, years of education, and employment status, among men, the OR of having roles in households for depression was 0.57 (95%CI: 0.34-0.93) compared to those having no roles and the adjusted OR for having roles in local communities was 0.26 (95% CI: 0.08-0.85). However, among women, no significant associations between depression and social roles were observed. **Conclusions:** Social roles may improve older people's mental health, especially among men. Older men can benefit not only by social roles in local communities, but also by roles in households.

421-S/P

THE ALTERNATIVE HEALTHY EATING INDEX-2010 AND PHYSICAL FUNCTION IN THE NURSES' HEALTH STUDY, Kaitlin Hagan*, Stephanie Chiuve, Meir Stampfer, Francine Grodstein (Harvard School of Public Health; Brigham and Women's Hospital)

Background: Physical function is a core component of mobility and independent living in older adults. Thus, it is important to identify strategies to prevent or delay physical function decline. **Methods:** We examined the association between the Alternative Healthy Eating Index 2010 (AHEI-2010), a measure of diet quality, and incident impairment in physical function, as measured by the Medical Outcomes Study Short- Form-36, among 55,145 women, age 44-71 years, from the Nurses' Health Study. Multivariable cox proportional hazards models were used to estimate the hazard ratios of incident impairment of physical function over 16 years of follow-up, adjusting for numerous potential confounding variables. **Results:** Participants in the highest quintiles of the AHEI-2010, indicating a healthier diet, were less likely to have incident physical impairment compared to participants in the lower quintiles. The multivariable adjusted hazard ratio of physical function impairment for those in the highest versus lowest quintile of AHEI-2010 was 0.87 (95% CI: 0.84, 0.89) (p-trend <0.001). When considering individual AHEI-2010 components, greater intake of vegetables (p-trend=0.009), fruits (p-trend=0,010), and moderate alcohol (p=0.001) and lower intake of sugar-sweetened beverages (p-trend=0.049), trans fat (p-trend=0.004), and sodium (p-trend<0.001), were all significantly associated with lower rates of incident physical impairment. **Conclusions:** In this large cohort of older women, diet was strongly associated with a lower risk of developing physical impairments. This may help provide compelling public health rationale for older persons to improve their diet.

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THE INFLUENCE OF NEIGHBORHOOD SOCIOECONOMIC POSITION AND THE TRANSITION TO TYPE II DIABETES IN OLDER LATINOS: THE SALSA STUDY. Lorena Garcia*, Mary Haan, Anne Lee, Adina Zeki, Al Hazzouri, John Neuhaus (University of California Davis)

Background: Some research has suggested that lower neighborhood socioeconomic position (NSEP) is associated with higher risk of type II diabetes. The purpose of this study was to examine the influence of NSEP on transitions to diabetes status over time. **Methods:** SALSA is a longitudinal study examining the health of 1777 older Latinos. The NSEP scale was derived from census 2000 data linked to participant observations at study baseline. The difference of interquartile range (7 out of 20) on the SEP scale was used. We used Multi-state Markov models to model transitions through a series of four possible states over time: 1= nondiabetic; 2=pre-diabetic; 3=diabetic; and 4=death without diabetes. Both nondiabetics and prediabetics could transition to diabetes or death without diabetes. Prediabetics could also transition to normal. Diabetics at baseline remained in that category. Thus there were a total of 6 possible transitions. **Results:** At baseline, nearly 50% were non-diabetic, 17.5% were pre-diabetic, nearly 33% were diabetic. In a fully adjusted regression model, among nondiabetics, higher NSEP was not associated with a transition to pre-diabetes (P = 0). Among nondiabetics, higher NSEP was associated with an increased risk of diabetes (HR= 1. 73, 95%CI= 1. 17, 2. 56) and a decreased risk of death without diabetes (HR: 0.58, 95% CI = .35, .97). Among prediabetics, there was not a significant transition to diabetes or to death without diabetes. Among prediabetics, higher NSEP was significantly associated with a transition to nondiabetic status (HR: 1.28, 95% CI = 1.04, 1.57). Adjusting for body mass index, age, education, and physical activity, did not affect this relationship. **Conclusion:** NSEP may be a plausible mechanism linking socioeconomic position and change in diabetes status in older Latinos.

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DISPARITIES IN RACE AND EDUCATION, BUT NOT RURAL/ URBAN DISPARITIES, INCREASE ODDS OF BENIGN PROSTATIC HYPERPLASIA IN THE UNITED STATES: THE NATIONAL HEALTH AND NUTRITION EXAMINATION SURVEY 2001-2008.
Kathryn B. Egan*, Minhyung Suh, Arthur L. Burnett, Xiao Ni, David G. Wong, Raymond C. Rosen, Kevin T. McVary(New England Research Institutes, Inc.)

Rural/urban disparities in the occurrence of lower urinary tract symptoms associated with benign prostatic hyperplasia (BPH/LUTS) have not been investigated in aging men. We investigated rural/urban, racial and socioeconomic disparities in a nationally representative population of men with recognized or unrecognized BPH/LUTS.**Methods** Complete data on men age ≥40 years (N=4,492) in the 2001-2008 National Health and Nutrition Examination Surveys were analyzed. Self-report of physician-diagnosed enlarged prostate and/or BPH medication use defined recognized BPH/LUTS. Urinary symptoms defined unrecognized BPH/LUTS. Rural-Urban Commuting Area Codes assessed urbanization. Descriptive analyses examined covariate distributions. Crude, age-adjusted, and backwards-selected multivariate logistic regressions($p \leq 0.1$) calculated ORs and 95%CIs.**Results** The recognized and unrecognized BPH/LUTS weighted-prevalence was 16.5% and 9.6%. Men with recognized BPH/LUTS were 7.8 years older than men with unrecognized BPH/LUTS (63.3 vs. 55.5 years). In addition to age, predisposing factors for recognized BPH/LUTS vs. no BPH/LUTS included hypertension (OR=1.4), proton pump inhibitor (OR=1.6) or analgesic use (OR=1.4), 2-3 or ≥4 vs. 0-1 healthcare visits/year (OR=1.4 and 2.0), and PSA>4ng/mL (OR=2.3) (all $p \leq 0.05$). Predisposing factors for unrecognized BPH/LUTS included black (OR=1.8) or Hispanic/other (OR=1.9)vs.white race, <$34,999 income (OR=1.6), hypertension (OR=1.4) and PSA>4ng/mL (OR=1.9) (all $p \leq 0.05$). Men with ≤high school education had 2.3 times age-adjusted odds of unrecognized BPH/LUTS vs. college graduates. Rural men had significantly increased age and race-adjusted odds of unrecognized BPH/LUTS (OR=1.3). There were no significant associations between BPH/LUTS and urbanization in unadjusted, age-adjusted, or multivariatemodels. **Conclusion**Age, race, education, and income, but not urbanization, are associated with significantly increased odds of unrecognized BPH/LUTS.

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PREDICTORS OF ADHERENCE TO PHARMACOLOGICAL AND BEHAVIORAL TREATMENT AMONG SMOKERS IN A CESSATION TRIAL IN ALEPPO, SYRIA. Ziyad Ben Taleb*, Raed Bahelah (Florida International University)

Introduction: The development of evidence-based smoking cessation programs is in its infancy in low income countries like Syria, which are suffering the brunt of the tobacco epidemic. Adherence to treatment recommendations is an important determinant of the success of smoking cessation programs, but little is known about factors influencing adherence to either pharmacological or behavioral treatment in such countries. Our study represents the first attempt to examine the predictors of adherence to cessation treatment in any low-income country. **Methods:** Examined correlates of adherence to pharmacologic (nicotine patch) and behavioral treatment (in-person + phone contact) in a multi-site, two-group, parallel-arm, double-blind, randomized, placebo-controlled smoking cessation trial in primary care clinics in Aleppo, Syria. All subjects received 3 in-person behavioral counseling sessions plus 5 brief follow-up phone counseling sessions, and were randomized to receive either 6 weeks of nicotine patch or placebo patch. **Results:** Of the 269 participants, 68% were adherent to patch, and 70% adhered to behavioral counseling. In logistic regression modeling, males were more likely to adhere to behavioral counseling. Allocation to nicotine treatment was associated with more adherence to patch. The perception of being allocated to nicotine treatment was associated with more adherence to patch and behavioral counseling. Higher tobacco withdrawal symptoms and greater baseline consumption of cigarettes per day was associated with less adherence to patch and behavioral counseling. Waterpipe smoking was associated with less adherence to patch. **Conclusion:** Our findings suggest that cigarette smokers in low-income countries like Syria may benefit from integrated cessation components that provide modified intensive treatment for subjects who have higher withdrawal symptoms, heavier cigarettes smoking and concurrently use waterpipe.

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EPIDEMIOLOGIC METHODS FOR STUDIES OF CANCER INCIDENCE IN SEER-MEDICARE. Elizabeth L. Yanik*, Hormuzd A. Katki, Eric A. Engels (Division of Cancer Epidemiology and Genetics, National Cancer Institute)

Background: Surveillance, Epidemiology, and End Results (SEER)-Medicare is a database linking SEER cancer registries and Medicare, which includes Medicare claims on all SEER cancer cases and a random 5% subcohort of all Medicare beneficiaries in SEER areas. Most SEER-Medicare studies have focused on cancer outcomes, but this is also a valuable resource for cancer incidence studies. **Methods:** In the SEER-Medicare population, we compared three methods for assessing the association between a medical risk factor and cancer outcome, choosing a rare risk factor (HIV infection) and a common cancer (lung cancer) for illustration. First, a cohort analysis was done within only the 5% subcohort using Cox regression. Second, a case-cohort analysis was done including the subcohort and all cancer cases and using weighted Cox regression. Third, a cohort analysis was done of the full Medicare population in SEER areas by obtaining person-time data within strata from Medicare and combining it with cancer counts within strata obtained from SEER; the resulting binned data were analyzed using Poisson regression. **Results:** Among 469,954 people included in the 5% subcohort, 0.08% had an HIV diagnosis. A total of 148,328 lung cancer cases were identified through cancer registries (7514 in the subcohort). In the subcohort, HIV was not associated with lung cancer incidence, but the confidence interval was wide (HR=0.9, 95%CI=0.3-2.8). With the case-cohort method, HIV was associated with 1.7 times higher incidence of lung cancer (HR=1.7, 95%CI=1.4-2.1). In the full Medicare population in SEER areas, HIV was associated with 1.6 times higher incidence of lung cancer (HR=1.6, 95%CI=1.3-1.9). **Conclusion:** Estimates of the association between a rare exposure and a common cancer were very imprecise using the subcohort method. The associations estimated in the case-cohort method and the full Medicare method were more precise and similar, demonstrating the efficiency of the case-cohort approach.

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RELATIONSHIP BETWEEN AMBIENT ULTRAVIOLET RADIATION AND HODGKIN LYMPHOMA SUBTYPES IN THE UNITED STATES. Emily M Bowen*, Ruth M. Pfeiffer, D. Michal Freedman, Wayne Liu, Martha S. Linet, Elizabeth K. Cahoon (Radiation Epidemiology Branch, National Cancer Institute, Division of Cancer Epidemiology and Genetics, National Institutes of Health, U.S. Department of Health and Human Services)

Ultraviolet radiation (UVR) exposure is associated with a number of immunological changes and immune dysregulation is believed to play an important role in Hodgkin lymphoma (HL) etiology. However, findings regarding the association between UVR and HL have been inconsistent; only one previous study examined risks for specific HL subtypes. We evaluated the relationship between ambient UVR and incidence of subtype-specific HL risk in the Surveillance Epidemiology and End Results program from 2001 to 2010 (N cases=20,021). Ground-based county-level ambient solar UVR estimates were linked to county of HL diagnosis. IRRs and 95% CIs were calculated for UVR quintiles using Poisson regression adjusting for age, sex, race/ethnicity, diagnosis year, and registry. HL incidence was lower in the highest quintile of UVR for nodular sclerosis (IRR=0.84, 95% CI: 0.75-0.96, p-trend<0.01), mixed cellularity/ lymphocyte depleted (IRR=0.66, 95% CI: 0.51-0.86, p-trend=0.02), lymphocyte rich (IRR=0.71, 95% CI: 0.57-0.88, p-trend<0.01), and non-classic nodular lymphocyte predominant HL (IRR=0.74, 95% CI: 0.56-0.97, p-trend=0.01), but not for "not otherwise specified HL" (IRR=1.19, 95% CI: 0.96-1.47, p-trend=0.11). These associations were not modified overall or by subtype by age, sex, diagnosis year, or race/ethnicity. We found significant heterogeneity in the UVR dose-response relationships across subtypes (p heterogeneity<0.01). Study strengths include a large number of United States population-based cases representing a large range of ambient UVR, county-level estimates for ambient UVR, and the ability to assess this relationship by HL subtype. We are limited by lack of information on lifetime residential locations and individual characteristics, although risk factors for HL are not completely understood. These findings support an inverse association between UVR exposure and HL.

441-S/P

SINGLE INSTITUTION STUDY OF MEDICAL RADIATION EXPOSURE IN A COHORT OF CHILDREN DIAGNOSED WITH SOLID TUMORS, 1985-2005. Robin Rohrer (Seton Hill University)

Background: Pre-natal or early childhood exposure to medical radiation used in diagnosis or treatment is an identified risk for childhood cancers but can be difficult to document. The author developed a family questionnaire/ interview form to identify possible exposures. **Aims:** This retrospective study examines pre-natal and early childhood medical radiation exposure in a cohort of children diagnosed with a solid tumor including brain tumors from 1985-2005 at the Children's Hospital of Pittsburgh (CHP). The hospital is a tri-state regional referral center which treats about 150-180 new cases of cancer in children per year. About 70% are diagnosed with a solid tumor. **Methods:** Each consented family so far (approximately 50% of the cohort) has been interviewed in person or by phone call. Medical staff and psycho- social staff referred patient families for interview with the author. **Results:** Among the families interviewed to date at least one medical radiation exposure has been identified (pre-conception, pre-natal or early childhood) in over 70% of diagnosed children. These exposures have included pre-conception sinus or chest CT or x-ray in either parent, sinus CT or x-ray in mother or diagnostic radiation of chest or abdomen in children. **Conclusions:** Exposures to medical radiation for a child later diagnosed with cancer may occur at several critical junctures. These exposures may well contribute to a "perfect storm" in the still elusive causes of childhood cancer. The author plans to expand the study from 1980 to present to hopefully further document these junctures.

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ASSOCIATION BETWEEN SELF-REPORTED WALKING SPEED AND STROKE RISK AMONG OLDER LATINO ADULTS. Adina Zeki Al Hazzouri*, Elizabeth Rose Mayeda Anne Lee, Tali ElFassy, Michelle Odden, Divya Thekkethala, Clinton Wright, Maria Glymour, Mary Haan (University of Miami)

Background: The relationship between walking speed and stroke risk is poorly understood. The objective of this study was to determine whether self-reported fast walking speed is associated with decreased stroke risk among older Latino adults. **Methods:** We examined 1,546 stroke-free participants from the Sacramento Area Latino Study on Aging, a prospective cohort study. Participants were community-dwelling older adults aged 60 years or older at baseline in 1988-1999 and were followed annually through 2010. Participants reported their usual walking speed outdoors which we classified it into slow, medium, or fast walking. We examined three incident stroke endpoints: 1) total stroke (first of non-fatal or fatal), 2) non-fatal stroke, and 3) fatal stroke. Stroke events were ascertained at annual home visits and semiannual phone calls as self-report of a physician diagnosis and from death certificates. Using Cox proportional hazards models, we estimated hazard ratios (HR) for stroke at different walking speed categories, adjusting for socio-demographics, cardiovascular risk factors, cognitive function, and functional status. **Results:** At baseline, 18% of participants reported fast walking speed. There were 152 total incident strokes, 114 non-fatal strokes, and 44 fatal strokes. The incidence rate (IR) of total stroke among fast walkers was 7.6/1000 person-years compared to 15.6/1000 person-years for medium walkers and 24.2/1000 person-years for slow walkers. In Cox models adjusted for established stroke risk factors, fast walkers had 58% lower hazard of total stroke (HR=0.42, 95%CI=0.23, 0.78) compared with slow walkers, and 48% lower hazard of non-fatal stroke (HR=0.52, 95% CI=0.28, 0.98), and 94% lower hazard of fatal stroke (HR=0.06; 95% CI=0.00, 0.49). **Conclusions:** Self-reported walking speed was strongly associated with stroke risk. Our findings lend support for current efforts to assess walking speed during clinic visits in order to reduce the risk of poor outcomes.

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ASSOCIATION OF SUGAR-SWEETENED BEVERAGE INTAKE AND ADOLESCENT METABOLIC SYNDROME RISK. Yu-Cheng Yang*, Pei-wen Wu, Wei-Ting Lin, Te-Fu Chan, Chun-Ying Lee, Hsiao-Ling Huang, Chien-Hung Lee (Department of Public Health, College of Health Sciences, Kaohsiung Medical University)

Chain convenience stores and bubble-tea shops are heavily in location in areas within a short walking distance from houses and schools, exposing children to environments of easy accessibility of sugar-sweetened beverages (SSB). SSBs are the major source of added sugar in diets. Cardiometabolic disturbances can occur from early childhood to adulthood. We conducted a cross-sectional study using multi-stage, geographically stratified cluster sampling to assess the association of SSB intake with metabolic syndrome (MetS) and its components among adolescents in Taiwan. A total of 2727 adolescents from 36 different urbanization-levels of schools participated in this study and offered blood samples. Demographic, dietary, physical and anthropometric parameters and clinical outcomes were obtained. The International Diabetes Federation (IDF) consensus definition, and criteria defined respectively by de Ferranti and Ford, and a metabolic risk classification derived from a two-step cluster analysis were used to assess adolescent MetS. Survey-data modules were applied to analyses of multivariate logistic regression models adjusted for survey design and covariates. The prevalence of MetS was 1.1-3.4% and 2.1-9.0% among girls with 1-500 and >500 cc/day intakes, respectively, and 2.2-6.8% and 5.1-6.7% among boys. As compared to nondrinkers, boys who consumed >500 cc/day of SSBs had a 10.3 and 5.1-fold risk of IDF and Ford-defined MetS, and girls who ingested >500 cc/day had an 8.8-fold risk of Ferranti-defined MetS. A 1.9 and 2.7-fold overall metabolic risk was observed among girls and boys with high levels of SSB intake. Our study offers findings to demonstrate the effect of SSBs intake on adolescent MetS.

452-S/P

CIGARETTE SMOKING AND SERUM ANDROGENS IN MEN AND WOMEN, A SYSTEMATIC REVIEW AND META-ANALYSIS OF OBSERVATIONAL STUDIES. Jie Zhao *, June YY Leung, Shi Lin Lin , C Mary Schooling (The University of Hong Kong)

Accumulating evidence suggests androgens might increase cardiovascular disease (CVD) risk. Environmental factors affecting androgens might provide new prevention strategies for CVD. Cotinine, a metabolite of nicotine in cigarettes, may competitively inhibit androgen breakdown, we assessed whether cigarette smoking was associated with higher androgens from available evidence. A systematic review and meta-analysis of observational studies reporting the association of smoking with androgens (testosterone and androstanediol glucuronide (AAG)) was conducted among men and women. We searched PubMed through end 2014 using ("testosterone" or "androgen" or "sex hormone") and ("smoking" or "cigarette") in any field, with the selection limited to studies of humans in English, supplemented by a bibliographic search of the selected studies and relevant reviews to identify additional studies. Two reviewers independently searched, selected and assessed study quality, and abstracted data with differences resolved by consensus or by reference to a third reviewer. Two statisticians analyzed data, using random or fixed effects models, as appropriate, with inverse variance weighting. Of the 946 studies identified 24 were eligible. In 20 studies of 10421 men, mainly middle-aged, smokers had higher mean testosterone than non-smokers (1.53nmol/L, 95% confidence interval (CI) 1.05 to 2.01). In 5 studies of 4027 men, mean AAG was similar among smokers compared with non-smokers (-0.12nmol/L, 95% CI -0.77 to 0.54). In 4 studies of 779 women and 2 studies of 710 women, no difference in testosterone (0.08nmol/L, 95% CI -0.13 to 0.30) or AAG (0.21nmol/L, 95% CI -0.12 to 0.55) was found. Smoking was associated with higher testosterone among men, but evidence for women or using AAG was limited. Suitable experimental studies are needed to examine whether smoking, or use of any other product that raises cotinine, also raises androgens given the potential implications for CVD prevention and treatment.

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CLINICAL COMMUNITY HEALTH WORKER INITIATIVE: IMPROVING HEALTH OUTCOMES WITH A TEAM-BASED APPROACH, Tameka Walls*, Vincent Mendy,, Cassandra Dove (Mississippi State Department of Health)

The Mississippi State Department of Health implemented the Clinical Community Health Worker Initiative (CCHWI) to improve clinical cardiovascular disease outcomes through self-management of A1C, blood pressure, cholesterol, and smoking. Historically, there has been limited data on the impact of CHWs on clinical outcomes in rural settings. We report on the impact of our clinical community health worker initiative (CCHWI) in the Mississippi Delta region. Patients from 8 participating healthcare systems, including Federally Qualified Health Centers, Rural Health Centers, and private providers, were selected based on diagnosis of uncontrolled hypertension, or diabetes, dyslipidemia. The CHWs visited consented patients within 7 days of referral, quarterly and as needed. CHWs conduct Chronic Disease Self-Management workshops, teach proper techniques for measuring blood pressure and hemoglobin A1C, encourage compliance, collect Body Mass Index and waist circumference measurements. Information is documented and shared with clinical providers. Abnormal or elevated measures are immediately reported. We observed statistically significant improvements (baseline vs most recent value) for diastolic blood pressure (p=0.0045), total cholesterol (p=0.0014), LDL cholesterol (p=0.0117), and triglycerides (p=0.0255). Mean age of participants was 57.6 (range 20-89) years; 71.1% were female, and 91.9% were black. The majority of the participants were diagnosed with hypertension (82.4%) and diabetes (72.0%) and more than half (57.2%) with high cholesterol. One in five (21.1%) participants had only one condition, 46.3% had two conditions and a third (32.6%) had all three conditions. CHWs may be useful in rural settings to improve cardiovascular clinical outcomes in rural settings.

454-S/P

CONGENITAL HEART DISEASE AND INDICES OF FETAL GROWTH IN A NATIONWIDE COHORT OF 973,141 LIVEBORN INFANTS. Niels B. Matthiesen*, Tine B. Henriksen, James W. Gaynor, Peter Agergaard, Cathrine C. Bach, Vibeke Hjortdal, John R. Ostergaard (Department of Pediatrics, Aarhus University Hospital, Aarhus University, Denmark)

Background: In children with congenital heart disease (CHD) neurodevelopmental disorders are prevalent. Measures of fetal cerebral growth i.e. small head circumference at birth are highly correlated with these disorders. It remains unsettled which types of CHD are associated with smaller heads at birth, and whether head size is small compared to overall size of the infant. We investigated the association between subtypes of CHD and size at birth in a large cohort. **Methods:** All Danish live births 1997-2012 were included. CHD, pregnancy outcomes and potential confounders were identified in national registries. In 30% of infants with CHD diagnostic validity and genetic anomalies were assessed in detail. The association between CHD and infant size was analyzed by multiple linear regression adjusted for potential confounders with and without adjustment for gestational age. The study further includes a sibling analyses and a comparison cohort of other major birth defects (not reported here). **Results:** 973,141 live births were included (8,220 with CHD). Overall, CHD was associated with smaller head circumference and lower birth weight, adjusted -0.5cm (95%CI -0.6;-0.4) and -208g (95%CI -237;-179). Most subtypes of CHD (e.g. univentricular hearts, septal defects) were associated with reduced measures of both. Only infants with hypoplastic left hearts or transposed great arteries had smaller heads and birth weights close to normal. Sensitivity analyses revealed that these associations were unlikely to be explained by conditioning on live birth or gestational age. **Conclusion:** Overall CHD was strongly associated with head circumference and birth weight in most subgroups. This was also the case in less severe defects not likely to cause growth restriction per se. Only 2 subtypes had smaller heads compared to overall size, consistent with theories of preferential cerebral hypoxia.

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CUMULATIVE EXPOSURE TO BLOOD PRESSURE ELEVATIONS AND CORONARY ARTERY CALCIFICATION AMONG WOMEN WITH PRETERM BIRTH. Janet M. Catov* (University of Pittsburgh)

A history of preterm birth (PTB) confers excess cardiovascular morbidity and mortality for women, but mechanisms linking these conditions are not well understood. Compared to women with term births, those with PTB have higher blood pressure before and after pregnancy, but the long term effects are unknown. We hypothesized that the cumulative exposure of modest, persistent blood pressure elevations in women with PTB would be associated with coronary artery calcification (CAC) many years later. We studied 814 women (51% black) with live births (n=206 preterm <37 weeks; n=608 term births) between enrollment in the Coronary Artery Risk Development in Young Adults (CARDIA) study and 20 years later. Latent class modeling was used to identify blood pressure trajectories from baseline to years 2, 5, 7, 10, 15, and 20, which were related to CAC greater than or equal to 100 Hounsfield units at year 20 according to preterm birth status. Three distinct systolic blood pressure (SBP) trajectories were identified: low-stable (n=451, 55.4%), moderate-stable (n=318, 39.1%), and elevated-increasing (n=45, 5.5%). Women with PTB compared to term births were more likely to be in the elevated-increasing group (37.3% vs. 4.3%, p<0.0001). Rates of CAC among women in the elevated-increasing group were higher among women with PTB compared to term births (33.3% vs. 12.5%). After accounting for age, race, education, body mass index and smoking, women with an elevated-increasing SBP trajectory and PTB had a 5.2-times higher risk of CAC compared to those with PTB and a low-stable SBP trajectory (95% CI 1.15, 23.20). In contrast, women with term births and an elevated-increasing SBP trajectory had no excess risk (aOR 1.31 [0.34, 5.44]). Women with PTB were more likely to follow a high risk blood pressure trajectory throughout young adulthood that was associated with excess risk of CAC in middle age. Women with PTB may benefit from blood pressure surveillance after pregnancy.

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DECLINING PREVALENCE OF NO KNOWN MAJOR RISK FACTORS FOR CARDIOVASCULAR DISEASE AMONG MISSISSIPPI ADULTS, BEHAVIORAL RISK FACTOR SURVEILLANCE SYSTEM, 2001 AND 2009. Vincent Mendy*, Rodolfo Vargas,Lamees El-sadek

Introduction Cardiovascular disease (CVD) remains the leading cause of death in Mississippi, despite decline in recent years. Major risk factors include high blood pressure, high cholesterol, diabetes, smoking, physical inactivity and obesity. Prevention programs such as the Mississippi Delta Health Collaborative are currently targeting these factors in the Mississippi Delta region, a high burden area in the state. However, the prevalence of no known major risk factors among adults and how the prevalence has changed in the past 10 years have not been determined. We assess changes in prevalence of no known risk factors for CVD during 2001 and 2009.**Methods** Prevalence of high blood pressure, high cholesterol, diabetes, physical inactivity, smoking and obesity were investigated using self-reported data from the Behavioral Risk factor Surveillance System, 2001 and 2009. Survey respondents who reported having none of these factors were defined as having no known risk factors for CVD. Analyses were restricted to black and white population and conducted using SAS 9.3 to account for the complex sampling design. To allow for comparison between the years, the results were age-adjusted to the U.S. 2000 standard population. Differences in percentages were determined by t-test. **Results** The age-standardized prevalence of having no CVD risk factors significantly decreased from 17.3% in 2001 to 14.5% in 2009 (p<0.0091). Age-standardized prevalence of no known CVD risk factors was significantly lower in 2001 than in 2009 for blacks (13.2% vs. 8.9%, p<0.008), men (17.9% vs.13.5%, p<0.0073), those with a college degree (30.8% vs. 25.2%, p<0.0483), and those with household incomes of $20,000-$34,999 (16.9% vs. 11.6%, p<0.0147), and $35,000-$49,999 (23.3% vs. 15.2%, p<0.0135). **Conclusion**The prevalence of no known major CVD risk factors among Mississippi adults declined from 2001 to 2009 with observed differences by race, gender, and household income.

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INTELLECTUAL AND THE ASSOCIATION OF INTERGENERATIONAL SOCIAL MOBILITY WITH ALL-CAUSE MORTALITY AND CARDIOVASCULAR MORTALITY. Ting Jia* (Child and Adolescent Public Health Epidemiology Unit, Department of Public Health Sciences, Karolinska Institutet)

Aim: The relationship between intergenerational social mobility and mortality, especially cardiovascular disease (CVD) mortality, is not fully understood. The potential influence of IQ and its modifying role on the link of social mobility-mortality is less known. Our study aims to analysis the influence of intellectual capacity on the association between intergenerational social mobility and mortality. **Methods:** The study involved 491,654 Swedish men. Intergenerational social mobility was derived from the movement from parental social class to offspring social class in adulthood. Intellectual capacity was measured by IQ test at military conscription at average age of 18.5 years. During the 35.4 years of follow-up (mean) were 19516 deaths from all causes, among which were 665 deaths from stroke, 2198 deaths from CHD and 4254 deaths from CVD. Causal mediation analysis was performed to assess the mediated effect of IQ on the social mobility-mortality relationship. Cox regression models were used to analysis the association between social mobility and mortality. **Results:** After adjustment for confounders, social mobility from manual to non-manual and remaining in non-manual class predicted a lower risk of all-cause and CVD mortality. Further adjustment for IQ attenuated the hazard ratio. In Cox regression models, IQ was associated with reduced risks of all-cause mortality. Stratified analysis showed that, mobility from the non-manual to manual group implied a higher risk of mortality compared with other social mobility groups for stroke. Individuals with lower IQ who moved from the non-manual to manual group even had an increased risk of stroke mortality with borderline significant. Mediation analysis demonstrated that IQ accounts for a significant proportion of the association between social mobility and mortality. **Conclusion:** Our study demonstrated an association of intergenerational social mobility with mortality, and this association is mediated by IQ in Swedish men.

458-S/P

PRENATAL EXPOSURE TO MATERNAL STRESS FOLLOWING BEREAVEMENT AND CARDIOVASCULAR DISEASE: A NATION-WIDE POPULATION-BASED AND SIBLING-MATCHED COHORT STUDY. Oleguer Plana-Ripoll*, Xiaoqin Liu, Natalie Momen, Erik Parner, Jørn Olsen, Jiong Li (Section for Epidemiology, University of Aarhus (Denmark)

INTRODUCTION Cardiovascular disease (CVD) is among the leading determinants of mortality and morbidity and causation may begin in the early intrauterine environment. Prenatal exposures to glucocorticoids or stress are potential risk factors of CVD later in life, but empirical evidence from large population studies is lacking. We explored the association between prenatal stress due to maternal bereavement following the death of a relative and CVD in the exposed offspring. **METHODS** This population-based cohort study included 2,607,851 children born in Denmark between 1970 and 2008. Subjects were classified as exposed if their mothers lost a child, spouse/partner, sibling or parent in the year before or during the index pregnancy and were followed-up for up to 40 years. Cox Proportional Hazards models were used to estimate the association between exposure and the (age-specific) rate of having CVD. We performed sibling-matched analyses to control for shared genetic and time-stable social and environmental factors using stratified Cox Proportional Hazards models in which each family had its own baseline risk of CVD and the comparisons were therefore made within families. **RESULTS** A total of 50,940 (2.0%) subjects were categorized as exposed and 73,708 (2.8%) had a CVD event during follow-up time. The overall hazard ratio (HR) [95% confidence interval] of having a CVD was 1.13 [1.06-1.20] and the estimates were 1.24 [1.11-1.38] for heart disease and 1.27 [1.01-1.60] for hypertension. Sibling-matched analyses showed an overall attenuated association (1.08 [0.94-1.24]).**DISCUSSION** Our results suggested a modest association between prenatal stress and CVD both in childhood and early adulthood, which could be of importance especially at an older age when the individuals are followed over a long period.

459-S/P

RESTING HEART RATE IN THE GENERAL POPULATION IS GOING DOWN, THE TROMSØ STUDY 1986-2007. Ekaterina Sharashova (UiT - The Arctic University of Norway)

Background Resting heart rate (RHR) is a simple cardiovascular parameter that is associated with risk of cardiovascular disease (CVD). We examined secular changes in RHR and their relationship with changes in other CVD risk factors in adult men and women from the general population over 22 years. **Methods** A single-center population-based longitudinal study comprised 30 699 subjects aged 30-89 years who participated in at least one of the 1986, 1994, 2001 and 2007 health surveys of the Tromsø Study, Tromsø, Norway. RHR was recorded using the automated Dinamap device. Age adjusted RHR means were calculated. Means of RHR were also calculated according to the four surveys, 10-years age groups and 10-years birth cohorts. Of the 30 699 participants, 15 603 attended at least two of the four surveys, and therefore were used in the linear mixed models to assess the association between individual changes in RHR and changes in other CVD risk factors. **Results** During the study period the age-adjusted means of RHR declined from 73.4 to 64.7 beats per minute (b.p.m.) in men, and from 78.3 to 66.4 b.p.m. in women. The decline was persistent from one survey to the next and was of similar size in both sexes and for all age groups and birth cohorts. In men and women 17.4% and 16.1% of the decline, respectively was attributable to other CVD risk factors. The strongest predictors of individual decline in RHR were decrease in systolic blood pressure and triglycerides, increase in physical activity, taking blood pressure treatment and smoking cessation. **Conclusion** A considerable decline in RHR has occurred in Tromsø over the last two decades in men and women of all ages. The decline is just partly related to changes in other CVD risk factors. The findings suggest that new definitions of normal RHR may be needed.

460-S/P

THE ASSOCIATION OF GESTATIONAL DIABETES MELLITUS WITH LEFT VENTRICULAR STRUCTURE AND FUNCTION: THE CARDIA STUDY. Duke Appiah*, Pamela Schreiner, Erica Gunderson, Suma Konety, Chike Nwabuo, Imo Ebong, David Jacobs, Hilary Whitham, David Goff Jr, Joao Lima, Ivy Ku, Samuel Gidding (University of Minnesota, Minneapolis, MN)

The association of gestational diabetes mellitus with left ventricular structure and function: the CARDIA study Gestational diabetes mellitus (GDM) is positively associated with future cardiovascular disease (CVD). However, mechanisms linking GDM to CVD beyond intervening incident diabetes are not well understood. Accordingly, we examined the relation of GDM with echocardiographic parameters of left ventricular (LV) structure and function, major predictors of future CVD risk. We studied 609 women (43% black, mean age=28.8 years) from the Coronary Artery Risk Development in Young Adults (CARDIA) study who delivered ≥ 1 births during follow up and had echocardiograms at 1990-1991 and 2010-2011. During the 20 years of follow up, 965 births were recorded with 64 (10.5%) women developing GDM. In linear regression models adjusted for sociodemographic factors, body mass index, physical activity, parity, smoking, oral contraceptives, marijuana use, alcohol intake, family history of coronary heart disease, systolic blood pressure and total cholesterol, women with GDM had poorer LV wall motion (four chamber longitudinal peak strain: -14.9 vs. -15.6%. p=0.050; circumferential peak strain: -14.4 vs. -15.4%. p = 0.010) at 2010-2011 and greater 20-year increases in LV mass (14.7g, 95%CI: 2.7, 26.6) and LV mass indexed to body surface area (8.3 g/m2, 2.2, 14.4) compared to women with non-GDM pregnancies. Further adjustment for incident type 2 diabetes after pregnancy did not attenuate these associations. Pregnancy complicated by GDM is independently associated with increased LV mass and poorer LV wall motion. Implementation of effective pregnancy and postpartum interventions in women with GDM may offer an additional opportunity to reduce future CVD risk.

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TO TREAT OR NOT TO TREAT: IMPLICATIONS OF THE ACC/AHA 2013 GUIDELINES IN A LOW-RISK CHINESE POPULATION: THE GUANGZHOU BIOBANK COHORT. JY Lin*, CQ Jiang WS Zhang, L Xu, KK Cheng, GM Leung, TH Lam, CM Schooling (School of Public Health, The University of Hong Kong, Hong Kong)

BACKGROUND: In November 2013, the American College of Cardiology/the American Heart Association (ACC/AHA) published updated guidelines for the prevention of atherosclerotic cardiovascular diseases (ASCVD) in adults, the potential implications of the new guidelines in other settings, such as Chinese, remain unverified. We aimed to determine the potential implications of these new guidelines in a Chinese cohort. **METHODS:** In the Guangzhou Biobank Cohort Study recruited from 2003 to 2008 (n=30499), followed-up from 2008 to 2012, 24838 participants aged 50 to 79 years (mean age 60.7y) without ASCVD or use of lipid modulating treatment at baseline and with low-density lipoprotein cholesterol from 70 to 189 mg/d (1.81 to 4.89 mmol/L) were eligible for 5-year CVD risk prediction. Participants were categorized into four groups based on their estimated 10-year ASCVD risk: less than 5%, 5% to less than 7.5%, 7.5% to less than 10% and 10% or above. The observed and predicted 5-year risks of a first hard ASCVD event (coronary heart disease death, nonfatal myocardial infarction or fatal or nonfatal stroke) were calculated by level of predicted 10-year ASCVD risk. **RESULTS:** The observed and predicted 5-year ASCVD risks for the group with 10-year predicted ASCVD risk of <5% was 0.1% and 0.8% respectively, for the group with 10-year predicted risk of 5%-<7.5% was 0.8% and 2.2%, for the group with 10-year predicted risk of 7.5%-<10% was 0.5% and 3.3%, and for the group with risk of ≥10% was 2.9% and 8.4%. Calibration was poor (Hosmer-Lemeshow χ^2=330.0, p<0.001), but the C statistic was 0.81 (95%CI, 0.78-0.85) indicating good discriminative ability.**CONCLUSIONS:** In this large community-based cohort of older Chinese eligible for statin initiation based on the ACC/AHA guidelines, the new risk equation led to substantial overestimation of 5-year risk of ASCVD events. Further validation of the equation is needed to facilitate CVD prevention for Chinese populations.

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TRIMETHYLAMINE-N-OXIDE, AN EMERGING CARDIOVASCULAR RISK FACTOR, IS ASSOCIATED WITH SYSTEMIC INFLAMMATION ONLY IN INDIVIDUALS WITH HIGH ANIMAL PROTEIN INTAKE. Stella Aslibekyan, Alexis Frazier-Wood, Jin Sha, Marguerite R. Irvin, Bertha A. Hidalgo, Erwin Garcia, Elias Jeyarajah, Irina Shalaurova, Ingrid B. Borecki, Hemant K. Tiwari, Jose M. Ordovas, Donna K. Arnett (University of Alabama at Birmingham)

Trimethylamine-N-oxide (TMAO), a pro-atherogenic metabolite species, has recently emerged as a promising new risk factor for cardiovascular disease (CVD). TMAO is synthesized in the liver from trimethylamine (TMA), which in turn is released by the gut flora from TMA-containing dietary phospholipid components such as choline, betaine, and L-carnitine contained in animal products. However, the underlying mechanisms of how TMAO affects atherosclerosis remain to be elucidated. One such potential pathway is systemic inflammation. We tested the association between TMAO and circulating inflammatory markers (C-reactive protein, interleukin-6, tumor necrosis factor alpha, soluble interleukin 2 receptor alpha, and monocyte chemoattractant protein 1) in participants of the Genetics of Lowering Drugs and Diet Network (GOLDN) study (n=1057). We fit linear mixed models adjusted for pedigree, age, sex, and study site. No associations were statistically significant in the overall sample. However, stratified analysis showed that among participants who reported consuming less than the median amount of animal protein (n=525), TMAO was associated with C-reactive protein (regression coefficient= 0.02, P=0.04). The association was null (regression coefficient= -0.0001, P=0.68) among those who reported consuming more than the median amount of animal protein (n=532). The findings highlight the importance of diet as a potential effect measure modifier in the relationship between TMAO and systemic inflammation.

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ASSESSING COOLING CENTER ADEQUACY IN HEAT VULNERABLE COUNTIES IN NEW YORK STATE. Seema G. Nayak*, Zev Ross, Patrick Kinney, Nazia Saiyed, Syni-An Hwang, Shao Lin (Bureau of Environmental and Occupational Epidemiology, NYSDOH)

During extreme heat events, to prevent or reduce occurrence of heat related and heat impacted illnesses, local governments and agencies set up places in communities called cooling centers where the public can seek relief from heat. Cooling centers are good community resources for heat adaptation, especially for people without access to air conditioning but they have not yet been assessed to determine adequacy in New York State (NYS). In this study, adequacy of cooling centers is assessed in terms of heat-vulnerable counties and census tracts. 377 Upstate NY cooling centers locations were identified from Upstate NY local health and emergency preparedness offices and official county websites. Using data from National Climatic Data Center, National Land Cover Database and US Census Bureau, county vulnerability to heat was defined by a combination of exposure (frequency of heat waves, daily maximum temperature); sensitivity (housing and population density, building intensity, race, poverty; elderly, living alone); health impact (prevalence of heat impacted illness like renal, respiratory and cardiovascular diseases) and adaptive capacity factors (land cover, intensity of built environment, and age of home, foreign born, or a non-English speaker). Using a scoring system, vulnerable counties and tracts were identified and mapped and adequacy of cooling centers was defined by: 1) their presence or absence in heat-vulnerable counties and tracts; 2) number of centers per 10000 elderly population (>=64 years). We identified 14 counties in Upstate NY that were most vulnerable to heat and observed that all had at least one cooling center (range 1-73 per county). Within these counties 284 tracts were identified as vulnerable (>= 20% of population was elderly) and of these 35 tracts had at least 1 cooling center (range 6-36 per 10000 elderly population) indicating that although adequate at county level, cooling centers are not adequately distributed in vulnerable tracts.

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ASSOCIATIONS BETWEEN PM2.5 AND PRETERM BIRTH AMONG CONTROLS IN THE NATIONAL BIRTH DEFECTS PREVENTION STUDY (1999 - 2006). Breanna Alman*, Jeanette Stingone, Marlene Anderka, Lorenzo Botto, Suzanne M Gilboa, Amy H. Herring, Peter H. Langlois, Wendy N. Nembhard, Gary M. Shaw, Andrew F. Olshan, Thomas J. Luben (The National Birth Defects Prevention Study ORISE/ U.S EPA)

Recent studies suggest that exposure to ambient particulate matter less than 2.5 µg/m3 in aerodynamic diameter (PM2.5) is associated with increased risk of preterm birth (PTB). This analysis investigated the relationship between PM2.5 and PTBs, using liveborn singleton controls without major birth defects with estimated dates of delivery from January 1999 through December 2006 in nine states participating in the National Birth Defect Prevention Study. To account for state-level variations, including differences in PM composition, a mixed effects logistic regression model was developed with random slopes and intercepts, clustered at the state-level. PTB was defined as births occurring before gestational week 36, and there were 401 PTBs and 3824 term-birth controls included in our analysis. Models were adjusted for household income, maternal education, maternal age, whether the mother was born in the US, maternal race/ethnicity, and season of conception. Exposure was assigned using inverse distance weighting of up to 4 monitors within 50 km of maternal residence, accounting for residential mobility when it occurred. Results based on exposures averaged within each trimester showed no relationship between PM2.5 and PTB, with odds ratios (OR) (95% confidence intervals (CI)) per interquartile increase for the first (0.94 (0.85, 1.02)), second (1.00 (0.90, 1.16)) and third (0.93 (0.85, 1.10)) trimesters, being close to the null. Categorizing exposure into quartiles revealed no discernable pattern. Some of the analyses yielded imprecise results and the possibility of effect estimates above the null cannot be excluded. US EPA Disclaimer: 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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EFFECTS OF AMBIENT AIR POLLUTION ON INSULIN RESISTANCE IN CHILDREN. Kristin A. Evans*, Elaine L. Hill, Stephen R. Cook, David Q. Rich (University of Rochester School of Medicine & Dentistry, Department of Public Health Sciences)

Background: Studies among animals and adults have shown elevated levels of ambient air pollution to be associated with insulin resistance and related metabolic abnormalities. Few investigations have examined how air pollution contributes to insulin resistance among children. **Objective:** Examine the association of increases in short and long-term mean ambient concentrations of particulate and gaseous air pollutants with insulin resistance in children. **Methods:** We linked data from a cohort study of 117 children (9-11 yrs at baseline) to pollutant levels measured by a state-run monitor in Rochester, NY. Fasting glucose and insulin were measured at up to 4 visits over 3 yeas. Homeostatic model assessment of insulin resistance (HOMA-IR) was calculated as [glucose mg/dL x insulin µU/L]/405 (higher scores=greater insulin resistance). Multilevel linear regression tested the hypothesis that increases in 1-day to 6-month mean pollutant levels are associated with increases in HOMA-IR, adjusted for sex, body fat, physical activity, family income, temperature, and humidity. **Results:** Interquartile range (IQR) increases in 2 to 6-month mean concentrations of black carbon, delta-C, and sulfur dioxide were associated with significant increases in HOMA-IR (59% increase in HOMA-IR [95% CI: 39-80%] per 0.13 µg/m3 increase in 6-month black carbon; 62% [23-101%] per 0.09 µg/m3 Delta-C; 34% [17-52%] per 0.003 ppb sulfur dioxide). Elevated carbon monoxide levels were associated with up to a 69% decrease in HOMA-IR ($p<0.05$). Long-term mean ozone levels and fine particle concentrations were also negatively associated with HOMA-IR (90-130% and 20-28% decrease per IQR, respectively; $p<0.05$). **Conclusions:** Though some markers of fossil fuel and biomass combustion appear to be associated with impaired insulin action, other pollutants appear protective. Future studies with larger samples and better estimates of individual exposures should be done to clarify these associations.

473-S/P

EFFECTS OF TEMPERATURE ON MORTALITY IN SEOUL: A TIME SERIES ANALYSIS. Won Kyung Lee*, Hye Ah LeE, Hyesook Park (Department of Social and Preventive Medicine, Inha University School of Medicine)

Background The relationship between temperature and mortality is essential to estimate the burden of climate change. Results from other countries in the same climate zone and some organization are used in estimation of national burden and attribution. However, it can be more reasonable using regional data because it depends on its socioeconomic environment and acclimation. **Methods** Time-series regression analysis was used to evaluate temperature-mortality relationships in Seoul. Mortality data and meteorological data from 1991 to 2011 were used. The qualitative relationship between daily mean temperature and mortality was evaluated using a generalized additive model with Poisson distribution. Further analysis was performed using piecewise linear regression if graph showed non-linearity with threshold. The threshold and effect of temperature on non-accidental and cardiovascular death were compared to those in previous research. Population attributable fraction (PAF) was calculated using regional data. **Results** A significantly raised risk of heat-related mortality was observed in Seoul. Non-accidental mortality increased by 0.37% (95%CI: 0.28-0.45) and 10.1% (95%CI: 8.54-11.7) with the threshold of 28.2□. Above the threshold, cardiovascular mortality increased more than non-accidental mortality, which was by 15.1% (95%CI: 12.0-18.3) with the threshold of 28.3□. These were quite higher than 2.6% increase in cardiovascular mortality from other studies of the temperate zone (World Health Organization). As for PAF, 9.17% and 13.1% of non-accidental and cardiovascular mortality could attribute to hot temperature. **Conclusions** The current research showed quite big difference in the influence of temperature on mortality with the previous literature. Regional data could be used for more accurate estimation of environmental burden and attributable fraction. Acknowledgments: This study was supported by a grant provided by the Korean Health Technology R&D Project, Ministry of Health & Welfare, Repub

474-S/P

EXAMINING THE ROLE OF ENVIRONMENTAL QUALITY IN ASTHMA-RELATED HOSPITALIZATIONS. Christine L Gray*, Shannon C Grabich, Lynne C Messer, Jyotsna S Jagai, Krsten M Rappazzo, Danelle T. Lobdell (University of North Carolina at Chapel Hill)

Asthma prevalence in the U.S. increased 12.3% from 2001 to 2009, causing 479,300 hospitalizations and 1.9 million emergency room visits in 2009 alone. Environmental quality is of particular concern: air pollution and low socioeconomic status have been associated with asthma, while exposure to green space has been linked to reductions in atopic sensitization, an asthma precursor. We linked the Environmental Quality Index (EQI), which represents 5 environmental domains (air, water, land, built, and sociodemographic) for all US counties (N=3,141) from 2000—2005 to county-level, age-adjusted asthma-related hospitalizations from 2005—2010 using data from the Environmental Public Health Tracking Network (N=1,150 counties). We used random intercept multi-level linear regression clustered by state to estimate fixed effects of EQI quintiles on asthma hospitalization rates. We stratified models by 4 rural-urban continuum codes (RUCC) ranging from most urban (RUCC1) to rural (RUCC4). Prevalence differences (PD) and 95% confidence intervals (CI) comparing the highest quintile (worst quality) to lowest quintile (best quality) are reported. For the overall EQI, we observed negative associations across strata (RUCC1: -0.52(-2.67, 1.63); RUCC2: -6.36(-9.42, -3.29), RUCC3: -1.75(-4.76, 1.25), RUCC4: -2.36(-7.83, 3.10)); as environmental quality worsened, asthma hospitalizations decreased. We further examined domain-specific EQIs. Results varied by RUCC strata; key associations were: in RUCC1, the air (5.88(3.97, 7.79)) and sociodemographic (9.011(7.36, 10.66)) domains; for RUCC2, the air (3.64(0.89, 6.40)) and land (-5.81(-8.77, -2.85)) domains; in RUCC3, the sociodemographic (-5.61(-8.23, -2.97)) domain; and for RUCC4, the air (4.16(-0.93, 9.23)) and water (-3.96(-7.30, -0.61)) domains. Environmental quality is associated with asthma-related hospitalizations, but is driven by different domains depending on urbanicity. This abstract does not necessarily reflect EPA policy.

475-S/P

HEALTH RISK ASSESSMENT OF OZONE: A PART OF KOREAN NATIONAL BURDEN OF DISEASE STUDY. Hye Ah Lee*(Ewha Womans University)

Introduction: environmental risk factors have becoming a major concern in public health with growing evidences of health risk. Of them, we focusing on exposure to ozone by reflecting the corrected minimal exposure level. **Methods:** the theoretical-minimum-risk exposure level suggested by global burden of disease (GBD) study is higher than general observable concentrations in Korea. Thus, we corrected the theoretical-minimum-risk level to average minimum level derived from Korea air monitoring data and World Health Organization (WHO) air quality criteria. Coverage of health risk including chronic obstructive pulmonary disease (COPD) expended than suggested from GBD. And then the PAF was calculated as following WHO methods. **Results:** The average concentrations of ozone were 48.7 μg/m3 (equal to 25 parts per billion, ppb), it was higher in regions with high latitudes. In addition, it concentrations have been gradually increased since late of 1980's. There was inequality of the population attributable fraction (PAF) due to different distributions of ozone concentrations by regions. PAF of natural mortality due to ozone accounted for from 0.8 to 1.3% and hospital admission by COPD covered from 2.2 to 3.7%. **Conclusion:** Although the PAF due to ozone were small portion in Korea, consistent assessment is required due to trend of increasing concentrations of ozone. 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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FACTORS ASSOCIATED WITH BIRTH DEFECTS IN THE REGION OF CORPUS CHRISTI, TEXAS. Timothy J. Wade*, Kyle Messier, Peter H. Langlois, Danelle T. Lobdell (US EPA)

In recent years, the Birth Defects Epidemiology & Surveillance Branch of the Texas Department of State Health Services (DSHS) has documented a high prevalence of certain birth defects in the Corpus Christi, TX region. We conducted a case-control study to evaluate associations between drinking water sources and proximity to hazardous waste sites with birth defects in this region. We obtained from DSHS records of birth defects and live births from 1997- 2008 from five counties near and including Corpus Christi. Using only geocoded records, cases were all birth defects, excluding minor defects (n=5158) and controls were live births without a birth defect (n=83034). Residences were mapped to water utility service areas using information provided by the State of Texas Commission on Environmental Quality. Water system violations for specific contaminants and locations of hazardous waste sites and toxic releases inventory sites (TRI) were obtained from the US EPA. Associations with birth defects were estimated using logistic regression models controlling for age, race/ethnicity, birth year and county of residence reported as (Odds Ratio [95% confidence interval]). No associations were observed between water source type (surface vs. ground), private vs. public water source, or drinking water violations for Total Trihalomethane, Haloacetic Acid, Chlorine or the Surface Water Treatment Rule. Residence in a water system that had more than three Total Coliform violations during the year before delivery was associated with an increased risk of birth defects (1.59[1.14,2.27]). Total birth defects were also associated with the density of Superfund sites, TRI sites, and Brownfields within 5 km of the residence at the time of birth. For example, the presence of two or more Superfund sites within 5 km was associated with a 33% increased odds of birth defects (1.32[1.05,1.65]). This abstract does not represent EPA policy.

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HEALTH RISKS ASSOCIATED WITH SWIMMING AT AN INLAND RIVER. Timothy J. Wade*, Whitney Krueger, Elizabeth Sams, Reagan R. Converse, Edward Hudgens, Alfred Dufour (US EPA)

Swimming exposure to fecally-contaminated oceans and lakes has been associated with an increased risk of gastrointestinal (GI) illness. Although treated and untreated sewage are often discharged to rivers, the health risks of swimming exposure on rivers has been less frequently studied. In the summer of 2011, we conducted a study on the Mississippi River near Davenport, Iowa to evaluate the risk of gastrointestinal (GI) illness among swimmers. The study site was a beach on the river, downstream from the discharge of several sewage treatment plants. We offered enrollment to those attending the beach on summer weekends. Participants completed a beach interview as they were leaving to determine swimming exposures. Ten to twelve days later, they completed a telephone interview to ascertain the occurrence of any new GI symptoms since the beach visit. Water samples were collected once each study day (n=11) and measured for indicators of fecal contamination. Logistic regression models were used to evaluate the association between GI symptoms and swimming exposures. Following exclusions for baseline illness, a total of 332 subjects had sufficiently complete follow up information to include in analysis. Fecal indicator bacteria at the river were well in exceedance of EPA's recommended geometric mean (GM) criterion for Enterococcus with a GM of 384 colony forming units (CFU) per 100 ml (EPA recommended GM criterion=35 CFU per 100 ml), indicating the presence of high levels of fecal contamination. A higher percentage of swimmers who swallowed water reported diarrhea (15%) compared to other swimmers who did not swallow water (9%) and non-swimmers (5%). Adjusted odds ratios, controlling for age, were 2.17 (95% Confidence Interval= 0.90-5.21) and 4.64 (95% Confidence Interval=1.18-18.19) comparing swimmers who swallowed water with swimmers who did not swallow water and other non-swimmers, respectively. This abstract does not represent EPA policy

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INTERACTIONS BETWEEN DIET AND EXPOSURE TO SECONDHAND SMOKE ON CHILDHOOD OBESITY – RESULTS FROM 2007-2010 NHANES. Brianna F. Moore*, Maggie L. Clark, Annette Bachand, Stephen J. Reynolds, Tracy L. Nelson, Jennifer L. Peel (Department of Environmental and Radiological Health Sciences, Colorado State University; Fort Collins, CO, USA)

Background: Exposure to secondhand smoke (SHS) may increase risk for obesity but few studies have investigated the joint effects of exposure to SHS and diet. **Objectives:** We examined the interaction of exposure to SHS and diet obesity among children (ages 6-19 years) who participated in the 2007-2010 National Health and Nutrition Examination Survey. We compared self-reported exposure to SHS with both an established biomarker (cotinine) and a novel biomarker (4-(methylnitrosamino)-1-(3-pyridyl)-1-butanol [NNAL]). **Methods:** Weighted multinomial logistic regression models were used to describe the association between exposure to SHS and overweight and obesity separate outcomes (compared with normal/underweight). Interaction by diet was assessed by introducing product terms between dichotomous exposure to SHS (high exposure vs. other) and dichotomized nutrients (dietary fiber, eicosapentaenoic acid [EPA], docosahexaenoic acid [DHA], vitamin C, and vitamin E) and nutrient patterns (determined by a principal components analysis) into separate models. The relative excess risk due to interaction (RERI) was used to evaluate interaction on the additive scale. **Results:** Approximately half of the children were exposed to SHS and one third of children were either overweight (15%) or obese (19%). Interaction results suggest that increases in obesity prevalence among children with both high exposure to SHS and low levels of certain nutrients (dietary fiber, DHA, or EPA) are greater than would be expected due to the effects of the individual exposures alone (for example, RERI for SHS and fiber = 0.8 [95% confidence interval: 0.1, 1.5]). **Conclusions:** Dietary fiber and omega-3 polyunsaturated fatty acids may counteract the effect of SHS on obesity. Childhood obesity prevention strategies aimed at reducing SHS exposures and improving diets may exceed the expected benefits based on targeting either risk factor alone.

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INTERACTIONS BETWEEN DIET AND EXPOSURE TO SECONDHAND SMOKE ON METABOLIC SYNDROME AMONG CHILDREN – RESULTS FROM 2007-2010 NHANES. Brianna F. Moore*, Maggie L. Clark, Annette Bachand, Stephen J. Reynolds, Tracy L. Nelson, Jennifer L. Peel (Department of Environmental and Radiological Health Sciences, Colorado State University; Fort Collins, CO, USA)

Background: Metabolic syndrome is likely influenced by a complex interaction between exposure to secondhand smoke (SHS) and diet, but no published studies have evaluated this relationship. **Objectives:** We examined the interaction of exposure to SHS and diet on metabolic syndrome among 12-19 year olds who participated in the 2007-2010 National Health and Nutrition Examination Survey. **Methods:** We utilized a novel biomarker (4-(methylnitrosamino)-1-(3-pyridyl)-1-butanol [NNAL]), an established biomarker (cotinine), and self-report to determine exposure. Interaction by diet was assessed by introducing interaction terms (with SHS) of the individual nutrients (dietary fiber, eicosapentaenoic acid [EPA], docosahexaenoic acid [DHA], vitamin C, and vitamin E) and nutrient patterns into weighted logistic regression models. Interaction was assessed on the additive and multiplicative scales; the relative excess risk due to interaction (RERI) was used to evaluate interaction on the additive scale. **Results:** Among our sample, approximately 5.6% of children were classified as having metabolic syndrome. The joint effect between high exposure to SHS and low levels of certain nutrients (vitamin E and omega-3 polyunsaturated fatty acids) on metabolic syndrome risk is greater than would be expected due to the effects of the individual exposures alone. For example, the joint effect of exposure to SHS and vitamin E intake was more than additive; the RERI for high NNAL exposure and low vitamin E intake was 6.4 (95% confidence interval: 0.2, 16.4). **Conclusions:** Public health prevention strategies for metabolic syndrome aimed at reducing SHS exposures and improving diets may exceed the expected benefits based on targeting these risk factors separately.

480-S/P

USING NLDAS-2 DATA TO MEASURE TEMPERATURE EXPOSURE IN HEAT-HEALTH EPIDEMIOLOGY: A COMPARISON OF NLDAS-2 AND NCDC SURFACE MONITOR TEMPERATURE DATA IN THE CONTEXT OF EPIDEMIOLOGICAL ANALYSES. Michelle DellOrto*, Roger D. Peng, William L. Crosson, Mohammad Z. Al-Hamdan, Brooke Anderson (Department of Environmental & Radiological Health Sciences, Colorado State University, Fort Collins, CO)

Extreme heat is a growing concern globally, often resulting in excess mortality and morbidity. To date, the majority of research studying the associations between temperature and human health risk has utilized data from surface-based temperature monitors (e.g., monitors in the National Climatic Data Center (NCDC) land surface weather station network). However, this data can be prone to missing values both temporally and spatially. The North American Land Data Assimilation System Phase 2 (NLDAS-2), a second source of temperature exposure data, combines information from surface-based weather monitors, remote sensing, and weather models. The final dataset is complete both spatially and temporally and is easily accessible to environmental epidemiologists through the Centers for Disease Control and Prevention's Wide-ranging Online Data for Epidemiologic Research (CDC WONDER) database. Here, we explore differences between these two temperature datasets in the context of heat-health epidemiology. We collected daily county-level warm-season (May—September) temperatures from both sources for 1999—2010 for 213 urban US counties. We explored differences between the two sets of exposure data for these counties in the context of epidemiologic studies (e.g., epidemiologic effect estimates differ if daily temperature measures for a county is larger in one of the two datasets). We also explored whether substantial differences between the two datasets could make interchangeability difficult for certain types of counties (e.g., coastal, high population density, mountainous regions, or large counties with few surface monitors). Finally, we performed a sensitivity analysis of a previous heat epidemiology study estimating the association between summer heat and respiratory hospitalizations. Overall, the results from this study inform whether results from epidemiologic studies using these two sources of temperature exposure data can be compared and combined (e.g., for meta-analysis).

481-S/P

VULNERABILITY TO HEAT-RELATED MORTALITY: A SYSTEMATIC REVIEW, META-ANALYSIS AND METAREGRESSION ANALYSIS. Tarik Benmarhnia* (Institute for Health and Social Policy, McGill University)

Background: Addressing vulnerability to heat-related mortality is a necessary step in the development of specific policies dictated by heat action plans. These policies should be based on international epidemiologic literature. The aim of this study was to provide a systematic assessment of the evidence regarding vulnerability to heat-related mortality. **Methods:** Studies published between January 1980 and August 2013 were identified through MEDLINE and EMBASE. Studies assessing the association between high ambient temperature or heat-waves and mortality among different subgroups were selected. Estimates of association for all the included subgroups were extracted. We assessed the presence of heterogeneous effects between subgroups conducting Cochran Q tests. We then conducted random effect meta-analyses of Ratios of Relative Risks (RRR) for high ambient temperature studies. Finally, we performed random effects meta-regression analyses to investigate factors associated with the magnitude of the RRR. **Results:** Overall 50 studies were included in the review. Using the Cochran Q test we consistently found evidence of vulnerability for the elderly aged more than 85 years. We found a pooled RRR of 0.98 (95% CI: 0.96, 0.99) for sex (RRmen/RRwomen), 1.02 (95% CI: 1.01, 1.04) for age>65 years (RR65+/RR15-64), 1.05 (95% CI: 1.02, 1.07) for age>75 years (RR75+/RR15-74) and 1.02 (95% CI: 1.00, 1.03) for socioeconomic status (SES) (RRlowSES/RRhighSES). We found association and SES measures to be determinants of heterogeneity in the **pooled RRR. Conclusions:** We found evidence of heat-related vulnerability for women, the elderly aged more than 65 years and low SES groups. Further studies are needed to complete knowledge about heat-related vulnerable subgroups to inform public health programs.

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RELIABILITY OF SELF-REPORTED LIFESTYLE EXPOSURES BEFORE, DURING, AND AFTER PREGNANCY. Rebecca J. Schmidt*, Pei-Chen Chen, Cheryl K. Walker, Irva Hertz-Picciotto, Daniel J. Tancredi (Department of Public Health Sciences and the MIND Institute, School of Medicine, University of California, Davis)

Background Questionnaires can help advance research when biomarker sample collection and analyses are too expensive or invasive, but only when exposures can be reported reliably. **Objective** To compare agreement of maternal retrospective report of lifestyle exposures in and around pregnancy on the ELEAT (Early Life Exposure Assessment Tool) with prospectively collected responses regarding the same exposures. **Methods** Participants (n=130) from the MARBLES (Markers of Autism Risk in Babies-Learning Early Signs) prospective study completed structured telephone interviews during pregnancy and then again with the ELEAT, a shorter instrument administered 2 or more years postpartum. Agreement was assessed with Cohen's Kappa statistic (K), sensitivity (Se), specificity (Sp) and Youden's index (Y=Se+Sp-1) for each exposure ever during the index period (3 months before pregnancy until the end of breastfeeding) and during six time periods: 3 months before pregnancy, pregnancy, each trimester of pregnancy, and during breastfeeding (if a maternal exposure) or the child's first year of life (if an exposure to the child). **Results** Retrospective reporting of maternal cigarette smoking (K=0.60, Y=0.54), other smokers within the home (K=1, Y=1), coffee drinking (K=0.64, Y=0.67), energy drinks (K=0.55, Y=0.75), alcohol (K=0.54, Y=0.63), illicit drugs (K=0.72, Y=0.57), and teeth clenching (K=0.87, Y=0.92) agreed substantially with prospective reports for the index period, but weakly to modestly agreed when taking into account timing (K/Y=0.05-0.60). Caffeinated soda (K=0.24, Y=0.42) and tea (K=0.32, Y=0.40), and sunscreen use (K=0.25, Y=0.26) during the index period had fair to moderate agreement. Sauna, hot tub and Jacuzzi use (K=0.04, Y=0.03) and maternal dental amalgam fillings (K=-0.08, Y=0.24) did not agree. Several exposures were rarely reported during pregnancy. **Conclusions** Retrospective reports of most lifestyle exposures were reliable; future studies need to assess validity.

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DOES HEALTH INSURANCE MITIGATE INEQUITIES IN NON-COMMUNICABLE DISEASE TREATMENT? EVIDENCE FROM 48 LOW- AND MIDDLE-INCOME COUNTRIES. Abdulrahman M. El-Sayed*, Anton Palma, Lynne P. Freedman, Margaret E. Kruk (Columbia University)

Non-communicable diseases (NCDs) are the greatest contributor to morbidity and mortality in lower and middle-income countries (LMICs). However, NCD care is limited in LMICs, particularly among the disadvantaged and rural. We explored the role of insurance in mitigating socioeconomic and urban-rural disparities in NCD treatment across 48 LMICs. Forty-eight LMICs from the 2002-2004 World Health Survey (WHS) were included in our analysis. We analyzed data about ever having received treatment for diagnosed high-burden NCDs (angina, asthma, depression, arthritis, schizophrenia, or diabetes). We fit multivariable regression models of each outcome by the interaction between insurance coverage and wealth (richest 20% vs poorest 50%) and urbanicity, respectively. We used predicted probabilities from these models to calculate an attributable benefit of insurance in mitigating disparities in treatment by wealth and urbanicity, respectively. We found that insurance was associated with higher treatment likelihood for most NCDs in LMICs. Insurance also predicted lower likelihood of borrowing or selling to pay for health services. Finally, insurance helped mitigate socioeconomic disparities in treatment between the poorest 50% and richest 20% of the sample for nearly all of the NCDs for which data were available, and reduced some disparities by urbanicity. Taken together, insurance coverage may serve as an important policy tool in promoting NCD treatment and reducing wealth-based disparities in access to NCD care in LMICs.

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INEFFECTIVE INSURANCE IN 42 LOW- AND MIDDLE-INCOME COUNTRIES. Abdulrahman M. El-Sayed*, Daniel Vail, Margaret E. Kruk (Columbia University)

Health insurance has two primary functions for individuals: It secures access to necessary health services in the advent of disease, and smoothens the costs of those services, protecting against potentially devastating economic shocks that occur as a result of illness. Recent health policy efforts have sought to promote Universal Health Coverage (UHC) as a means of providing these functions to populations, particularly in lower- and middle-income countries. However, insurance schemes are heterogeneous, and some schemes may not provide these services to those covered. We explored the prevalence and determinants of ineffective insurance across 42 LMICs. Forty-two LMICs from the 2002-2004 World Health Survey (WHS) were included in our analysis. Those with ineffective insurance were those who ever met the following criteria from among those who reported being insured: were forced to borrow or sell personal items to pay for health services, had an untreated chronic condition, and among women who had delivered infants in the past five years, delivered a child outside of a skilled health facility. In addition, we estimated the country-level and individual-level predictors of ineffective insurance. Among the insured, 13% had ineffective insurance, which was most commonly due to having to borrow or sell to pay for healthcare (69% of the ineffectively insured). The likelihood of ineffective insurance was lowest in upper-middle income countries and higher in other LMICs. Ineffective insurance also decreased with family wealth and was higher among rural residents. Our findings suggest that a high proportion of insurance in LMICs is ineffective, and that attention should be paid to effectiveness when defining health insurance in policy conversations about UHC.

492-S/P

EXAMINING THE IMPACT OF MISCLASSIFICATION ERROR ON PREVALENCE ESTIMATES OF EPILEPSY AND SEVERE CHRONIC HEADACHES IN BURKINA FASO. Ida Sahlu*, Hélène Carabin, Ganaba Rasmané, Pierre-Marie Preux, Athanase Millogo (Brown University)

Neuroepidemiologic studies in low-resource settings often use community-based surveys—a screening questionnaire followed by medical confirmation—to estimate population prevalence. Past studies have failed to report results that account for misclassification error. This paper aims to quantify the bias introduced by misclassification error when estimating the prevalence of epilepsy and severe chronic headaches (SCH). Methods: Baseline data from a randomized community controlled trial conducted in Burkina Faso between Feb 2011 and Jan 2012 were used. Three adjacent provinces were selected based on the size of the pig population, as cysticercosis was of interest. From the 30 pig raising departments, two eligible villages were randomly selected. Concessions, a compound consisting of a chief and several households, were randomly sampled among those with sows, piglets or none. In each concession, one member from one household was randomly selected. This sampling scheme resultedin a study sample of 4780 participants in 60 villages. Epilepsy and SCH were confirmed by a physician trained in neurology among participants screened positive and a sub-sample of 250 screened negative to assess the sensitivity and specificity of the screening. Crude prevalence estimates were calculated followed by misclassification error-adjusted estimates using a Bayesian approach. Results: The sensitivity and specificity of the screening varied by the team of interviewers. Crude prevalence estimates were consistently smaller than the adjusted estimates. Across the 60 villages, the crude prevalence estimates ranged from 0-11.3% for epilepsy and from 0-7.7% for SCH, while the adjusted estimates ranged from 2.3-13.3% for epilepsy and from 2.4-9.9% for SCH. The average percent increase for epilepsy and SCH were 49.4% and 54.6%, respectively. Conclusion: Failure to account for misclassification error could result in underestimating the burden of neurological diseases in developing countries.

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IMPACT OF A BRAZILIAN CASH TRANSFER PROGRAM ON INFANT GROWTH TO 24 MONTHS. JA Labrecque*, AJD Barros, EC Strumpf, JS Kaufman (McGill University)

Introduction: Conditional cash transfers (CCTs) are programs that give money to poor families that meet specific health or educational conditions such as vaccine coverage or school attendance. Though CCTs are internationally widespread, the most recent Cochrane review maintains that evidence supporting their impact on child health outcomes, such as child growth, is weak. We examine the impact of Bolsa Família (BF), a Brazilian CCT, on child growth from birth to 24 months. **Methods:** Data from the 2004 Pelotas Birth Cohort were matched with an online database reporting BF participation to determine whether a family received BF. Only families reporting a household per capita income (PCI) less than R$100 (n=1593) were eligible for BF and therefore used in the primary analysis. Propensity scores (PS) for the receipt of BF were calculated using fractional polynomials on all continuous variables and interactions between important terms to achieve balance among potential confounders such as birth length, mother's height and education, household income and health problems at birth. Effect estimates of BF on child length Z-score at 24 months were calculated using PS as inverse probability of treatment weights. **Results:** Balance among all covariates available was achieved and no resulting differences were substantively important. The effect of receiving BF was 0.00 (95% confidence interval [CI]: -0.11, 0.12). However, there was important effect heterogeneity by PS. For example, the first quartile revealed a positive effect, 0.21 (95% CI: 0.01, 0.41) while the second quartile revealed a negative effect, -0.29 (95% CI: -0.51, -0.06). **Discussion:** We found no evidence of an effect of BF on child growth at 24 months. Secondary analyses may indicate effect heterogeneity by PS and PCI. Future work will extend this analysis to child growth to six years using methods allowing for a time-varying exposures and covariates as well as modeling money received from BF as a continuous variable.

495-S/P

NATIONAL TUBERCULOSIS SURVEILLANCE SYSTEM REPORTING CHECK - A KAZAKHTAN CASE STUDY. Sabrina Hermosilla*, Assel Terlikbayeva, Bauzhan Zhussupov, Angela Aifah E. Berikova, Z. Zhumadilov, R. Issayeva, N. Schluger, N. El-Bassel, S. Galea (Columbia University)

Despite recent declines in pulmonary tuberculosis (TB) morbidity and mortality globally, the potential for reservoirs of TB to threaten global public health warrants epidemiologic study. In Kazakhstan, a World Health Organization (WHO) high TB burden country, the development and transmission of TB is poorly understood. In 2010 86% of incident cases in the national TB registry had only the "unknown" category documented as a known TB risk factor. We studied the sensitivity and specificity of key risk factors (alcohol and drug use, diabetic, migrant status, recently delivered mother, recent incarceration, and TB case contact) reported in the Kazakhstan National TB Registry managed by the Kazakhstan National Tuberculosis Program (NTP) in a high multidrug-resistant-TB (MDR-TB) burden province (Almaty oblast). Participants included 110 TB cases with newly detected pulmonary TB in 2012. Surveillance data were provided by the NTP. 110 (87%) of 126 incident TB cases registered during the study period (June 2012-January 2013) met study inclusion criteria. 110 (100%) were interviewed and relevant data was extracted from their matched record in the TB Registry. Based on the study design, incident cases were identified through the TB Registry, thus 110 (100%) of the TB cases were in the TB Registry. 91 (83%) of cases have risk factor listing in clinical record as "unknown". For documented risk factors, sensitivity ranged from 5% (legal migrant status) to 55% (diabetic), with 6 out of the 7 key risk factors having a sensitivity of less than 10%. The specificity of the TB Registry ranged from 86% (legal migrant status) to 100% (recent incarceration). The accurate and timely reporting of TB cases to a national surveillance system can be a crucial tool in combating TB and MDR-TB. Additional work to improve the quality of documentation in these reporting systems is necessary to accurately document and address the growing MDR-TB epidemic.

496-S/P

ROAD CONNECTIVITY AND CHILD MALNUTRITION: REMOTE ECUADORIAN VILLAGES HAVE LOWER ODDS OF STUNTING. Lopez, V., Dombecki, C., Trostle, J., Jaramillo, A, Cevallos, W., Goldstick, J., Eisenberg, J.N.S (University of Michigan)

Background: Nutritional trends towards both over and under nutrition are occurring globally throughout low and middle income countries. In northern coastal Ecuador the construction of a new road that created differential access, provided a unique opportunity to examine the impact of roads on nutrition. **Methods:** Anthropometric and hemoglobin measurements were collected on children < 5 years in Esmeraldas, Ecuador from 2004–2013 across 24 villages with differing road access. Logistic regression modeling using general estimating equations (GEE) assessed the relationship between village remoteness and prevalence of stunting, wasting, underweight, overweight, obesity, and anemia over time. Race, education, SES, and number of kids in a household were tested for their influence to mediate the remoteness-malnutrition relationship. **Results:** Overall prevalence of stunting was 13%, underweight 6%, wasting 5.7%, overweight 5.6%, obesity 1.9%, and anemia 55%. Stunting decreased and obesity increased over time while other nutritional outcomes remained stable. Remoteness was found to be significantly associated with stunting (OR=0.46, CI=0.31, 0.68) and anemia (OR = 0.53, CI=0.41, 0.68), adjusted for time. Over time, remoteness becomes less protective towards stunting (OR=0.36, CI=0.20, 0.66 early versus OR=0.57, CI=0.35, 0.94 late). Indigenous Chachi children were found to have a higher prevalence of all malnutrition outcomes compared to Afro-Ecuadorian and Mestizo children in the area. **Conclusions:** Over time a double burden of child malnutrition has occurred in the study site. This pattern is likely influenced by road construction in the area. Among rural areas, heterogeneous nutritional outcomes are observed; however, as road development continues, this heterogeneity diminishes and less remote villages show improvements in stunting outcomes. This suggests that relationship between roads and nutrition are complex and occur over multiple time scales.

497-S/P

TESTING PROXY MEASURES AND DOMAINS OF SATISFACTION: DOES HEALTH WORKER SATISFACTION CORRELATE WITH PERFORMANCE OR CLINICAL KNOWLEDGE IN RURAL GHANA? Emma Sacks, Soumya Alva, Sophia Magalona, Linda Vesel (Columbia University)

Background: A more satisfied and motivated work force is expected to have better retention rates, be more willing to serve in difficult areas, and provide better care to patients, but this assumption is rarely tested. **Methods:** This study employed a survey of health worker satisfaction and a clinical knowledge assessment focused on maternal, newborn and child health, both given to all rostered community health nurses working in five districts in Eastern Ghana (N=205). Data were analyzed in Stata (Version 13); statistical comparisons were done using the chi-square analysis or Fischer's exact test for the satisfaction and motivation analyses and the Kruskal-Wallis nonparametric test for the knowledge assessment scores. **Results:** Overall, health workers reported being satisfied in their positions and motivated to provide high-quality care to patients, although over 60% reported feeling that they were not satisfied with their pay. The median score on the knowledge assessment was 78.15%; however, subgroups did not perform differently by reported satisfaction. Results were stratified by district and by type of posting: either to a community health compound or health facility. CHNs working at compounds rated their work as more difficult and were more likely to report insufficient resources to do their jobs than their facility -posted counterparts (48% vs 36%). However, CHNs posted at health facilities were more likely to report insufficient opportunities for career advancement that the compound nurses (49% vs 33%).**Conclusions:** Improving health worker satisfaction and morale may be important for health worker retention and certain aspects of care, but may not have an influence on level of clinical care provided; satisfaction level was not associated with performance on the knowledge assessment. Community health nurses in Ghana were satisfied overall, but desire more training, better resources, more guidance and supervision, fair pay and opportunities for career advancement.

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TESTOSTERONE: RELEVANCE TO GLOBAL HEALTH. C. Mary Schooling*, Gabriel M Leung (School of Urban Public Health at Hunter College and City University of New York School of Public Health)

Following a rapid increase in the use of testosterone mainly by older men, regulators recently highlighted the lack of benefit and cardiovascular risk on testosterone, due to blood clots and arrhythmia, consistent with men having higher hemoglobin and hematocrit than women partially driven by testosterone. This insight about the potential role of testosterone in cardiovascular disease, supported by regulatory action and a plausible, modifiable mechanism, provides an exciting new avenue to address a major disparity in a leading cause of morbidity and mortality. Currently research interest is focused on a large scale trial to establish the risks of testosterone. We discuss the rationale for such a trial, the importance of balancing the need for information against the need to focus on topics with the greatest potential impact on public health and the imperative of moving forward when old paradigms have failed. We suggest that rather than a trial to establish cardiovascular risk, which might be hard to justify to the participants, focusing research effort on the overlooked role of testosterone in cardiovascular disease would be a better use of research resources. Greater awareness of the potential role of testosterone in cardiovascular disease has the potential to drive forward the understanding of a major disease, and more importantly to identify new means of prevention and treatment.

499-S/P

THE BURDEN OF DISEASE DUE TO PRETERM BIRTH COMPLICATION IN KOREA. Hyun Joo Kim*, Jin Yong Lee, Sang Jun Eun, Minsu Ock, Min-Woo Jo (Department of Public Health, the Graduate School of Konyang University, Daejeon, Korea)

Objectives The rate of premature birth (preterm birth within 37 gestational weeks) in Korea has been continuously increasing from 13.5% in 2008 to 15.7% in 2013. The reason might be due to the increase of maternal age and high-risk pregnancy. The complications of premature birth are major determinant of neonatal mortality and morbidities. In particular, the disabilities from preterm birth have long-term adverse effects on health. The purpose of this study was to estimate the burden of premature birth using Disability-Adjusted Life Years (DALY) in Korea. **Methods** DALY is consist of YLL (Year of Life Loss) and YLD (the Years Lost due to Disability). In this study, preterm birth complications refer 11 diseases including P010, P011, P07, P22, P25, P26, P27, P28, P52, P612 and P77 based on ICD-10 code. Using the National Health Insurance Data in 2012, YLL was calculated based on mortality data. In addition, YLD was yielded from the sum of the values which are multiplying prevalence and disability weight (DW) by each complication. DW was used the results from Korean Disability Weight Study for National Burden of Disease in Korea 2012/2015. **Results** The burden of premature birth in Korea is 43,988 DALYs (YLL: 43,730, YLD: 258). The burden of male (DALY: 24,149, YLL: 24.009, and YLD: 140) is higher than that of female (DALY: 19,839, YLL: 19,722, and YLD: 117).**Conclusions** This is the first attempt to calculate the burden of preterm birth complication in Korea. This result could be used as the essential data to evaluate the effects of policies in purposing to reduce preterm birth. Keywords: Premature birth, disability-adjusted life year, burden of disease.

500-S/P

THE EFFECTS OF REMOVING PRIMARY SCHOOL TUITION FEES ON DETERMINANTS OF FERTILITY: AN EVALUATION OF POLICY CHANGE IN 18 AFRICAN COUNTRIES. Alissa Koski*, Arijit Nandi (McGill University)

Education has long been associated with fertility. Women with more schooling marry later and have fewer, healthier children. Though these associations are persistent it remains unclear whether the relationship between schooling and fertility is causal. Many African countries eliminated primary school tuition fees in the 1990s in an effort to make education more accessible, particularly for girls. Dramatic increases in enrollment followed. Estimating the effects of these policy changes on proximate determinants of fertility allowed us to avoid endogeneity problems present in previous studies. We used data from Demographic and Health Surveys to assemble a panel of 670,000 women born between 1950 and 1999 in 18 African countries. These data were merged with longitudinal information on the timing of tuition fee removal in each country. We estimated the effect of fee removal on age at sexual debut, first marriage, and first birth using linear regression models. Fixed effects for country and year of birth were included to control for unobserved, time-invariant confounders that varied across countries and temporal trends in each of the outcomes shared across countries. We calculated robust standard errors to account for clustering by country. We found no evidence that the removal of tuition fees had an effect on any of the outcomes. The removal of primary school tuition fees was associated with average increases of 0.03 years in the age at sexual debut (95% CI -0.31, 0.37), 0.34 years in the age at first marriage (95% CI -0.32, 1.00) and a decrease of 0.01 year in the age at first birth (95% CI -0.63, 0.62). Estimates were robust to adjustment for household wealth and rural residence. Despite initial increases in enrollment, removing tuition fees may not have increased the duration or quality of schooling. Further work should address the effects of removing tuition fees on longer-term measures of educational attainment, learning, and health.

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THE INFLUENCE OF MATERNAL CHARACTERISTICS AND DIAGNOSES AND ACCESS TO HOSPITAL CARE ON BIRTH OUTCOMES IN INDONESIA. Michele Kiely*, Trisari Anggondowati, Ayman AE El-Mohandes (University of Nebraska Medical Center College of Public Health)

Stillbirth and early neonatal death are important indicators of obstetric and neonatal care. Indonesia has had a decline in infant, but not equaled in neonatal mortality. Socioeconomic and care barriers, as well as obstetric complications affect perinatal outcomes. This study investigated the impact of maternal characteristics, perinatal complications and access to care on birth outcomes among Indonesian-born singletons. We prospectively collected data on all singleton hospital births at 2 hospitals in East Java between 10/1/2009 and 3/15/2010. Reduced multivariate models were constructed to elucidate the relationship between maternal characteristics and birth outcomes. Referral from another facility significantly reduced the risk of low and very low birth weight (VLBW)(AOR=0.28, 95% CI=0.11-0.69, AOR=0.18, 95% CI=0.04-0.75, respectively), and neonatal death (AOR=0.2, 95% CI=0.05-0.81). Mothers being <20 years increased the risk of VLBW (AOR=6.39, 95% CI=1.82-22.35) and neonatal death (AOR=4.10, 95% CI=1.29-13.02). Malpresentation increased the risk of asphyxia (AOR=4.65, 95% CI=2.23-9.70) and perinatal death (AOR=3.89 95% CI=1.42-10.64). Postpartum hemorrhage increased the risk of neonatal (AOR=4.11 95% CI=1.03-16.39) and perinatal death (AOR=3.96 95% CI=1.41-11.15). Near-miss on admission increased the risk of neonatal (AOR=11.67, 95% CI=2.08-65.65) and perinatal death (AOR=13.08 95% CI=3.77-45.37).The importance of severity of maternal illness as a predictor for neonatal death and the protective effect that a referral from a health facility has over self-referral highlights the importance in engaging the mothers with the health care delivery system and upgrading the education of primary health care providers to protect mothers from arriving at the hospital with irreversible medical complications.

502-S/P

VALIDITY OF CAREGIVER-REPORTED STOOL CONSISTENCY AS A MEASURE OF DIARRHEA IN AMHARA, ETHIOPIA. Kristen Aiemjoy*, Sintayehu Gebresillasie, Zerihun Tadesse, Zhaoxia Zhou, Nicole E Stoller, Sun Y Cotter, Thomas M Lietman, Jeremy D Keenan (UCSF)

Background: Diarrhea is the second leading cause of death among children under 5 globally. Most studies of pediatric diarrhea rely on caregiver reports. The WHO's case definition of diarrhea, three or more loose or watery stools in a 24-hour period, is the most widely used. However, the terms "loose" or "watery" are difficult to standardize and are subjective to individual caregivers. **Methods:** The study population included children under 5 from 7 communities randomly selected for a 3-year water, sanitation and hygiene study in the Goncha Siso Enese district of Amhara, Ethiopia. In April 2014 a population census was performed; all 253 children under 5 were eligible to participate. Caregivers in these communities were asked to report stool consistency. Stool samples were collected and classified by the researcher as either "loose or watery" or "solid or formed." We used a logistic random-effects model to estimate sensitivity and specificity, accounting for clustering by village. **Results:** Caregivers of 214 (84.6%) children under 5 agreed to participate in the study. The point-prevalence of diarrhea based on any "loose or watery stool today" was 12.8%. The 24-hour hour prevalence of diarrhea base on the WHO definition ("three or more loose or watery stools") was 15.9%. Of the 162 children who returned stool samples, 8 were classified as loose or watery (4.9%) and 154 (95.1%) were classified as formed or solid. Using stool classification as the gold standard, the sensitivity of the terms "loose or watery" was 37.5% (95%CI: 8.52, 75.5) and the specificity was 88.7% (95%CI: 82.6, 93.3). **Conclusion:** The results indicate that caregiver reported diarrhea using the WHO standard terms "loose or watery" may not accurately describe actual stool consistency and in this case overestimated diarrhea prevalence. This error may introduce measurement bias to the epidemiologic studies that rely on caregiver reported diarrhea as an outcome.

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ASSESSING THE FEASIBILITY OF PROMOTING PHYSICAL ACTIVITY AMONG LOW INCOME LATINOS DIAGNOSED WITH DIABETES: THE PHYSICAL ACTIVITY SYSTEM OF SUPPORT (PASOS) PROGRAM. Sandra E. Echeverria*, Mariam Merced, Anindita Fahad, Leslie Malachi, Kerly Guerrero, Timothy Marshall (Rutgers School of Public Health)

Latinos are less likely to be physically active than their non-Latino White peers and have a disproportionate burden of Type II diabetes. They are also at increased risk of diabetes-related health complications and mortality. Randomized clinical trials have shown that increasing physical activity for patients with diabetes can improve glucose and lipid levels, insulin resistance, and weight reduction goals. Nonetheless, there is limited evidence on the effectiveness of physical activity interventions targeting underserved groups, particularly Latinos with low income and limited English proficiency who may face greater challenges in adopting physical activity behavior change. We developed the Physical Activity System of Support (PASOS) program, a community-based intervention designed to increase physical activity among Latinos living with diabetes. The intervention consisted of a culturally-tailored physical activity model involving group-based exercises offered twice per week over an 8 week period. We describe the collaborative process we undertook to develop the intervention and the multi-level nature of the intervention which incorporates healthcare and physical activity resources and the use of community outreach workers. A total of 30 participants were enrolled in the study and nearly all participants were poor, had limited English proficiency and had no or limited health insurance coverage. The feasibility of the design and implementation are analyzed descriptively using data maintained by program staff and the physical activity facility. Pre-post change in study outcomes (physical activity minutes completed per week, self-reported measures of physical activity engagement, VO2 max, heart rate, waist circumference, and blood pressure) will be performed using mixed models. Understanding the strengths and barriers to physical activity promotion among low income Latinos suffering from diabetes can aid in the design of future randomized trials targeting hard-to-reach groups.

511-S/P

A COMPARISON OF TWO METHODS FOR IDENTIFYING INAPPROPRIATE ER UTILIZATION IN THE SOONER HAN MEDICAID POPULATION. Juell Homco*, Hélène Carabin(Department of Medical Informatics, University of Oklahoma School of Community Medicine)

Introduction: Inappropriate emergency room (ER) utilization increases healthcare costs and diminishes the patient-centered medical home model. Identifying factors associated with inappropriate ER utilization are needed to reduce this burden. The objective of this analysis was to compare the results of two methods for identifying patients with unnecessary ER visits. **Methods:** Oklahoma claims data were used to assess avoidable visits among Sooner Health Access Network (Sooner HAN) Medicaid patients between July 1, 2013 and June 30, 2014. The Sooner HAN provides services, including care management, to over 100,000 Medicaid patients in Oklahoma. Using ICD-9 diagnosis codes, avoidable visits were defined using two methods: Method 1: the California Emergency Room Coalition definition and Method 2: the non-emergent (100% of the time) according to the New York University algorithm. Descriptive and kappa statistics were calculated to assess agreement between the two methods. **Results:** There were 27,701 ER visits made by 13,983 unique patients. The top five primary diagnoses, representing 14.5% of all visits, were acute respiratory infection (465.9), otitis media (382.9), fever (780.6), acute pharyngitis (462), and asthma with acute exacerbation (493.92). Overall, 18.5% of all visits were avoidable according to Method 1 and 3.8% according to Method 2. There were 3,958 and 868 unique patients with at least one avoidable visit according to Method 1 and Method 2, respectively. There was very poor agreement between the two methods (kappa: 0.03, CI: 0.02-0.04). Only 5.7% of avoidable visits identified in Method 1 were also deemed avoidable in Method 2. **Conclusion:** The methods used to identify avoidable utilization did not produce consistent results, suggesting misclassification error. Bayesian methods could be used in the future to adjust for this error and therefore provide more accurate estimates of ER overuse and its burden on society.

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ASSESSING THE GENERALIZABILITY OF A STATISTICAL NATURAL LANGUAGE PROCESSING MODEL FOR PNEUMONIA SURVEILLANCE. Christian M. Rochefort*, Aman D. Verma, Tewodros Eguale, David L. Buckeridge (McGill University)

Objective: Natural language processing (NLP) models are increasingly used for disease surveillance, but limited information is available on their generalizability. We examined the generalizability of a statistical NLP model for identifying pneumonia from electronic health record (EHR) data. **Methods:** We randomly sampled 4,000 narrative reports of chest radiological examinations performed at a university health network (UHN) in Quebec (Canada) between 2008 and 2012. We manually identified pneumonia within each report, which served as our reference standard. We used a nested cross-validation approach to train and validate a support vector machine (SVM) model predicting pneumonia. This model was then applied to a random sample of 2,281 narrative radiology reports from another UHN in Ontario (Canada), and accuracy was measured. The accuracy of the Quebec model, as applied to Ontario data, was compared to that of two alternative models: 1) a model retrained on Ontario data and; 2) a model trained and validated using all available data (pooled Quebec-Ontario model). **Results:** On manual review 640 (16.0%) and 303 (13.3%) reports were pneumonia-positive in Quebec and Ontario data, respectively. The SVM model predicting pneumonia on Quebec data achieved 83% sensitivity (95%CI: 78%-88%), 98% specificity (95%CI: 97%-99%) and 88% PPV (95%CI: 83%-94%). When applied to Ontario data, this model achieved 57% sensitivity (95%CI: 51%-63%), 99% specificity (95%CI: 98%-99%) and 86% PPV (95%CI: 80%-90%). In comparison, the model retrained on Ontario data achieved 76% sensitivity (95%CI: 70%-82%), 98% specificity (95%CI: 97%-99%) and 86% PPV (95%CI: 82%-91%), while the pooled Quebec-Ontario model performed worse than the Quebec model, but better that the Ontario one.**Conclusion:** A statistical NLP model predicting pneumonia has limited generalizability. Local retraining is required for improved performances.

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DETECTING ADVERSE EVENTS FROM ELECTRONIC HEALTH RECORDS DATA USING NATURAL LANGUAGE PROCESSING TECHNIQUES: PRELIMINARY RESULTS OF A VALIDATION STUDY. Christian M. Rochefort*, Aman D. Verma Tewodros Eguale, David L. Buckeridge (McGill University)

Objective: Adverse events (AEs) are associated with significant morbidity, mortality and cost in hospitalized patients. Measuring AEs is necessary for quality improvements but current detection methods are inaccurate. We determined the accuracy of a potential alternative, the natural language processing (NLP) of electronic health record data, for detecting three highly prevalent AEs: a) deep vein thrombosis (DVT), b) pulmonary embolism (PE) and, c) pneumonia.**Methods:** A validation study was conducted at a university health network in Montreal (Canada). We randomly sampled 6,000 narrative radiology reports performed between 2008 and 2012; 2,000 from patients who had a radiologic workup for DVT/PE, and 4,000 from patients who had a radiological imaging of the chest. We manually identified DVT, PE or pneumonia within each report, which served as our reference standard. Using a bag-of-words approach, we trained support vector machine (SVM) models predicting DVT, PE and pneumonia. SVM training and testing was performed with nested 10-fold cross-validation, and the average accuracy of each model was measured.**Results:** On manual review, 324 (16.2%) reports were DVT-positive, 154 (7.7%) were PE-positive and 640 (16.0%) were pneumonia-positive. On average, the SVM model predicting DVT achieved sensitivity of 0.80 (95%CI: 0.76-0.85), specificity of 0.98 (95%CI: 0.97-0.99) and positive predictive value (PPV) of 0.89 (95% CI: 0.85-0.93). The SVM model predicting PE achieved, on average, sensitivity of 0.79 (95%CI: 0.73-0.85), specificity of 0.99 (95%CI: 0.98-0.99), and PPV of 0.84 (95%CI: 0.75-0.92). The pneumonia model achieved, on average, sensitivity of 0.83 (95%CI: 0.78-0.88), specificity of 0.98 (95%CI: 0.97-0.99) and PPV of .88 (95%CI: 0.83-0.94).**Conclusion:** Statistical NLP can accurately identify DVT, PE and pneumonia from narrative radiology reports. The SVM models validated in this study could assist prevention and quality improvement efforts.

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NATURAL LANGUAGE PROCESSING (NLP) TECHNIQUES AND THE AUTOMATED DETECTION OF ADVERSE EVENTS: A CRITICAL REVIEW AND SYNTHESIS OF THE LITERATURE. Christian M. Rochefort*, Aman D. Verma, Tewodros Eguale, David L. Buckeridge (McGill University)

Objective: Natural language processing (NLP) techniques are increasingly used for the detection and the monitoring of adverse events (AEs) in acute care hospitals. The aim of this literature review was to critically assess the studies that examined the accuracy of these techniques. **Methods:** Eligible studies, published in any languages, were identified through an extensive search of the PubMed database (January 1990 – December 2014) using combinations of selected keywords, bibliographic reviews of the key articles retrieved, and the 'related articles' feature of PubMed. Studies were included if they: a) were conducted in an inpatient setting, b) described an NLP system for detecting AEs, and c) assessed the accuracy of this system in comparison with a reference standard. The methodological quality of each study was assessed using published criteria, but the diversity of the methods employed precluded the use of meta-analytic techniques. **Results:** A total of 87 articles were identified. Of these, 28 (32.2%) assessed the accuracy of NLP for detecting AEs; 22 (78.6%) studies used symbolic NLP and 6 (21.4%) used statistical NLP techniques. The accuracy of symbolic NLP systems varied widely, both within a given task (e.g. pneumonia detection) and across tasks. Their accuracy was influenced by: a) the grammatical characteristics of the narrative documents processed, b) the domain knowledge used to encode clinical findings into detection rules, and c) the degree of sophistication of the NLP system used (e.g., simple keywords search, negation and uncertainty detection, temporal relationships extraction). Few studies used statistical NLP, and none has directly compared the accuracy of symbolic and statistical classifiers on a given task. The methodological quality of the reviewed studies varied widely. **Conclusion:** NLP techniques promise improved accuracy for AE detection. However, their accuracy varies widely, thus limiting their widespread utilization in the inpatient settings.

515-S/P

EFFECTIVENESS OF HOME VISITS IN PREGNANCY AS A PUBLIC HEALTH MEASURE TO IMPROVE BIRTH OUTCOMES. Kayoko Ichikawa , Takeo Fujiwara (Kyoto University School of Public Health)

Background: Birth outcomes, such as preterm birth, low birth weight (LBW), and small for gestational age (SGA) are crucial for child development and health. **Purpose:** To evaluate whether home visits from public health nurses for high-risk pregnant women prevent adverse birth outcomes. **Methods:** In this quasi-experimental cohort study, high-risk pregnant women were defined as teenage girls, women who had a twin pregnancy, women who registered their pregnancy late, had a physical or mental illness, were of single marital status, non-Japanese women who were not fluent in Japanese, or elderly primiparas. All valid records were collected from women who registered their pregnancy in Kyoto city between 2011 and 2012 (N = 964). Of these women, 410 received the program (42.5%) and a further 622 women were selected based on the home-visit program propensity score -matched sample (pair of N= 311). Data were analyzed between January and June 2014. **Results:** In the propensity score-matched sample, women who received the program had lower odds of preterm birth (odds ratio [OR], 0.62; 95% confidence interval [CI], 0.39 to 0.98) and showed a 0.55-week difference in gestational age (95 % CI: 0.18 to 0.92) compared to the matched controlled sample. Although the program did not prevent LBW and SGA, children born to mothers who received the program showed an increase in birth weight by 107.8 g (95% CI: 27.0 to 188.5). **Conclusion:** Home visits by public health nurses for high-risk pregnant women in Japan might be effective in preventing preterm birth, but not intrauterine growth retardation.

516-S/P

EFFECTS OF CONTINUITY OF CARE ON HOSPITALIZATION FOR AMBULATORY CARE SENSITIVE CONDITIONS AMONG ELDERLY PATIENTS WITH SEVERE ASTHMA. Yu-Hsiang Kao*, Shiao-Chi Wu, Wei-Ting Lin, Chien-Hung Lee (National Yang-Ming University)

A high amount of medical expenses spending for annual health care in countries with insurance system is attributable to preventable hospitalizations. Preventable hospitalizations occur unduly in elderly patients, especially for older adults with chronic disorders. Although studies have linked higher continuity of care (COC) to less hospital utilization in other patient populations, preventable hospitalizations among older adults with severe asthma are not well understood. Ambulatory care sensitive conditions (ACSC) are the conditions for which hospital admission could be prevented by interventions in primary care. We conducted a cohort study to evaluate the effect of COC on hospitalization for ACSC among elderly asthmatic patients. A 2004-2010 retrospective cohort analysis for older adults with asthma was performed using population-based data obtained from the Taiwan National Health Insurance Research Database. A total of 30,372 elderly asthmatic patients with >=3 visits to clinics/hospitals were identified and followed-up. Multivariate logistic regression models were used to estimate the likelihood of ACSC among patients with varied COC levels. Adjusted for age, gender, living area, the number of ambulatory visit, admissions for respiratory system diseases within 1 year and the participation of pay-for-performance program, a higher level of physician COC was found to be related to a lower likelihood of hospitalization for asthma (P for trend <0.05). As compared to patients with low COC (COC<0.5), patients with high (COC=1) and moderate COC (0.5<=COC<1) had a 0.39- and 0.81-fold significantly lower likelihood of hospitalizations due to asthma, respectively. Our study offers findings to stress the importance of continuity of ambulatory care in elderly asthmatic patients.

517-S/P

ESTIMATING THE EFFECT OF HEALTH INSURANCE ON PERSONAL PRESCRIPTION DRUG IMPORTATION IN VARIOUS SUBPOPULATIONS USING COMPLEX SURVEY DATA AND MARGINAL STRUCTURAL MODELS. Andrew Zullo*, Chanelle Howe (Department of Epidemiology, School of Public Health, Brown University, Providence, RI, US)

Personal prescription drug importation occurs in the United States (U.S.) because of the high cost of U.S. medicines and lower cost of foreign equivalents. Importation carries a risk of exposure to counterfeit, adulterated, and substandard drugs. Inadequate health insurance may increase the risk of importation. This elevated risk may vary by subpopulation. Population-based complex survey data and inverse probability weighted (IPW) marginal structural models (MSMs) can be used to estimate the marginal effect of health insurance on importation and examine whether the estimated marginal effect varies across different subpopulations. Marginal effects are needed to conduct cost-effectiveness analyses. Here we use IPW MSMs and nationally representative cross-sectional data on 101,103 individuals from the 2011-2013 National Health Interview Survey to estimate the marginal association between no health insurance versus any and importation within U.S. subpopulations. Health insurance weights accounted for confounding bias related to various individual characteristics. Inverse probability and survey weighted MSMs were fit first without and then accounting for potential association modifiers including birth region, sex, race, transportation, and health-related technology use. In the weighted sample, 3.9% of individuals imported drugs. The marginal prevalence difference (PD) [95% Confidence Limits] for importing that did not account for potential modification was 0.017 [0.009, 0.025]. Accounting for potential modification indicated that the PD was heterogeneous solely by region of birth (P=0.04). Adults born in the Americas had the highest PD {0.039 [0.019, 0.059]} followed by adults born in Europe {0.027 [-0.030, 0.084]} and then Africa/Middle East/Asia {0.004 [-0.013, 0.022]}. Our study demonstrates that uninsured adults have an elevated prevalence of importation, particularly adults born in the Americas. Future analyses will examine the role of insurance by type.

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HEALTH AND CANCER AMONG OLD ORDER AMISH AND MENNONITES IN RURAL ONTARIO, CANADA. Dionne Gesink, Jane Leach, Kate McBride, Karen Bergin-Payette (University of Toronto)

Approximately 4,000 Old Order Mennonites and 5,000 Amish live in Ontario. This ethno-cultural group is less likely to be screened for cancer than similarly located communities. Our objective was to understand perceptions around cancer and health seeking practices of Old Order Amish and Mennonite in rural Ontario. In January 2014, 980 self-administered surveys were distributed to Old Order Amish and Mennonite households in and around Perth County, Ontario. By April 11, 2014, 399 completed surveys were returned for a response rate of 41%. Respondents were a balance of men (41%) and women (59%), Amish (52%) and Mennonite (48%). Respondents ranged in age from 20 to 88 years (average 43 years) and most were married (79%). We learned that health decisions are most often made together with a spouse (79% for men; 65% for women). Circulatory system conditions dominated individual health conditions (45% of respondents), followed by chronic diseases (10%), injuries (9%), mental health issues (8%), and cancer (7%). However, 56% of respondents had a family history of cancer mortality. The odds of being up-to-date with cancer screening was higher for men than women (OR: 3.12, 95% CI: 1.45-6.67). Over 70% of respondents stayed physically healthy by eating healthy, sleeping 8 hours, or taking supplements; and mentally healthy by praying, reading the bible, or visiting with family and friends. Respondents would talk with their spouse (55%) or family/friends (38%) about their mental health before an 'English' doctor (8%) or mental health worker/counselor (5%). Respondents accessed 'English' (87%), complimentary (52%), and alternative (44%) health care providers. Mental health increased as a health priority from third place for self (31%), to second place for family (41%), to first place for community (44%).

519-S/P

IS JOB SATISFACTION AMONG HEALTHCARE PROVIDERS ASSOCIATED WITH PROVISION OF KIND AND RESPECTFUL CARE? AN ANALYSIS OF RECENT BIRTHS IN 24 HEALTHCARE FACILITIES IN RURAL TANZANIA. Elysia Larson* (Harvard T. H. Chan School of Public Health)

Background: As patient-centered care moves to the forefront of discussions regarding healthcare quality, questions surrounding how to improve healthcare providers' attitudes and behaviors arise. There is limited literature demonstrating successful interventions to improve the provision of kind and respectful care. This analysis explores whether improved satisfaction with one's job is associated with higher patient perception of kindness. **Methods:** 107 healthcare providers in 24 primary health clinics in rural Tanzania participated in a job satisfaction survey from February-March 2014. Respondents were asked to rate their satisfaction with their job on a 4-level likert scale. Responses were averaged to create a single score for each clinic. Household surveys were conducted from February to March 2014 among women who delivered a child in one of the study clinics within one year prior to interview. Women were asked to rate the quality of healthcare providers' explanations and how respectfully they spoke to them. These were coded as excellent versus not excellent. Women were also asked if they experienced any disrespect or abuse during their visit. We used logistic regression with robust standard errors clustered at the health facility level to determine the association between job satisfaction and kind receipt of care.**Results:** 695 women participated in the survey. Women who delivered in facilities with healthcare providers reporting higher levels of job satisfaction were more likely to report a kind provider (β=0.41, p=0.001), more likely to report a provider who explained things well (β=0.44, p=0.002) and less likely to report disrespect or abuse (β= -0.08, p=0.023).**Discussion:** Healthcare providers who are satisfied with their jobs are more likely to provide kind and respectful care. Future interventions designed to improve healthcare provider's attitudes toward care should consider addressing barriers to providers' job satisfaction.

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DO MULTIDISCIPINARY PRIMARY CARE MODELS IMPROVE QUALITY OF CARE? ADHERENCE TO CLINICAL GUIDELINES FOR PATIENTS WITH THREE CHRONIC DISEASES IN QUEBEC'S FAMILY MEDICINE GROUPS (FMGS). Erin Strumpf*, Mamadou Diop, Pierre Tousignant, Sylvie Provost, Marie-Jo Ouimet, Roxane Borges da Silva, Julie Fiset-Laniel, Eric Latimer (Direction de santé publique de Montréal)

Quality of care for patients with chronic conditions is often assessed based on processes of care being consistent with clinical guidelines (use of indicated medications, visits with specialist providers). We estimated the effects of enrollment in a multidisciplinary primary care team practice on rates of guideline-consistent care among patients with diabetes, cardiac insufficiency, or chronic obstructive pulmonary disease (COPD). Compliance with the relevant guidelines for these diseases is measureable in administrative health data. Family Medicine Groups (FMGs) do not include pay-for-performance-style financial incentives to follow such guidelines, allowing us to isolate the effect of team-based organizational models. Using administrative health data from the Quebec public insurer, we built a longitudinal cohort of vulnerable patients. Our sample includes 224,450 patients with at least one of the three above chronic conditions, registered as vulnerable in or outside of FMGs. We constructed indicators of compliance with clinical guidelines specific to each disease, as well as variables that reflect the share of guidelines followed for each condition. FMG enrollment is voluntary so we address selection bias using propensity scores based on patients' pre-registration characteristics and health care utilization. We use multivariate difference-in-differences regressions to estimate the effects of FMGs. In the five years of follow up, both FMG and non-FMG patients are more likely to receive care consistent with clinical guidelines. However, we found no evidence of a beneficial effect of registration in an FMG on adherence to clinical guidelines. FMG patients increased rates of compliance with guideline-recommended prescription use by less than non-FMG patients. Increases in use of recommended specialist services increased by similar amounts for both groups. Registration with a family physician may lead to higher quality irrespective of the organizational model of care.

521-S/P

PREDICTORS OF "NO SHOWS" AT OMAHA VETERANS ADMINISTRATION PRIMARY CARE CLINICS. Elizabeth Boos*, Marvin Bittner, Michael Kramer (Emory University Rollins School of Public Health)

Background: Missed medical appointments ("no shows") affect both staff and other patients who are unable to make timely appointments. No shows can be prevented through interventions that target those most at risk to make appointments. Young age, low socioeconomic status, a history of missed appointments, psychosocial problems, and longer wait times are some predictors that have been previously found to be associated with higher no show rates. **Objective:** This study aimed to determine the potential risk factors for no shows in primary care clinics of the Veterans Affairs Nebraska-Western Iowa Health Care System (VA NWI HCS). **Design:** Age, sex, race, presence of a mental health diagnosis, previous no show rate in past two years, wait time, distance to clinic, and neighborhood deprivation index were obtained for 18,798 non-deceased patients who were seen at the Omaha, Nebraska primary care clinics between January 1, 2012 and December 31, 2013. Inclusion criteria was patients whose zip code was within the VA NWI HCS Service Area and who had non-cancelled appointments at the Omaha primary care clinics. **Results:** In unadjusted bivariate relationships, the strongest predictors of no shows were age between 20 and 39 (OR=3.73, 95% CI=3.45, 4.03) or between 40 and 59 (OR=2.45, 95% CI= 2.29, 2.61), black (OR=2.27, 95% CI=2.12, 2.44) or other non-white race (OR=1.38, 95% CI=1.23, 1.55), female sex (OR=1.25, 95% CI=1.14, 1.37), presence of mental health diagnosis (OR=1.38, 95% CI=1.30, 1.47), and previous no show rate in the past two years (OR=1.12, 95% CI=1.12, 1.12). **Conclusion:** These results show that individuals who are younger, non-white, female or have been diagnosed with mental health issues are more likely to no show. Interventions to improve compliance could be targeted at these individuals in order to decrease the burden of no shows on healthcare systems, such as the Veterans Health Administration.

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SOCIAL NETWORK ANALYSIS OF DUPLICATIVE PRESCRIPTIONS IN JAPAN. Yoshimitsu Takahashi*, Tatsuro Ishizaki, Takeo Nakayama, Ichiro Kawachi (Department of Health Informatics, Kyoto University School of Public Health, JAPAN)

[**Objectives]** Duplicative prescriptions refer to situations in which patients receive medications for the same condition from two or more sources. Health officials in Japan have previously expressed concern about medical "waste" resulting from this practice. We sought to conduct a descriptive analysis of duplicative prescriptions using social network analysis. [**Methods]** We analyzed a database of 1.23 million health insurance claims (Japan Medical Data Center Claims Data Base) from December 2012. Drugs were categorized according to the Anatomical Therapeutic Chemical (ATC) Classification. Through social network analysis, we examined the duplicative prescriptions networks for each class of drug, representing each medical facility as nodes, and individual prescriptions for patients as the connecting edges. [**Results]** Among all people, the frequency of each drug was correlated with the prevalence (r=0.90). Among patients aged 0-19, drugs for treating cough and colds (ATC code: R05) showed the highest prevalence of duplicative prescription, 10.8%. Among people aged 65 and over, antihypertensive drugs had the highest frequency of prescription, but the prevalence of duplicative prescriptions was very low (0.2-0.3%). Social network analysis revealed clusters of medical facilities connected via duplicative prescriptions. For example, psychotropic drugs (N05) showed clustering due to a few patients receiving drugs from three or more facilities. [**Conclusion]** Overall the prevalence of duplicative prescriptions was quite low -- less than 10% -- although the extent of the problem varied by drug class and patient age group. Our approach illustrates the potential utility of using social network approaches to understand duplicative prescription practices.

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SPATIAL DIFFERENCES IN QUALITY OF MATERNAL HEALTH SERVICE IN PRIMARY HEALTH CENTERS OF ENUGU STATE, NIGERIA. Edmund Ndudi Ossai*, BENJAMIN S.C. UZOCHUKWU (DEPARTMENT OF COMMUNITY MEDICINE UNIVERSITY OF NIGERIA TEACHING HOSPITAL ENUGU, NIGERIA)

Introduction: Nigeria has second largest burden of maternal death globally. Countries that achieved low maternal mortality rates paid attention to good quality care. Aim of study was to determine how adequate were the resources, (equipment and personnel), process, (client-provider interaction), and outcome components of quality of maternal health service in urban and rural primary health centers of Enugu state, Nigeria. **Methodology:** A cross-sectional analytical study design was used. A three stage sampling method was used to select 540 clients in18 of 440 health centers in the state. The clients were women who attended antenatal and postnatal care in the facilities. Outcome measure, is clients true satisfaction with maternal health service and was assessed by proportion of clients who were satisfied with antenatal, and postnatal care, and were ready to use the health centers again, and also willing to recommend them to others for same services. **Results:** None of the health centers had adequate equipment, and only 16.7% had adequate health manpower. On client provider interaction, 16.7% of health centers were adequate. On part of clients, 64.8% in urban were truly satisfied, as compared to 75.6% in rural. Predictors of clients true satisfaction included being client in urban, (AOR=0.6, 95% CI: 0.4- 0.9), client unmarried, (AOR=0.3, 95% CI: 0.1- 0.5), and being unemployed/housewife, (AOR=2.0, 95% CI: 1.0- 4.0). **Conclusion:** The structure and process components of quality of maternal health service in the health centers were deficient. More health workers should be employed, and more equipment supplied in-order to improve the quality of maternal health service in these facilities.

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URBAN-RURAL DISPARITIES ON CLIENTS KNOWLEDGE OF CAUSE AND PREVENTIVE MEASURE FOR CHILDHOOD IMMUNIZABLE DISEASES IN PRIMARY HEALTH CENTERS OF ENUGU STATE, NIGERIA. Edmund Ndudi Ossai*,AKINOLA AYOOLA FATIREGUN (DEPARTMENT OF COMMUNITY MEDICINE UNIVERSITY OF NIGERIA TEACHING HOSPITAL ENUGU, NIGERIA)

Background: Current priorities of health sector in Nigeria are in childhood immunization and HIV/AIDS prevention. This study was designed to determine Urban – Rural disparities on clients knowledge of cause and preventive measure for childhood immunizable diseases in primary health centers of Enugu State, Nigeria **Methods:** Using a cross-sectional analytical study design, a three stage sampling technique was used to select 800 clients who presented with their children/wards to 18 of 440 health centers for immunization services. The outcome measure of study is clients good knowledge of cause of childhood immunizable diseases and was determined by proportion of clients who knew the cause of four of eight childhood immunizable diseases in the national schedule. **Results:** Majority of clients were aware of the childhood iimmunizable diseases and their preventive measures. Knowledge of cause of tetanus was high, (urban, 75.3%; rural 71.3%), but low for poliomyelitis, (urban 0.5%;, rural 3.3%), and yellow fever, (urban, 5.0%; rural 5.5%). None of the clients knew the cause of measles. Comparable proportion of clients had good knowledge of cause of immunizable diseases, (urban, 23.8%; rural 27.5%). Predictor of good knowledge of cause of the diseases is having attained primary education, (AOR) =0.4, 95% CI: 0.2- 0.8). **Conclusion:** Clients perception of cause of childhood immunizable diseases is poor. There is need for adequate health education on the cause of these diseases as such good understanding may attach relevance to the immunization process and help to increase its coverage.

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UNNECESSARY HOSPITAL OUTPATIENT SERVICES UTILIZATION AMONG PATIENTS WITH 52 SIMPLE OR MINOR DISEASE GROUPS IN KOREA. Jin Yong Lee*, Min-Woo Jo, Hyun Joo Kim, Minsu Ock, Sang Jun Eun (Public Health Medical Service, Seoul National University Boramae Medical Center)

Objectives This study aims to estimate the volume of unnecessary hospital outpatient services utilization in Korea and quantify the total cost resulting from the inappropriate utilization **Methods** We used the 2011 National Inpatient Sample database published by the Health Insurance Review and Assessment Service in Korea (HIRA-NIS database), which is containing 29,837,213 sampled outpatient claims and each claim is designed to represent 100 claims. "Unnecessary hospital outpatient services utilization" was defined as following; in case of a claim, containing one of 52 simple or minor disease groups recommended to utilize local clinics by Korean government, and was estimated 0 score of the Charlson Comorbidity Index (CCI), and concurrently utilized the hospital outpatient service. **Results** Among patients who had one of 52 simple or minor disease groups with 0 score of CCI, approximately 15% of hospital outpatient services utilization was evaluated as unnecessary, which contains 162.9 million claims (tertiary hospital: 4.3, general hospital 9.5, hospital 10.9 million claims, respectively). Hospital outpatient visits due to gastritis and duodenitis were most common (8.5 million claims). The amount of inefficient healthcare expenditure due to unnecessary hospital utilization was estimated to 754.4 million USD (gastritis and duodenitis: 287.8, essential hypertension: 55.3, dyspepsia 25.1 million USD, respectively). If all the hospital outpatient visits were redirected to primary care clinics, Korean government could save 416.2 million USD as a total. **Conclusions** Our results showed that at least 15% of patients (who has simple or minor diseases and is enough to be handled at the level of primary care) unnecessarily utilized hospital outpatient service. This could be evidence that healthcare delivery system in Korea is seriously distorted. Therefore, Korean government should make an effort to reverse the flow of the patients with simple or minor diseases from hospitals to primary care.

530-S/P

A META-ANALYSIS OF THE ASSOCIATION BETWEEN HELICOBACTER PYLORI INFECTION AND RISK OF CORONARY HEART DISEASE: A META-ANALYSIS FROM PUBLISHED PROSPECTIVE STUDIES. Jing Sun*, Longjian Liu(Drexel University School of Public Health)

The association between helicobacter pylori (H. pylori) infection and coronary heart disease (CHD) has long been debated, and the results from previous meta-analysis are varied. A systematic review and meta-analysis was performed on studies published from January, 1992 to April, 2014. All studies included used data from prospective cohort studies of CHD events or CHD deaths. Random-effect models were applied in all estimations. H. pylori infection increased the risk of CHD events by 11% (17 studies, n= 20,864, risk ratio (RR) = 1.11, 95% confidence interval (CI): 1.02-1.20). This effect was greater for studies that had less than 5 years' follow-up time (RR=1.16, 95%CI: 1.02-1.31). However, this effect was not significant for studies that had follow-up times ≥ 10 years (n=5,750, RR=1.04, 95%CI: 0.9 -1.20). Neither Cag-A seropositive nor Cag-A seronegative strains of H. pylori was associated with a significantly increased risk of CHD events or deaths based on the current published data (in the comparison between Cag-A seropositive H. pylori and H. pylori negative, RR=1.09, 95%CI: 0.84-1.41; in the comparison between Cag-A seronegative H. pylori and H. pylori negative, RR=0.86, 95%CI: 0.68-1.10). In conclusion, H. pylori infection increased the risk of CHD events, especially in a patient's early life, but this association was weaker or might be masked by other CHD risk factors in long term observations.

531-S/P

BEYOND R0: STOCHASTIC EFFECTS, EPIDEMIC POTENTIAL AND LESSONS FROM THE EBOLA EPIDEMIC. Eric T. Lofgren*, Caitlin M. Rivers, Madhav V. Marathe, Bryan L. Lewis, Stephen G. Eubank (Network Dynamics and Simulation Science Lab, Virginia Bioinformatics Institute, Virginia Tech)

Before the current epidemic, Ebola was regarded as a disease causing small outbreaks, primarily in rural Africa. The current larger, urban-centered epidemic has prompted a research in what might be different about this particular virus, from the population level to the genetic makeup of the virus. One explanation is that nothing is different. Each outbreak of Ebola is one realization of an underlying stochastic process, one of an infinite number of potential Ebola outbreaks. It is possible that an epidemic being small and self-contained or large and necessitating large-scale response is due to chance, and the scope of the current epidemic is a combination of bad luck and a delayed response based on flawed assumptions about Ebola. The standard approach to assessing epidemic potential, the "Basic Reproductive Number" (R0), is an estimation of the number of secondary cases caused by a single infective case introduced to a susceptible population. Most often based on a deterministic model, this estimate ignores the role of chance. For many diseases predicted not to be able to be capable of causing an epidemic ($R0 < 1$), stochastic effects can produce fairly serious outbreaks before the disease dies out. Similarly, for many diseases that should cause epidemics ($R0 > 1$), a fair proportion of potential epidemics die out before causing a large number of cases. We suggest a simulation-based approach, which takes chance into account. By simulating many outbreaks and treating them as a cohort, we can consider the distribution of final epidemic sizes, or the survival curve of time until an epidemic ends, capturing the natural variability of the disease process. Using an agent-based model, we show that the possibility of Ebola being characterized as frequently small, short-lived outbreaks with rarer, larger outbreaks is supported without the need for differences in the biology of the virus or the structure of the population it spreads within.

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CONTRIBUTION OF INFLUENZA VIRUSES TO MEDICALLY-ATTENDED ACUTE RESPIRATORY ILLNESSES IN YOUNG CHILDREN: A SYSTEMATIC REVIEW AND META-ANALYSIS. Sarah A Buchan*, Travis S Hottes, Jeff C Kwong(Dalla Lana School of Public Health, University of Toronto)

Background The burden of disease in children attributable to influenza is difficult to quantify given the similarity of symptoms caused by infection due to influenza or other viruses. This uncertainty impacts both clinical decision-making and the estimation of the true burden of influenza. We aimed to systematically review the evidence to determine the proportion of healthy children presenting for healthcare services with an acute respiratory illness (ARI) who have laboratory-confirmed seasonal influenza. **Methods** & Findings We searched OVID MEDLINE, EMBASE, SCOPUS (from inception to 2014) and references of included articles. We included studies that used polymerase chain reaction methods to test for influenza infection in healthy children aged <5 years who presented with an ARI for healthcare services in high-income countries. Out of 3,474 citations, 141 were selected for full text review and 17 studies covering 12 different influenza seasons were included in the review and meta-analysis. A pooled proportion of influenza positivity was calculated overall to be 20% (95%CI 15-25), using the Inverse Variance Heterogeneity method in MetaXL. A Random Effects model was also used to compare positivity estimates obtained through different methods and was calculated to be 26% (95%CI 22-31) with a prediction interval of 8-49%. Subgroup analyses were performed by season, region, setting, age group, and vaccination status, given the considerable amount of heterogeneity (I2=91%). Children aged 2-5 years had significantly higher influenza positivity compared to children aged <2 years (34% vs. 16%), and those fully vaccinated appeared to be protected from contracting influenza compared to those unvaccinated. **Conclusions** This study is a first step in understanding what proportion of ARI is attributable to influenza virus infection in pediatric populations in high-income countries. However, more work is needed to understand the large amount of variability in this estimate.

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EXPLORING VARIABILITY IN RESULTS FROM NEGATIVE BINOMIAL MODELS FOR LYME DISEASE VIA MONTE CARLO SIMULATION. Phoebe Tran*, Lam Tran (Harvard School of Public Health)

Lyme disease has been studied extensively due to its increasing incidence rates in the United States. Various regression models including negative binomial regressions have been applied to link Lyme disease to diverse climate and/or landscape factors but there has been little focus on the variation that can exist in the results from those models with respect to changes in input data. This study used a Monte Carlo simulation to explore the variation in the outputs from a negative binomial model used to study Lyme disease in connection with various climate and landscape factors. The study area includes the thirteen states in the Northeastern United States with the Lyme disease incidence during the 2002-2006 period. The county-level Lyme disease incidence was linked with several previously identified key landscape and climatic variables in a negative binomial regression model for the study area. The Monte Carlo simulation was then run on the negative binomial model, which contained 62 climate and landscape fragmentation indicators. We discuss the variation in significance, magnitude and direction for the independent variables in the negative binomial model derived from the Monte Carlo simulation and offer plausible explanations as to what causes these variables to behave in such fashion.

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LENGTH OF STAY AN IMPORTANT MEDIATOR OF HOSPITAL-ACQUIRED METHICILLIN-RESISTANT STAPHYLOCOCCUS AUREUS. Joshua Wong*, Mark Chen, Win Mar Kyaw, Angela Chow (Department of Clinical Epidemiology, Tan Tock Seng Hospital, Singapore)

Background: Hospital-acquired Methicillin resistant Staphylococcus aureus (HA-MRSA) is a major cause of infection in hospitals and nursing homes, and is becoming increasingly established in Asian hospitals. The primary aim for the study was to decompose the risk factors for HA-MRSA based on conceptual pathways. The secondary aim was quantify the percentage of effect attributable to antibiotic exposure and length of stay (LOS) so that institutions can manage at-risk patients accordingly. **Methods:**The study population consisted of patients admitted to Tan Tock Seng Hospital, a tertiary hospital in Singapore between January and December 2006. Inclusion criteria included patients who were negative from MRSA blood culture in the previous 5 years presenting with clinical signs or symptoms of infection. 600 randomly selected MRSA infections were compared with 600 non-Staphylococcus aureus infections. Clinical data relating to the patient's admission were obtained via medical record review. HA- MRSA was defined as positive culture 2 days after admission and was used as the outcome of interest (n=337). Generalised structural equation model (GSEM) was used to address the presence of intermediate variables and take into account indirect effects. **Results:**The median age was 69 years, 56% of them being male. Length of stay (aOR:15 [8.7-25]), prior hospitalisation (aOR:6.2 [3.3-11]) , and cumulative antibiotic exposure (aOR:3.5 [2.3-5.3]) , directly affected HA-MRSA acquisition. LOS accounted for majority of the effects due to age (100%), male (22%), immunosuppression (67%) and surgery (96%). **Discussion:** Our model enabled us to account for intermediaries, which might not be feasible using traditional regression approaches. LOS was found to be an important mediator for MRSA infection. Hospitals should minimise the LOS of patients if possible to reduce the risk of MRSA. Outpatient follow-up will be ideal if patients' condition permit.

535-S/P

PREDICTORS OF SEASONAL INFLUENZA VACCINE UPTAKE AMONG PATIENTS AT DIFFERENT RISK OF INFLUENZA-RELATED COMPLICATIONS. Mushfiq Tarafder*, Hélène Carabin, Betsy Mead, Mary Feeney, Shubhra Shetty (The Commonwealth Medical College, Scranton, Pennsylvania)

Background: The aim of this study was to identify socio-behavioral factors and influenza (flu) vaccine-related perception associated with flu vaccine uptake among individuals who are HIV positive, at higher risk and low risk of flu complications. **Methods:** Eligible participants were recruited from Jun-Aug, 2012 from a primary care and an HIV clinic in Scranton, PA, for a 15-months follow-up study. Participants were categorized as high (n=154) or low risk (n=69) for flu complications based on CDC guidelines. HIV patients (n=120) were included in a separate group. A self-administered questionnaire was used to measure data on socio-demographic factors, health conditions, flu and flu vaccine-related perceptions at baseline. A follow-up questionnaire was administered from Jun-Aug, 2013 to collect flu vaccine information. Log-binomial regression models were used to identify factors associated with flu vaccine uptake. **Results:** Among the 103 HIV, 115 high risk, and 48 low risk follow-up participants, flu vaccination proportions were 91.1%, 69.5%, and 54.6%, respectively. After adjusting for sex, race and risk status, prior season flu vaccination was associated with a higher current season uptake (RR=2.48, 95% CI: 1.71, 3.59). After adjusting for sex and race, being asked by a physician to get vaccinated increased the uptake only among those at low risk (RR=2.41, CI: 1.12, 5.19). The risk group modified the association between perceived flu vaccine efficacy and vaccine uptake with the highest increase among low risk individuals (RR=3.2, CI: 1.58, 6.5) followed by high risk group (RR=1.34, CI: 1.03, 1.74) and HIV positive individuals (RR=1.07, CI: 1.03, 1.11). **Discussion:** Influenza complication risk status influences the effect of important predictors of flu vaccine uptake. Risk group-specific predictors should be taken into account while designing intervention programs aimed at increasing seasonal flu vaccine uptake.

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SEROLOGIC EVIDENCE FOR FECAL-ORAL TRANSMISSION OF H. PYLORI., David Bui*, Heidi E. Brown, Robin B. Harris, Eyal Oren (The University of Arizona Division of Epidemiology and Biostatistics)

Helicobacter pylori is one of the most prevalent infections in the world and a key cause of gastric diseases; however, its route of transmission remains unclear. This study aimed to assess the potential for fecal-oral transmission of H. pylori by leveraging its association with a disease with a known etiology. Utilizing serology data from a National Health and Nutrition Examination Survey (NHANES 1999; N = 6,347), a cross-sectional study was conducted to assess the association between H. pylori and hepatitis A virus (HAV), a sensitive indicator for fecal-oral exposure. Survey-weighted Kappa and multiple logistic regression analyses were used to quantify the association between H. pylori and HAV after controlling for potential confounders of age, sex, race, poverty, birthplace, crowding, smoking, and alcohol use. Concordant serology occurred among 67% of participants (survey-weighted $\kappa = 0.30$, 95% confidence interval: 0.26, 0.35). Unadjusted odds of H. pylori seropositivity was more than four times higher among HAV-positive participants than HAV-negative (odds ratio = 4.39, 95% confidence interval: 3.38, 5.68), and over two times higher after adjusting for confounders (odds ratio = 2.27, 95% confidence interval: 1.79, 2.87). Results from this study suggest H. pylori and HAV infections are strongly associated. Since HAV is primarily transmitted through the fecal-oral route, fecal-oral transmission may be an important pathway for H. pylori spread.

537-S/P

USE OF A MULTI-STRAIN SIR MODEL MAY ALLOW ADVANCE FORECASTING OF SEASONAL INFLUENZA EPIDEMICS. Michael L. Jackson* (Group Health Research Institute)

Advance forecasts of the intensity and dominant virus types/subtypes of seasonal influenza epidemics would help plan resource allocation and vaccine virus strain selection. Current forecasting approaches are generally limited by modeling influenza as a single virus and by only using a single season's worth of data. The author developed a multi-strain SIR-type model of influenza infection that simulates infection and immunity over multiple years. This compartmental model tracks the proportion of hosts currently susceptible to or infectious with each virus strain, modeled as A(H1N1) pdm09, A(H3N2), and B. Antigenic drift is modeled phenomenologically, by increasing the proportion of the population susceptible to the drifted virus. The model was fit to influenza surveillance data from western Washington State from September 2010 through August 2012. The model was then used to forecast the 2012/13 and 2013/14 influenza epidemics. Forecasts made using data as of 1 September 2012 were inaccurate for both years, due to the emergence of drifted A(H3N2) virus (A/Victoria/361/2011 -like) in 2012. As of 10 November 2012 it was clear that this was the dominant A(H3N2) strain in the United States. Forecasts assuming a drifted A (H3N2) virus as of 10 November 2012 predicted the season 2012/13 season would be dominated by A(H3N2). The model predicted 1307 (95% CI, 975 –1578) reported A(H3N2) cases, compared to 1498 observed, and a total of 1523 (95% CI, 1067–1966) reported cases, compared to 1720 observed. More importantly, forecasts made as of 10 November 2012 also accurately predicted that the 2013/14 influenza season would be dominated by A (H1N1), with 1288 predicted A(H1N1) cases (95% CI, 631-1626) and 1537 (95% CI, 696–2356) total cases, compared to the observed 1057 A(H1N1) and 1258 total cases. These results suggest that the multi-strain SIR model may be able to forecast the intensity and type/subtype distribution of influenza epidemics 12 months or more in advance.

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VALIDATION AND BAYESIAN CORRECTION OF MISCLASSIFICATION OF PERTUSSIS IN RETROSPECTIVE STUDIES. Neal D. Goldstein*, E. Claire Newbern, Loni P. Tabb, Jennifer Gutowski, Seth L. Welles (Department of Epidemiology and Biostatistics, Drexel University School of Public Health, Philadelphia, PA 19104, United States)

Background: Diagnosis of pertussis remains a challenge given its resemblance to other respiratory diseases, and consequently retrospective research that examine it as an outcome may be biased due to disease misclassification. This analysis quantified the amount of misclassification present and corrected for this misclassification via Bayesian adjustment to arrive at adjusted estimates of disease risk. **Methods:** Case control study of children in Philadelphia aged 3 months through 6 years, between 2001 and 2013. Vaccination status was operationalized as being up-to-date on pertussis antigen-containing vaccines, and the outcome was reported incident cases of pertussis. Measures of association are specified by the OR and 1-OR (vaccine effectiveness, VE) for being UTD and risk of pertussis. Bayesian misclassification adjustment techniques were used to correct for purported differential misclassification of pertussis by applying the 1997 and 2014 case definitions and reclassifying the cases. **Results:** Naïve VE was 45% (OR=0.55, 95% CI: 0.34-0.89). After correcting for misclassification VE was 54% (OR=0.46, 95% CrI: 0.27-0.76) using the 1997 pertussis case definition and 53% (OR=0.47, 95% CrI: 0.29-0.75) using the 2014 case definition, an improvement by 20%. For both case definitions, posterior sensitivity was on average 90% for being UTD and 83% for not being UTD. Compared to the averaged prior sensitivity of 78% for not being UTD, false negatives were detected. Posterior specificity was at least 94% for both UTD and not UTD for both case definitions, and essentially unchanged from the prior estimates indicating minimal false positives. **Conclusion:** We observed meaningful differential misclassification of pertussis that when corrected, strengthened the VE. This work can serve as a tool in public health surveillance for correcting case status if the original diagnostic criteria are available, or in their absence, to perform a sensitivity analysis via Bayesian simulation.

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WHY DON'T HEALTHCARE STAFF WASH THEIR HANDS?, Angela Chow*, Muhamad-Alif Ibrahim, Chengzi Chow, Bee-Fong Poh, Brenda Ang (Institute of Infectious Diseases & Epidemiology, Tan Tock Seng Hospital Singapore)

Hand hygiene (HH) prevents healthcare-associated infections, but compliance among healthcare staff is suboptimal. We evaluated healthcare staff's perceptions and attitudes toward HH, and explored psychosocial factors associated with HH compliance in routine patient care. We conducted a mixed-methods study in a 1500-bed tertiary-care hospital in Singapore in July 2013. Focus group discussions were conducted among purposively-sampled physicians, nurses, and allied health professionals (AHP), and data analyzed using the framework approach. Emerging themes were included in the subsequent hospital-wide cross-sectional survey. Principal components analysis was performed to derive the latent factor structure which was later applied in the multivariable logistic regression analyses. Staff acknowledged that HH was a critical component of patient care, but shared that heavy workloads and forgetfulness posed barriers to HH. Many perceived senior colleagues as role models for HH. Staff felt that gentle reminders and nudges from team members and "HH buddies" could enhance their HH compliance. Of 1066 staff, proportion who reported good HH compliance (>90% of the time) was: nurses 40.1%, AHPs 31.0%, physicians 22.8% ($p<0.01$). After adjusting for gender, staff category, years in profession, seniority, and history of dermatitis, having positive knowledge, attitudes, and behaviors toward HH (OR 1.44; 95%CI 1.22, 1.68), personal motivators and enablers (OR 1.61; 95%CI 1.39, 1.86) and emotional motivators (OR 1.62; 95%CI 1.40, 1.88) were positively associated with good HH compliance. Perceived barriers to HH (OR 0.83; 95%CI 0.72, 0.95) and need for external reminders (OR 0.76; 95%CI 0.66, 0.87) were negatively associated with good HH compliance. Healthcare staff recognize the importance of HH, but face practical barriers that reduce compliance. Role modelling by senior staff, external reminders, and nudges by team members, could enhance HH compliance and should be actively promoted.

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EPIDEMIOLOGY AND RISK FACTORS FOR CO-COLONIZATION OF MULTIDRUG-RESISTANT ORGANISMS. Angela Chow*, Hanley Ho, Nwe-Ni Win, Jia-Wei Lim, Pei-Yun Hon, David Lye, Kalisvar Marimuthu, Brenda Ang (Institute of Infectious Diseases & Epidemiology, Tan Tock Seng Hospital Singapore)

Antimicrobial resistance is a growing clinical problem worldwide. Prevalence of methicillin-resistant Staphylococcus aureus (MRSA), vancomycin-resistant Enterococcus (VRE), and carbapenem-resistant Enterobacteriaceae (CRE) are increasing in acute hospitals. Co-colonization by these organisms can result in higher morbidity, but risk factors for co-colonization are poorly understood. We evaluated epidemiologic factors associated with co-colonization of MRSA, VRE, and CRE in an acute hospital. We conducted a cross-sectional study at a 1500-bed tertiary-care hospital in Singapore, June 12 thro' July 9, 2014. Patients with >48 hours' hospital stay were screened for MRSA via nasal, axillary, and groin swabs, and for VRE and CRE via rectal swabs/stool. Epidemiologic data were collected and associations with MRSA, VRE, and CRE co-colonization compared. We estimated ORs and 95% CIs for each association. To control for potential confounding, multivariable logistic regression models were constructed. Of 992 patients screened, 41 (4.1%) were co-colonized with MRSA and VRE, of whom 2 were also co-colonized with CRE. 4 were co-colonized with VRE and CRE. Sub-acute (5.0%) and acute (4.1%) wards had more patients with MRSA-VRE co-colonization than intensive care units (1.9%). After adjusting for age and care unit type, male gender (OR 2.2; 95%CI 1.1, 4.4), prior admission within 1 year (OR 2.8; 95%CI 1.3, 5.8), and >7 days of hospital stay (OR 6.7; 95%CI 2.0, 22.2) were positively associated with MRSA-VRE co-colonization. The same factors were not found to be associated with MRSA-CRE and VRE-CRE co-colonization. MRSA-VRE co-colonization appears to be related to exposure to hospital environments, with patients having prior admissions and >7 days of hospital stay being at higher risk. Appropriate precautions should be instituted to prevent co-colonization. Further studies are needed to better understand the risks for CRE colonization and CRE co-colonization with MRSA and VRE.

550-S/P

DISAGGREGATING RELATIONSHIPS BETWEEN OFF-PREMISE ALCOHOL OUTLETS AND TRAUMA. Christopher Morrison*, Karen Smith, Paul J. Gruenewald, William R. Ponicki, Peter Cameron (Monash University)

Traumatic injuries occur more frequently in areas with greater overall densities of off-premise alcohol outlets. However, not all outlets are created equal. Due to economies of scale, chains and larger outlets sell greater volumes of alcohol at reduced prices, potentially leading to greater alcohol consumption and greater incidence of trauma in surrounding areas. Conventional outlet density metrics cannot assess such relationships. In this study, two unobtrusive observers attended all 295 off-premise outlets within 2119 randomly selected SA1 census regions of Melbourne, Australia (mean population = 392.4; SD = 195.7), assessing alcohol volume (paces of alcohol-shelves; inter-observer reliability: r = 0.928) and price (cheapest 750ml bottle of wine; r = 0.973). Outlet type (chain Vs. independent) was based on licencee name. Multilevel Bayesian conditional autoregressive Poisson models predicted three-year cross-sectional counts of non-fatal ambulance-attended intentional injuries (assault, stabbing, shooting) and unintentional injuries (fall, crush, object strike). Independent variables were local and lagged off-premise outlet characteristics (mean volume, chain density, independent outlet density), on-premise outlet density (bars, restaurants), and areal characteristics (population density, median age, median income, retail zoning). We could not include price in the spatial model, as logged price was correlated with logged volume (r = -0.52) and chains (r = -0.48) within outlets. Linearly extrapolating model estimates, each additional chain was associated with 0.28 additional intentional injuries and 1.28 additional unintentional injuries per year. Relationships for alcohol volume and independent outlet density were not supported. Outlets are differentially associated with trauma incidence. Future research should attempt to establish causation and clarify the mechanisms by which some outlets, particularly chains or cheaper outlets, might contribute to greater risk.

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EPIDEMIOLOGY OF HIGH SCHOOL CHEERLEADING CONCUSSIONS IN THE UNITED STATES, 2009/10-2013/14. Dustin W. Currie*, R. Dawn Comstock (Department of Epidemiology, Colorado School of Public Health)

Background: Approximately 400,000 students participate in US high school cheerleading annually including 116,508 involved in competitive spirit squads. A relatively new high school sanctioned sport, competitive spirit has increased the skill difficulty and athleticism required of today's high school cheerleaders, renewing safety concerns. Concussions are a particular concern. **Methods:** We describe cheerleading concussion epidemiology using 2009/10-2013/14 data from a national sports injury surveillance system (High School RIO). **Results:** Concussions represented the most common cheerleading injury (31.1% of all injuries). Of the 22 sports in High School RIO, cheerleading had the 11th highest concussion rate overall but the 3rd highest practice concussion rate. Overall 245 concussions were reported in 1,109,489 athlete-exposures (AEs); a concussion rate of 2.2 per 10,000 AEs. Unlike most other sports where competition concussion rates are much higher than practice concussion rates, in cheerleading concussion rates in practice (2.5) and competition (2.4) were similar (RR: 1.06 95% CI: 0.67, 1.77). Most concussions resulted from athlete-athlete contact (59.1%) or contact with the ground (38.4%). Common activities at time of injury included stunts (69.0%), pyramids (15.7%) and tumbling (9.1%). Most stunt (60.5%) and pyramid (79.0%) concussions resulted from athlete-athlete contact, while most tumbling concussions (81.8%) resulted from contact with the ground. Most athletes returned to play in <3 weeks (74.1%), with 13.4% returning to play in <1 week. **Discussion:** While concussion remains a safety concern among cheerleaders, overall rates are lower than in many other sports (girls' soccer, basketball, lacrosse, and field hockey included). Concussion rates are similar in practice and competition, making cheerleading a unique high school sport. A detailed knowledge of patterns of concussion in cheerleading is needed to drive evidence-based prevention efforts.

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GENDER DIFFERENCES IN HIGH SCHOOL AND COLLEGIATE SOCCER, BASKETBALL, BASEBALL AND SOFTBALL ATHLETES' INJURY RECOVER TIME. Melanie Ewald*, Sarah Fields, Dawn Comstock (Colorado School of Public Health, Department of Epidemiology)

Background: In 2013/2014 an estimated 7 million youth participated in high school sports and an estimated 470,000 young adults participated in collegiate sports. Our aim was to investigate gender differences in injury recovery time among high school and collegiate soccer, basketball, softball and baseball athletes. **Materials and Methods:** High school injury data from 2005/06 - 2013/2014 was collected from the National High School Sports Related Injury Surveillance System. Collegiate injury data from 2005/2006 - 2008/09 was collected from the NCAA Injury Surveillance Program. **Results:** High School: Female soccer (OR= 1.28 [95% CI 1.01, 1.56] P=.002) and basketball (OR=1.24 [95% CI 1.07, 1.45] P=.005) players were more likely to be held out of play for ≥22 days than males. Female soccer (OR=1.29 [95% CI 1.06, 1.56] P=.011) and basketball (OR=1.47 [95% CI 1.18, 1.84] P=.0006) players were more likely to be medically disqualified for the season or for their career compared to males. Collegiate: Female soccer (OR=1.3 [95% CI 1.11, 1.53] P=.0013) and basketball (OR=1.5 [95% CI 1.27, 1.78] P<.0001) players were more likely to be held out of play ≥22 days than males. Female basketball players were more likely than males to be medically disqualified for the season or their career (OR=1.85 [95% CI 1.50, 2.28] P<.0001). Female softball players were less likely than male baseball players to lose ≥22 days (OR=0.70 [95% CI 0.57, 0.87] P=.0012) or to be medically disqualified for the season or their career (OR=.058 [95% CI 0.45, 0.75] P<.0001). **Discussion:** Female soccer and basketball athletes have longer injury recovery times than males at both the high school and collegiate levels. Collegiate female softball athletes had shorter recovery times than male baseball athletes although this trend was not seen in high school athletes. Further research is needed to determine why injury recovery times differ by gender across these sports.

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HIGH SCHOOL AND COLLEGIATE SOCCER, BASKETBALL, AND BASEBALL/SOFTBALL ATHLETES' INJURY RECOVERY TIME DIFFERENCES. Melanie Ewald*, Sarah Fields, Dawn Comstock (Colorado School of Public Health, Department of Epidemiology)

Background: During the 2013/2014 school year an estimated 7 million youth participated in high school sports and an estimated 470,000 young adults participated in collegiate sports. Few researchers have compared differences between these two age groups. The aim of this study was to examine age differences in recovery time between high school and collegiate soccer, basketball, and softball/baseball athletes. **Methods:** High school injury data from 2005/06 through 2013/2014 was collected from the National High School Sports Related Injury Surveillance System. Collegiate injury data from 2005/2006 through 2008/09 was collected from the NCAA Injury Surveillance Program. **Results:** Collegiate soccer athletes were more likely to return to play in ≥22 days (OR= 1.40 [95% CI: 1.19, 1.64] P<0.0001) compared to high school soccer athletes. Collegiate baseball/softball players were more likely to return in ≥22 days (OR=1.94 [95% CI: 1.57, 2.40] P<0.0001) or be medically disqualified for the season or for their career (OR= 1.63 [95% CI: 1.29, 2.08) P<0.0001) compared to high school athletes. There were no significant age differences in recovery times in basketball. **Discussion:** Collegiate athletes playing soccer and baseball/softball had significantly longer injury recovery times than their high school counterparts but basketball players had similar injury recovery times across age groups. Understanding why there were age group differences in injury recovery times in some sports and not others requires additional research.

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INDIVIDUAL- AND COMMUNITY-LEVEL PREDICTORS OF MEDICALLY-ATTENDED UNINTENTIONAL INJURY IN A HIGH RISK POPULATION. Katherine Bowers*, Alonzo T. Folger Judith Dexheimer, Ting Sa, Robert T. Ammerman, Judith B. Van Ginkel (Cincinnati Children's Hospital Medical Center)

Medically-attended unintentional injury (UI) occurs at an annual rate of 11-12% among children 0-5 years in the U.S. There is evidence that suggests UI is associated with risk factors operating at both the family (e.g., mother-child dyads) and community levels. Our objective was to understand individual- and community-level risk factors that have the greatest influence on UI in the first 3 years of life in a high risk, home visited (HV), population. Methods: Analyses were conducted within Every Child Succeeds (ECS), a HV service program in Greater Cincinnati, Ohio. ECS conducts home hazard assessments and delivers a curriculum with components of child safety and development. UI were identified from the Hamilton County Injury Surveillance System (HCISS), a population-based registry that contains injury data from all emergency departments in Hamilton County. T-tests and chi-square tests were used to determine differences in baseline characteristics of children with and without UI. A proportional hazards model (with and without random effects) was used to determine the association of individual and community level variables with UI, while controlling for covariates. Results Among n=2,023 participants followed for 3 years, late initiation of prenatal care was inversely associated with UI in the first 3 years (hazard ratio (HR) =0.77, p=0.006). In addition, gestational age was positively associated (HR=1.07, p=0.001). Neither community-level risk factors (eg. neighborhood violence, percent poverty) nor maternal mental health status in pregnancy, including depression, interpersonal support and family stress, were significantly associated with UI. Conclusions Findings suggest an inverse association between inadequate prenatal care and medically-attended UI, which may be a proxy for health care utilization

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INFLAMMATORY MARKERS AND RISK OF FALLS IN OLDER CAUCASIAN WOMEN: RESULTS FROM THE STUDY OF OSTEOPOROTIC FRACTURES. Ahmed M. Kassem*, Robert M. Boudreau, Lily Lui, Kristine Yaffe, Kamil E. Barbour, Peggy Cawthon, Katie Stone, Lisa Fredman, Kristine E. Ensrud, Jane A. Cauley(University of Pittsburgh)

Background: Falls are the leading cause of injury in older adults. Previous studies examined the association between inflammatory markers and poor physical function, a major risk factor for falls. We examined the direct relationship between inflammatory markers and incident falls, and the influence of physical function on this relationship. **Methods:** We included 1,128 older Caucasian women (mean age = 80.02, SD ± 4.11 years) who were followed on average for 10 years. We constructed a baseline inflammatory burden [IB] score (range = 0-4) that summed the highest quartile of 4 pro-inflammatory cytokines (interleukin-6 [IL-6], IL-6 soluble receptor, tumor necrosis factor alpha soluble receptor-1 [TNFα-SRI], TNFα-SRII). We assessed falls prospectively by questionnaire every 4 months for 10 years and defined the outcome as ≥2 falls/year, modeled annually via negative binomial regression with generalized estimating equations. Physical function was measured by gait speed, chair stands and grip strength at baseline and at 3 subsequent visits. **Results:** At baseline, 367 (33%) women had 1 cytokine in the highest quartile and 319 (28%) women had 2 or more. Women with high IB scores were more likely to be older, have poor physical function, more chronic medical conditions and higher BMI compared to those with lower IB scores. Compared to those with IB score of 0 at baseline, women with the highest IB scores (2-4) had higher incidence of 2 or more falls per year (age-adjusted incidence rate ratio [IRR] = 1.25, 95% CI 1.02, 1.54); however, this association was attenuated and lost significance after adjusting for physical function and potential confounders (multivariable-adjusted IRR = 0.98, 95% CI 0.79, 1.23). IL-6 and TNFα-SRII showed stronger association with incidence of falls than other cytokines. **Conclusion:** In older women, the association between pro-inflammatory cytokines and incident falls does not appear to be independent and may be explained by poor physical function.

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INJURIES AMONG EMPLOYEES OF A LARGE PEDIATRIC HOSPITAL. Maurizio Macaluso*, Nancy Daraiseh, Yanhong Liu(Cincinnati Children's Hospital Medical Center)

Surveillance and research have focused on the prevention of needle-stick and musculoskeletal injuries among health care workers, but little work has described the occurrence of all injuries in specific job groups and work areas. Work in pediatric hospitals has not been the object of much research, although most facilities conduct surveillance and report serious injuries to the Occupational Safety and Health Administration (OSHA). We evaluated all self-reported and OSHA-reportable injuries among employees of a large pediatric hospital during 2007-2011, and studied incidence rates by job group, work area and calendar year. The workforce of this 600-bed pediatric hospital was 9,271 in 2007 and increased to 12,964 in 2011. A total of 4,908 injuries were reported during 2007-2011, 1,151 (23.5%) of which reported to OSHA. The rate of all injuries was 7.8 per 100 employees in 2007 (95% CI: 7.2-8.4), and increased to 9.9 (9.3-10.4) in 2011. The OSHA-reportable injury rate was 2.1 (1.8-2.4) in 2007, remained above 2 through 2010, and dropped to 1.6 (1.4-1.8) in 2011. All-injury rates varied across work areas, and were highest in psychiatric units (49.1, 46.0-52.4), perioperative services (14.5, 12.9-16.4), and in the emergency department (13.6, 11.9-15.6). Job groups also varied, with the highest all-injury rates among technical jobs (17.5, 16.4-18.6), service jobs (16.4, 15.4-17.5) clinical fellows (10, 7.4 -13.2) and nurses (9.9, 9.4-10.5). OSHA-reportable injury rates showed similar variation. Risk varied considerably within the same job groups according to the work area of assignment. The increasing trend in self-reported injuries may be due to institutional campaigns promoting safety awareness, which may also have contributed to the declining rate of severe (OSHA-reportable) injuries. The data, however, indicate that more progress needs to be made in reducing injury risk in select areas of the hospital.

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INTERACTION EFFECT OF ALCOHOL AND MARIJUANA ON FATAL CRASH INITIATION: A PAIR-MATCHED CASE-CONTROL STUDY. Guohua Li*, Joanne E. Brady (Columbia University)

Drugged driving is a serious safety concern and marijuana is the most commonly used non-alcohol drug in drivers. Epidemiologic studies indicate that marijuana use approximately doubles the risk of crash involvement. Little is known about the role of concurrent use of alcohol and marijuana in crash causation. Using a pair-matched case-control design and data for 14,117 fatal two-vehicle crashes recorded by the Fatality Analysis Reporting System during 1993-2012, we assessed the individual and joint effects of alcohol and marijuana on crash initiation as determined by driving error precipitating the crash, such as failure to stay in lane or yield right of way. Cases (n=14,117) were drivers whose errors initiated the crashes and controls (n=14,117) were drivers who were involved in the same crashes as the cases but did not initiate the crashes. Conditional logistic regression modeling revealed that compared to drivers who tested negative for both alcohol and marijuana, the estimated odds ratios (OR) of crash initiation were 1.80 [95% confidence interval (CI) 1.61 − 2.02] for those testing positive for marijuana and negative for alcohol, 4.96 (95% CI 4.54 − 5.41) for those testing positive for alcohol and negative for marijuana, and 5.15 (95% CI 4.03 − 6.22) for those testing positive for both alcohol and marijuana. The results indicate that alcohol and marijuana may each play an important role in crash initiation. When used in combination, alcohol and marijuana do not seem to have a significant positive interaction effect on crash initiation.

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LATE EMERGING CARDIOVASCULAR AND RESPIRATORY DISEASE ASSOCIATED WITH WTC EXPOSURES ON SEPTEMBER 11, 2001 MEDIATED BY POST TRAUMATIC STRESS DISORDER. Robert M. Brackbill*, Howard Alper, Shengchao Yu, Steven D Stellman (New York City Department of Heatlh and Mental Hygiene)

Adverse physical and mental health have consistently been associated with exposure to the World Trade Center disaster on 9/11/2001. This study evaluates the association of WTC exposures on cardiovascular and respiratory outcomes up to 11 years after 9/11/2001 WTC attacks and if 9/11 PTSD serves as a mediator in this relationship. Methods. We studied 13,344 World Trade Center Health Registry (WTCHR) enrollees who were south of Chambers Street in Manhattan on the morning of 9/11/2001, and who had completed 3 Registry health surveys spanning 2003 to 2012. M-plus path analysis was used to model the direct and indirect associations between injury severity (measured by number of injuries) and intense dust cloud with (1) angina or heart attacks and 2) respiratory diseases, primarily asthma or chronic bronchitis, or emphysema, all with a self-reported year of diagnosis from 2008-2012. The mediating variable was PTSD check list score measured once for each case between 2006-2007. Results. Increased number of injuries was directly associated with heart disease (OR=1.23 per injury, p=0.046), and intense dust cloud exposure vs some/none was directly associated with respiratory disease (OR=1.41, p<0.001). There was a significant indirect association for both exposures with both heart and respiratory diseases, mediated by PTSD. Conclusion. Major WTC disaster exposures such as being injured and/or enveloped by the intense dust cloud were associated with physical disease 10 to 11 years post event. Although 9/11-related PTSD can serve as a pathway for WTC exposures and adverse physical health, there were also significant direct links between severity of injury with heart disease, and dust cloud with respiratory disease independent of PTSD.

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MOVING VIOLATIONS AND RISK OF MOTOR VEHICLE CRASH FOR OLDER ADULTS: A CASE-CROSSOVER STUDY. Jonathan Davis*, Carri Casteel, Cara Hamann, Corinne Peek-Asa(University of Iowa, Iowa City, IA United States)

Background: After the age of 65 the number of motor vehicle crashes per mile driven increases throughout older age. Traffic citations for moving violations can help identify drivers who are at a higher risk of having a crash. This relationship is confounded by personal characteristics that lead to both unsafe driving and receiving a citation. The time stratified case-crossover method provides a way for controlling for these difficult to measure variables. **Methods:** Iowa Department of Transpiration crash data from 2011-2012 were linked with Iowa Department of Corrections data for moving violations that occurred from 2009-2012 for drivers over the age of 65. A time stratified case-crossover design was used matching on time periods one year apart. Case exposure was defined as having a moving violation citation 30 days before the crash. Control exposure was the same 30 day time period 1 year before the crash for each individual. Conditional logistic regression was used to analyze the self-matched pairs. Additional time periods of 60 and 90 days were also assessed. **Results:** Between 2011 and 2012, there were 14,338 adults over the age of 65 who experienced a crash in Iowa. Of those with a crash, 3,629 subjects also received a citation during 2009-2012. Relative to the control time period, experiencing a moving violation in the 30 day time period before the crash increased the odds of a crash by 22.4% (OR = 1.224; 95% CI: 0.938 – 1.599). The risk was less pronounced for longer periods before the crash date (60 day OR = 1.116; 95% CI: 0.921-1.352 and 90 day OR = 1.083; 95% CI: 0.916 – 1.281). **Conclusions:** A moving violation for an adult over the age of 65 indicates an increased risk of experiencing a crash. The risk of experiencing a crash decreases with the more time that passes after receiving a moving violation.

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OPIATE USE AND FATAL CRASH INVOLVEMENT: A CASE-CONTROL STUDY. Alexander Mizenko* (Columbia Mailman School of Public Health)

Background: Opioids are a class of drugs that includes hydrocodone, codeine, morphine, heroin, and oxycodone (National Institute of Drug Abuse, 2014). Opioid use has more than doubled between 1997 and 2007 (Manchikanti, 2010). Because drowsiness is a common side effect, driving under the influence of opioids is a compelling safety concern (Schisler et al, 2005). Opioid use has been associated with increased crash risk in previous literature (Hetland and Carr, 2014). It has been at times difficult to verify these findings (Leung, 2011). One study that measured driving errors in opioid users compared to control subjects using video showed no differences in the rate of driving errors between the two groups (Byas-Smith, 2005). Therefore, further research is needed to assess this relationship. The premise of this study was to clear this uncertainty. **Methods:** The data was analyzed using a case-control study design. Subjects from the 2007 National Roadside Survey (NRS) were controls and subjects from the 2006-2008 Fatal Accident Reporting System (FARS) were used as cases. The outcome of interest is involvement in a fatal crash or "case" status. The main independent variable was opioid use. Logistic regression was used to assess whether a relationship existed and if it might be influenced by covariates such as age and gender. **Results:** Opioid use was associated with significantly increased odds of fatal crash involvement (OR: 3.1; 95% CI: (2.09, 4.52)). The odds were even higher among those who used both an opioid and a cannabinoid (OR: 6.72; 95% CI: (3.14, 13.99)). Although the relationship existed regardless of sex, the magnitude of the relationship was much stronger among females. **Conclusions:** The relationship between opioid use and fatal crash involvement is troubling given the fact the opioid use is on the rise. The even further increased risk posed by mixing opiates and cannabis poses an especially challenging public health problem as legal cannabis proliferates in the United States.

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ROLE OF ALCOHOL AND REPEAT TRAUMA: RECIDIVISM VARIES BY BAC AND INJURY CAUSE. Christina Greene*, Gordon Smith, Bethany Strong, Jamila Torain (Department of Epidemiology & Public Health, University of Maryland Baltimore School of Medicine, Baltimore, Maryland, USA)

Introduction: Past studies indicate that alcohol is associated with repeat trauma but little is known regarding how blood alcohol content (BAC) affects recidivism across different injury causes. **Methods:** Initial injury admission information was abstracted for adult patients tested for BAC and discharged alive at an urban trauma center from 1997-2008. Patients were identified as recidivists if they had a subsequent new trauma admission. Recidivists and single admissions were compared with respect to BAC levels, injury cause, Injury Severity Score (ISS), race, age, and sex using chi -squared test. Multivariable logistic regression was used to estimate Adjusted ORs and 95% CIs. **Results:** Of 47, 257 first admissions analyzed, 3.8% resulted in repeat admissions. Admission BAC of > 80mg/dL on first admission was associated with higher overall repeat trauma (OR 1.6 [1.4- 1.8]) compared to zero BAC after adjusting for age, race, sex, ISS, and injury cause. In examining the effect of BAC level on recidivism by injury cause, we found that BAC > 80mg/dL was associated with repeat trauma for motor vehicle crashes (MVC, OR 1.6 [1.3-1.9]), falls (OR 2.1 [1.6-2.7]), and knife (OR 1.8 [1.3-2.5]) injuries but not beating or firearm injuries. A positive BAC under 80mg/dL was associated with repeat trauma only for MVC injuries (OR 1.4 [1.1-1.9]) compared to zero BAC. Among beating victims with elevated BAC, those over 80mg/dL were more likely to have repeat trauma than those under 80 (OR 1.9 [1.1-3.5]). **Conclusions:** Similar to other studies, we found elevated BACs to increase the odds of recurrent trauma. However BACs over 80mg/dL (legal driving limit) were not associated with increased odds of recidivism for beating and firearm injuries; only for MVCs, falls, and knife injuries. Elevated BACs under the legal limit are only associated with repeat trauma for MVCs. More consideration should be given to variation in alcohol involvement by injury cause in future studies.

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UPPER BODY MUSCULOSKELETAL SYMPTOMS AND ASSOCIATIONS WITH INDIVIDUAL FACTORS IN PEDIATRIC HEALTHCARE PERSONNEL. Nancy Daraiseh*, Maurizio Macaluso, Lauren Summerville, Yanhong Liu, William Vidonish, Sue Davis (Cincinnati Children's Hospital Medical Center)

Research has documented relatively high rates of musculoskeletal symptoms among nurses, with significant health and economic impact on both employees and organizations. Pediatric providers, however, have been excluded from these investigations. As part of a study examining injury reporting in pediatric healthcare personnel, a modified Worklife and Health Survey was administered to randomly selected registered nurses, patient care assistants, and mental health specialists (N=685) employed at a pediatric medical center to examine self-reported musculoskeletal symptoms in the neck, back, and shoulders. Functional outcomes (e.g. physician visits, reduced activity) and pain medication use related to these symptoms were also collected. The respondents were mostly women (85%), white (84%), young (75% <35y), with a graduate school degree or higher (81%), who had never smoked (80%) but were overweight (median BMI: 26). The majority were nurses (73%), worked in 8h (37%), 12h (38%) shifts or both (25%) and had been in the current position for ³1y (75%, median: 2y). About 16% reported having frequent (³weekly) neck pain in the previous year, 12% reported shoulder pain and 24% lower back pain. Overall, 34% reported frequent pain at any of the three sites. Frequent musculoskeletal symptoms were reported more often by women (OR: 2.9, 95%CI:1.7-5.1), and were associated with working longer shifts (p=0.02), but were not associated with age or experience on the job. Nurses (OR: 2.3, 95%CI:1.6-3.5) and workers in medical/surgical departments (OR: 1.5, 95%CI:1.1-2.2) reported frequent pain more often than workers in other jobs or departments. Our results indicate that musculoskeletal symptoms are common among pediatric health care workers, and are related to employment characteristics that may be modifiable by interventions on work environment and workers' behavior.

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INJURIES IN US TRACK & FIELD HIGH SCHOOL STUDENT-ATHLETES, 2008/09-2013/14. Lauren Pierpoint*, Claire Williams, Sarah Fields, Dawn Comstock (University of Colorado Denver)

Introduction: In 2013/14, in the United States (US) 1,059,206 high school girls and boys participated in track & field. Understanding the epidemiology of track & field injuries will better facilitate evidence-based injury prevention efforts. Our objective was to describe injury rates and patterns in this popular high school sport. **Methods:** Using High School Reporting Information Online (RIO), certified athletic trainers (ATs) from a large national sample of US high schools reported track & field athlete exposures (AEs) and injury data weekly during the 2008/09-2013/14 seasons. **Results:** During the study period, 2485 injuries occurred during 2,962,308 AEs for a rate of 0.84 injuries per 1000 AEs. Injury rates were higher in competition (1.26 per 1000 AEs) vs. practice (0.74 per 1000 AEs; RR=1.70 95% CI=1.56-1.86). Girls had higher injury rates than boys overall (0.99 vs 0.72 per 1000 AEs; RR=1.37 95% CI=1.27-1.48) and in practice (0.93 vs 0.58 per 1000 AEs; RR=1.60 95% CI=1.46-1.76). The most commonly injured body parts were the thigh/upper leg (boys 35.3%; girls 26.6%), lower leg (boys 14.0%, girls 22.1%), and hip for boys (12.3%) and knee for girls (12.2%). Muscle strains (boys 49.7%, girls 41.1%) and ligament sprains (boys 10.1%; girls 13.7%) were the most common diagnoses. Over 85% of injuries were new rather than recurrent. Most athletes (>80%) returned to play in ≤21 days. Sprints (boys 33.5%; girls 30.0%), middle distance events (19% each), and jumping events (boys 17.9%; girls 16.3%) accounted for the majority of injuries overall. In competition, hurdle events accounted for 8.5% of boys' injuries but 20.6% of girls' injuries. **Conclusion:** Rates and patterns of track & field injuries differ by gender and athletic activity. A better understanding of the epidemiology of injuries in this widely popular sport with diverse events can inform coaching techniques and targeted injury prevention efforts for high school track & field athletes.

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A MISSING DATA APPROACH FOR THE CALCULATION OF U.S. NATIONAL MORTALITY STATISTICS BY DISAGGREGATED ASIAN ETHNICITY OVER TIME. Caroline A. Thompson*, Derek Boothroyd, Katie Hastings, Latha Palaniappan, Mark Cullen,, David Rehkopf (Palo Alto Medical Foundation Research Institute, Palo Alto, CA)

While mortality rates in Asians in the United States (US) are the lowest among major racial/ethnic groups, more recent examinations of Asian subethnicities have shown heterogeneity in rates. Once defined as a single race category, the 2003 release of the national death certificate now reports up to 10 distinct Asian sub-ethnicities. An impediment to using this data, however, is that implementation of this standard since 2003 has been gradual by state, requiring re-aggregation of Asian ethnicities for reporting of mortality statistics. The incomparability of two classification systems to describe the same data can be seen as a missing data problem, and missing data methods may be employed to "bridge" systems between collection years. This study aims to improve understanding of Asian mortality disparities during a period of transition to the use of improved racial classification systems. We use multiple imputation by chained equations (MICE) to re-classify ethnicity for Asian Americans who died between 2003 and the year their state of residence adopted the new death certificate. We fit by-state models with post-adoption individual-level data from the National Center for Health Statistics (decedent ethnicity, age at death, cause and county of death), along with county--level contextual data from the US Census bureau (which did not change sub-ethnicity classification over the time period) from pre- and post-adoption years (age- and subethnicity-specific population distributions, indicators of population stability, and sociodemographic measures) to predict pre-adoption sub-ethnicity of the decedents. We present mortality rates for the leading causes of death from 2003-2011 by sub-ethnicity with/ without imputation, and model validation results. Our imputation strategy, designed to be a "forward bridging" approach to analysis with a new classification system, also demonstrates the novel use of longitudinal contextual measures to address missing data for vital statistics.

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A MORPHOLOGICAL EFFECTIVE SYSTEMIC EPIGRAPH (MESE) FOR SYNDEMIC PATHOLOGY AND SYSTEM DESIGN. Matteo Convertino* (University of Minnesota)

Predictive tools of population health trajectory are very often statistical tools with little consideration of the physics of the problem and related uncertainty. Thus, these models lack of a full exploration of all potential population health causes and trajectories and cannot be used for identifying system design alternative and control strategies that minimize morbidity and mortality over space and time. For this purpose a Morphological Effective Systemic EpiGraph model (MESE) is proposed. MESE, inspired by hydrogeomorphological models, allows to determine principal webs of transmission, factors causing disease production and persistence, disease spreading and incidence. The case of fast infectious diseases is proposed as a blueprint of the model but the application of MESE can be extended to the analysis of socially communicable diseases, chronic disease generated by environmental exposures, and physiological disease development processes. Predictions are tested against real data of syndemics in the Central Africa band from 2009 to 2014. Infectious diseases that are simultaneously reproduced are malaria, dengue, cholera, meningitis measles, Typhoid fever, human influenza, and tuberculosis. Importance and synergy of socio-environmental factors is assessed along the Central Africa band to determine syndemic diversity by just making use of one disease prediction and few disease determinants. Beyond disease predictions, MESE model is able to inform about disease latency time, disease determinant causality, interaction with other determinants, and the likely transmission networks producing the disease. Thus, MESE can be used to both answer basic research questions related to disease production in populations, and practical questions related to the detection of disease hotspots, early warning signals, and optimal control strategies. The model can also be used a real-time artificial intelligence cyber-infrastructure for public health surveillance.

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A UNIFYING APPROACH TO THE CONCEPTS OF CONFOUNDING AND CONFOUNDERS . Etsuji Suzuki, Toshihide Tsuda, Toshiharu Mitsuhashi, Eiji Yamamoto (Okayama University)

Causal inference is a central issue in biomedical research. In this context, the concepts of confounding and confounders have gained much attention in the causal inference literature. The counterfactual approach to confounding has been widely accessible to epidemiologists, and the concept of confounding is now explained in the counterfactual framework. Much of the literature on this topic has been also concerned with the presence or absence of confounders. Traditionally, a confounder was explained as a factor that has the following three necessary (but not sufficient or defining) characteristics: (a) it must be a risk factor for the outcome; (b) it must be associated with the exposure; and (c) it must not be an intermediate step in the causal path between the exposure and the outcome. As has been well addressed, however, this traditional "definition" of confounder may lead to inappropriate adjustment for confounding, and the relationship between the concepts of confounding and confounders remain equivocal. In this presentation, we aim to provide a unifying approach to these two subtly different causal concepts by considering the link between the sufficient-cause model and the counterfactual model. Furthermore, we incorporate sufficient causes within the directed acyclic graph framework, emphasizing that the target population concept plays a key role when discussing these concepts. In general, no confounding is neither a necessary condition nor a sufficient condition for no confounder(s), and vice versa. Our unifying approach highlights the relationship between the subtly different concepts of confounding and confounders, and under-appreciation of them could lead to widespread confusion about these concepts. Our findings also highlight that the different approaches to causality provide complementary perspectives, and can be employed together to improve our understanding about fundamental causal concepts.

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CHALLENGES OF THE LABORATORY COMPONENT OF THE NATIONAL HEALTH AND NUTRITION EXAMINATION SURVEY. David A Lacher* (National Center for Health Statistics, Centers for Disease Control and Prevention, Hyattsville, MD 20782)

The National Health and Nutrition Examination Survey (NHANES) has collected laboratory data since its beginning in 1960. The NHANES laboratory component is large with over 700 laboratory tests currently performed. NHANES performs some tests in its mobile examination center (MEC), but most tests are examined by other laboratories. Challenges arise during the pre-examination, examination and post-examination phases of laboratory data generation. These laboratory challenges are generally similar to clinical laboratories, but there are some challenges unique to NHANES. For example, the NHANES MEC is moved to multiple locations and instruments have more stability issues and must be calibrated more frequently. Pre-examination issues include inadequate sample volume, failure of sample participants to collect samples properly, such as not fasting or improperly collecting a 24 hour urine specimen, and specimen storage and stability issues. The examination phase presents the most challenging problems for NHANES especially when trending data over time. Changes in laboratories, instruments, methods, reagent lots and standardization can affect laboratory data. Crossover studies are done in an attempt to trend data. Prevalence of diseases can be significantly affected by small changes in data due to analytical issues when true changes in the population are not occurring. Long-term quality controls can help detect changes due to analytical issues. Split samples, prepared in the NHANES MEC, are sent to laboratories to detect analytical issues. Low analytical sensitivity as seen in environmental tests can lead to a high proportion of values below the limit of detection and lead to unstable estimates of the distribution of test values. Post-examination challenges in NHANES include collecting data from up to 30 laboratories in a timely manner with multiple data reporting formats, and matching sample participant data to associated bench quality control data.

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EFFECTS OF VARIATIONS IN ESTIMATED COMPLETION TIME AND VOUCHER INCENTIVES ON QUESTIONNAIRE RESPONSE. Nel Roeleveld*, Marleen van Gelder, Paulien Geuijen, Saskia Meijboom (Radboud Institute for Health Sciences, Radboud university medical center, Nijmegen, The Netherlands)

Background: Obtaining a response rate as high as possible is important to reduce selection bias and increase external validity. Some strategies have been found to increase response rates, whereas others have no or ambiguous effects. In this study, we determined whether the estimated completion time and/or a voucher incentive affects questionnaire response. **Methods:** Pregnant women participating in the PRegnancy and Infant DEvelopment (PRIDE) Study were asked to fill out a postal food frequency questionnaire after completing the baseline PRIDE Study questionnaire. We employed three strategies: (A) underestimated completion time without incentive, (B) underestimated completion time with an unconditional € 5 voucher, and (C) correctly estimated completion time with the € 5 voucher. Response rates with and without reminder letters and levels of item non-response were compared between the three strategies. **Results:** The food frequency questionnaire was sent to 822 women, of which 729 (89%) returned a completed questionnaire. We did not observe differences in completion rates (p=0.40) or the proportion of questionnaires returned without a reminder letter (p=0.61) between the three strategies. Furthermore, the proportion of questionnaires with < 5% item non-response was comparable between the strategies, although it seemed to be somewhat higher in strategy C (69%) compared to the strategies with an underestimated completion time (63%).**Conclusion:** Variations in estimated completion time and a voucher incentive did not affect response to a postal food frequency questionnaire among pregnant women enrolled in a prospective cohort study. However, these strategies might increase response rates in less intrinsically motivated study populations.

575-S/P

FURTHER EXPLORATIONS OF STATISTICAL AND MECHANISTIC INTERACTIONS. Stephen J Mooney* (Columbia University Mailman School of Public Health)

Within epidemiology, it is well established that positive additive statistical interaction does not in general imply mechanistic interaction (also called synergism) in the sufficient cause sense. However, Greenland and Poole showed that under a monotonicity assumption, a perfectly valid relative excess risk due to interaction (RERI) greater than zero can imply mechanistic interaction under some conditions. VanderWeele and Robins further showed that in such conditions, a valid RERI greater than one implies mechanistic interaction even when monotonicity cannot be assumed. This work examines further the potential outcome response types contributing to a positive RERI in the absence of mechanistic interaction. Working from prior categorization of response types, we show that in the absence of interactive types, the RERI is given by (p3+p5-p2-p9)/(p1+p3+p5+p9+p11+p13) where pi indicates the proportion of the study population with the ith response type. We observe that because all pi must be 0 or greater and p3 and p5, the only positive components of the numerator, are also present in the denominator, this derivation contributes to an alternate statement of VanderWeele and Robins' finding that a valid RERI greater than one implies the presence of interactive types. Next, we explore the RERI equation's implications with respect to sufficient causes. We observe that response types 3 and 5 arise in the absence of mechanistic interaction only when background causes render either the presence of one exposure or the lack of the other exposure causative in the same subject. We further derive an inequality relating the proportion of study subjects of response type 1 ('doomed' to an outcome regardless of the exposures of interest) to the maximum RERI observable in the absence of mechanistic interaction. From these explorations, we consider how subject matter knowledge of causal pathways might inform interpretation of an RERI between zero and one.

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MEASURING NEIGHBORHOODS USING PUBLICLY AVAILABLE PROPERTY APPRAISAL VALUES: AN APPLICATION OF HEDONIC PRICE THEORY. Sandi L. Pruitt*, Tammy Leonard, Tiffany M. Powell-Wiley, Wenyuan Yin (Economics Department, University of Dallas)

Background Epidemiologists studying relationships between neighborhoods and health have begun using property appraisal data, a publicly available data source, to characterize neighborhoods. Economists have developed a rich toolkit, including hedonic (implicit) price models, to understand how neighborhood characteristics are quantified in appraisal values and to provide guidance in extracting neighborhood-level information from these data. While the hedonic approach has much to offer regarding interpreting and operationalizing appraisal data-derived neighborhood measures; to date, this literature has not been fully integrated into epidemiological research on neighborhoods and health. **Methods** We develop a theoretically-informed hedonic-based neighborhood measure (HBNM) using residuals of a hedonic price regression applied to appraisal data in a single metropolitan area. The model included school district, city jurisdiction, house age/age2, condition, square feet, number of stories, foundation and fence type, presence of central air conditioning and swimming pool, number of fireplaces and bathrooms. HBNM for each parcel in a block group was aggregated, creating a block group level measure. **Results** We describe HBNM's characteristics, reliability in different neighborhood types, and correlation with other neighborhood measures (i.e. other appraisal-based measures, block group poverty rate and objectively observed parcel-level characteristics). HBNM was correlated in the expected direction with block group poverty rate and observed property characteristics. **Conclusion** Property values contain implicit valuation of neighborhood quality. By drawing from hedonic price theory literature in economics, we demonstrate a theoretically consistent method to leverage implicit valuation contained in appraisal data. Consistent measurement, application, and interpretation of HBNM in epidemiologic studies will improve understanding of relationships between neighborhoods and health.

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NULL HYPOTHESIS SIGNIFICANCE TESTING IN MAJOR EPIDEMIOLOGIC JOURNALS FROM 1975 THROUGH 2013. A BIBLIOGRAPHIC REVIEW. Andreas Stang*, Charles Poole(Center for Clinical Epidemiology, University Hospital of Essen, Germany)

Background: Despite the many cautions, null hypothesis significance testing (NHST) remains one of the most prevalent and abused statistical procedure in the biomedical literature. The aim of this study was to investigate time trends of NHST in major epidemiologic journals. **Methods:** We selected six major epidemiologic journals including the American Journal of Epidemiology, International Journal of Epidemiology, Epidemiology (1990-2014), European Journal of Epidemiology (1985-2014), Journal of Epidemiology and Community Health (1978-2014), Annals of Epidemiology (1990-2014) and Journal of Clinical Epidemiology (1988-2014). We developed a search algorithm that identified Medline entries with abstracts and detected significance terminology or categorized p-values ($p<0.05$, $p<0.01$, $p<0.001$) for the years 1975 through 2014 if not other specified. The search was done Jan 22-26, 2015. **Results:** We assessed overall 29.999 abstracts. The number of abstracts per year increased over time among all journals. The proportion of abstracts that contained significance terminology ranged between 18.7% (J Clin Epidemiol) and 25.4% (Ann Epidemiol), exception: Epidemiology (2.4%). When we also counted abstracts that categorized p-values, the range shifted upwards (24.8% (Int J Epidemiol) to 29.6% (Ann Epidemiol)), exception: Epidemiology (3.0%). Time trends differed by journals: the proportion of NHST abstracts showed peaks in the 1990ies and thereafter declined (Am J Epidemiol, Int J Epidemiol, Ann Epidemiol), the proportion monotonically increased (Eur J Epidemiol and J Epidemiol & Comm Health), or the proportion steadily decreased (J Clin Epidemiol). **Discussion:** NHST is still a very prevalent procedure in major epidemiologic journals despite its well-known fallacies. The majority of epidemiologic journals showed decreasing proportions of abstracts with NHST after the 1990ies. The journal Epidemiology has an exceptionally low proportion of abstracts with NHST.

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POPULATION INTERVENTION EFFECTS WITH INVERSE PROBABILITY WEIGHTS: ESTIMATING THE EFFECTS OF NEW US HIV TREATMENT GUIDELINES ON MORTALITY. Jessie K. Edwards*, Daniel J. Westreich, Catherine R. Lesko, Stephen R. Cole (Department of Epidemiology, University of North Carolina at Chapel Hill)

Traditional epidemiologic approaches compare counterfactual outcomes under 2 exposure distributions, usually 100% exposed and 100% unexposed. However, to estimate the population health effect of a proposed intervention, one may wish to compare counterfactual outcomes under the exposure distribution produced by the intervention to factual outcomes under the observed exposure distribution (i.e., the natural course). Here, we estimate such intervention effects using inverse probability weights. We compare 5-year mortality that was observed given actual ART use among HIV+ patients in the Center for AIDS Research Network of Integrated Clinical Systems between 1998 and 2013 (the natural course) to 5-year mortality which would had been observed had all patients initiated antiretroviral therapy (ART) immediately upon entry to care. ART-naïve patients (n=14,700) were followed from entry into care until death, loss to follow-up, or censoring on December 31, 2013 or at 5 years. The median CD4 cell count at study entry was 343 cells/mm3 (interquartile range: 154, 552). In the observed data, 10,047 patients started ART during the study period, of whom 35% initiated ART in their first month in care. The 5-year cumulative incidence of mortality in the observed data was 11%. Under an intervention to treat all patients immediately upon entry into care, the 5-year mortality was 9%, yielding a hazard ratio comparing universal ART to the natural course of 0.82 (95% CI: 0.72, 0.93). The estimated 5-year mortality under an unrealistic intervention to prohibit any ART was 22%, yielding a hazard ratio comparing universal ART to no ART of 0.33 (95% CI: 0.23, 0.45). Comparing outcomes under immediate ART on entry into care to outcomes under actual ART use provides meaningful information about the potential consequences of new US guidelines to treat all patients with HIV regardless of CD4 cell count under actual clinical conditions.

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PRECISELY DEFINING DYNAMIC STRATEGIES WITH GRACE PERIODS IN HIV RESEARCH: IMPLICATIONS FOR INVERSE-PROBABILITY WEIGHTS. Lauren E. Cain*, Xabier Garcia-Albeniz, James Robins, Miguel A. Hernán (Harvard T.H. Chan School of Public Health)

In deciding when and how to treat their patients, clinicians naturally consider their patients' evolving characteristics. These dynamic strategies often allow a grace period during which the treatment may start. Strategies with grace periods may better reflect actual practice if, for example, there is a delay in filling prescriptions. However, the strategy "initiate antiretroviral therapy (ART) within m months of CD4 dropping below x" is ill-defined. Many strategies are consistent with this description. The strategy may refer to strategy A: "initiate ART within m months of CD4 dropping below x, such that there is a uniform probability of starting in each of the months 0, 1, …, m" or strategy B: "initiate ART m months after CD4 drops below x unless you have initiated earlier in the grace period". While methods such as inverse-probability (IP) weighting of a dynamic marginal structural model can be used to compare these types of strategies, the form of the IP weights differs for strategies A and B. To construct unstabilized IP weights for both strategies, we fit a pooled logistic model for ART initiation to estimate the probability of initiating conditional on measured time-fixed and time-varying covariates (pA). For a grace period of length m months, let j indicate the position in the grace period such that j=0 and j=m represent the start and end of the grace period, respectively. The weights for strategies A and B are identical for $j<0$. For strategy A, the contribution to the denominator of the weights is 1 for times $0\leq j<m$ and pA for times j=m. For strategy B, the contribution to the denominator of the weights is 1-pA for times in $0\leq j<m$ before the individual initiates and pA otherwise. The weights for strategy B also include a numerator which is a function of m and j. Using an example from the HIV-CAUSAL Collaboration, we will demonstrate the differences in the distributions of the weights and their influence on weighted results including their efficiency profiles.

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PROBABILISTIC PORTFOLIO DECISION MODELING FOR OPTIMAL MANAGEMENT OF COMMUNICABLE DISEASES. Matteo Convertino*, Yang Liu (University of Minnesota)

The selection of location and timing of control strategies for containing incidence and prevalence of infectious diseases is a difficult task that is rarely optimized with mathematical models. Humanitarian organizations typically displace vaccines and hygiene/sanitation controls in areas that are hit the most by the disease. To promote the efficient allocation of scarce resources for disease controls in space and time, a probabilistic portfolio decision model (PDM) that integrates physical-based models yielding predictions of cholera prevalence in response to disease control plans is proposed. The model can also consider different water management and climate change scenarios since it includes a spatially explicit hydrological model coupled to the pathogen-ecology and epidemiological model. In a manner that is somewhat analogous to financial portfolios, each community is considered as a human asset requiring health assistance. Predictions serve as inputs to a Multi Criteria Decision Analysis model (MCDA) that is used to measure the benefits of control plans composed by multiple actions (e.g., vaccines, hygiene/sanitation, mobility control, water management), as well as to construct Pareto frontiers that represent optimal portfolio allocations of control actions (e.g. vaccines and sanitary interventions). Optimal plans allow humanitarian organizations and local governments to maintain or increase the benefits of the population by contrasting the overall risk of infection. The optimal combination of control actions that emerge from the PDM allows decision-makers to achieve higher health benefits, with equal or lower costs, than those achievable by adopting the myopic prescriptions of the MCDA model. The PDA approach demonstrates the advantages of integrated top-down control strategies, versus bottom-up management approaches.

581-S/P

STANDARDIZING EVENT RATES IN NON-REPRESENTATIVE DATA: AN APPLIED EXAMPLE. Mitchell M. Conover*, Suzanne Landi, Michele Jonsson Funk(Department of Epidemiology, Gillings School of Global Public Health, University of North Carolina at Chapel Hill)

BACKGROUND: Event rates estimated from samples with non-representative covariate distributions (e.g. convenience samples, RCTs) may be biased. **OBJECTIVE:** To demonstrate the impact of external standardization on calendar year and regional event rates for acute myocardial infarction (AMI), stroke, and in-hospital death (IHD) estimated from national convenience sample of healthcare claims data. **METHODS:** We analyzed MarketScan healthcare claims of patients aged 18 to 79 from 2000-2012. We identified outcomes using ICD-9 diagnosis codes (AMI, stroke) and discharge status (IHD) from inpatient claims. To standardize calendar year-specific event rates (and 95% CIs) by age, sex and region and regional rates by age, sex and calendar year, we uniformly weighted the data to a standard U.S. population with employer-provided insurance (2010 Current Population Survey). RESULTS: Person-time (PT) in the data varied by age, year, and region. The proportion of patients age >64 was highest in 2001 (15.8% of PT) and the Midwest (11.2%) and lowest in 2012 (7.4%) and the South (6.8%). For all outcomes, standardization reduced calendar year-specific rates relative to the crude, with the greatest reductions in 2001 (AMI: -22.5%, stroke: -29.6%, IHD: -31.0%) and the smallest in 2012 (AMI: -0.6%, stroke: -1.1%, -2.7%). The South had the lowest crude rate of IHD (70.6 per 100,000 PY [70.1, 71.1]) and relatively low rates of stroke (29.1 [28.8, 29.4]) and AMI (161.4 [160.6, 162.1]). After standardization, the South had the highest rate of IHD (74.7 [74.1, 75.4]) and stroke (35.6 [35.1, 36.2]) and the second highest rate of AMI (181.1 [179.9, 182.2]). **CONCLUSIONS:** Variation in covariate distributions in non-representative data may result in biased event rates. External standardization is a flexible analytical tool that can be used to estimate valid rates in the target population despite structural limitations in the data and improve the internal and external validity of findings.

582-S/P

USING SIMULATION METHODS TO ESTIMATE POWER IN STUDIES OF THE HUMAN MICROBIOME. Alexander Breskin*, Levi Waldron, Ryan Demmer (Department of Epidemiology, Mailman School of Public Health at Columbia University)

Background: Affordable next-generation DNA sequencing has enabled investigations of the role of the microbiome in disease occurrence. Few tools exist for conducting power calculations necessary to design such studies. Power calculations for microbiome outcomes must address issues not typically encountered in traditional settings including: i) identifying statistical models that best fit microbiome data; ii) filtering low abundance taxa without losing important biological information; iii) using pilot data to generate realistic taxa count values; iv) controlling familywise error rates in settings of multiple hypothesis tests; v) ensuring ease of use with standard computing platforms. **Methods:** A simulation tool was developed to estimate the power to detect differential taxa counts between disease groups. Negative-binomially distributed taxa counts were generated with parameters estimated from actual data, with a multiplicative effect applied to a random set of taxa in the diseased group. Tests for differential taxa counts between the groups were conducted using negative-binomial regressions. Sensitivities and specificities for detecting differential taxa were estimated using pilot data from the Oral Infections Glucose Intolerance and Insulin Resistance Study (ORIGINS). All calculations were performed using SAS version 9.4. **Results:** Using a multiplicative effect size of 2, specificity remained excellent across nearly all study sizes (>98%). Sensitivity was poor for relatively small study sizes, reaching 70% with 1200 participants, and 80% with 2400 participants. **Conclusion:** This tool offers a simulation-based method of power estimation for epidemiologic studies of the microbiome. Results are generated quickly using a standard laptop computer. This tool allows epidemiologists to design studies to investigate the role of the microbiome in human disease. Large-scale studies with over 1000 participants are necessary to adequately detect differential taxa between disease groups.

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TO REPORT OR NOT TO REPORT? EFFECT ON CRIME VICTIMIZATION. Shabbar I Ranapurwala*, Mark T. Berg, Carri Casteel (Injury Prevention Research Center, The University of Iowa, Iowa City, IA)

Law enforcement depends on crime reports from the public to be able to protect citizens and dissuade future criminal activity. However, many crimes are not reported because of fear of repercussions or because the crime is considered trivial. We longitudinally assessed the relationship between police reporting of crime victimization and the incidence of future victimization using the National Crime Victimization Survey (NCVS) 2008-2012. All NCVS participants are followed biannually for 3 years. Participants who completed at least one follow-up survey after their initial victimization were included in the study. 18,657 eligible victims reported 10,155 follow-up victimizations. Victimizations included assaults, sexual assaults, forced entry in a property, pick pocketing, thefts, and motor-vehicle thefts. Of the eligible participants, 41% (n=7,630) reported their initial victimization to the police (exposed) and 59% (n=11,027) did not (unexposed). To model the effect of reporting on future incidents of victimization, we used negative binomial regression with generalized estimating equations clustering on schools, while accounting for sampling weights. Analyses were adjusted for victim and offender age and sex, including victim's family income and education, crime type, location of crime, and victim-offender relationship. The crude future victimization rate among the exposed was 11/100 person-years, while that in the unexposed was 14.6/100 person-years. The crude rate ratio (RR) was 0.75 (95%CI: 0.71, 0.80). The adjusted rate for future victimization for those who reported to the police decreased by 28%, compared to those who did not – RR: 0.72 (95%CI: 0.69, 0.77). Except for victims of sexual assaults, all others who reported to the police experienced fewer future victimization. This protective association may be due, in part, to the victim's protective behavior, but also police action.

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DNA METHYLATION ALTERATIONS IN BLOOD ASSOCIATED WITH CIGARETTE SMOKING. Maria Argos, Farzana Jasmine, Brandon Pierce, Muhammad Kibriya, and Habibul Ahsan (University of Illinois at Chicago, Chicago, IL)

Background: Tobacco smoke is a known human carcinogen, with evidence to suggest that epigenetic alterations may mediate the carcinogenic effects of tobacco smoking. Recent human studies have reported associations between cigarette smoking and DNA methylation. While these methylation loci appear to be associated with tobacco smoking exposure, it is not well understood whether differential methylation at these loci regulate gene expression changes. **Objectives:** We evaluated the association between tobacco smoking and epigenome-wide white blood cell DNA methylation and whether the identified differentially methylated loci showed evidence of methylation-related gene regulation based on existing genome-wide gene expression data for the study sample. **Methods:** Cross-sectional analyses were conducted among 400 adult participants. Self-reported smoking status was ascertained, including information on duration and quantity. DNA methylation was measured using white blood cell DNA. Linear regression models were utilized to evaluate associations between methylation values with smoking phenotypes as well as expression values of the corresponding gene, adjusting for covariates.**Results:** We observed 56 differentially methylated loci associated with smoking status based on the Bonferroni-corrected significant threshold ($P<1\times10\text{-}7$). Methylation of AHRR cg05575921 was the most significantly associated locus ($P=1.11\times10\text{-}47$), which has been previously reported. Several other significant differentially methylated loci were also observed in previously reported regions as well as at novel loci. Furthermore, there was evidence of methylation-related gene regulation based on gene expression for a subset of these differentially methylated loci. **Conclusions:** Gene expression alterations were associated with differentially methylated loci related to tobacco smoking status. Future studies are needed to evaluate these genes in relation to smoking-related disease outcomes.

600-S/P

ADIPONECTIN, LEPTIN, RESISTIN AND INCIDENT COGNITIVE IMPAIRMENT IN THE REASONS FOR GEOGRAPHIC AND RACIAL DIFFERENCES IN STROKE STUDY (REGARDS) Reena Karki*, Mary Cushman, Sarah R Gillett, Suzanne E Judd, Richard E Kennedy, Jorge R Kizer, Deborah A Levine, William M McLellan, Manjula Kurella, Tamura Frederick, W Unverzagt, Virginia G Wadley, Evan L Thacker (Brigham Young University)

OBJECTIVE: Metabolism biomarker levels are associated with vascular health and may also relate to cognitive performance. Our goal was to determine associations of three metabolism biomarkers, adiponectin, leptin, and resistin, with cognitive dysfunction in adults. **METHODS:** We analyzed biomarker levels in baseline blood samples of 462 incident cognitive impairment cases and 557 randomly sampled controls from REGARDS, a population-based prospective cohort of adults aged 45 and above. Cognitive impairment was identified using measures of verbal learning, memory, and fluency obtained a mean of four years after baseline. Odds ratios (OR) of cognitive impairment relative to biomarker levels were adjusted for demographics, health behaviors, clinical measures, and comorbid cardiovascular conditions. **RESULTS:** Adiponectin was positively associated with cognitive impairment (per standard deviation [SD], OR = 1.62 [95% CI: 0.96-2.73] P = 0.07). Leptin was inversely associated with cognitive impairment (per SD, OR = 0.46 [95% CI: 0.19-1.09] P = 0.08). The precision of both estimates was nearly sufficient to confidently rule out chance. Resistin was weakly associated with cognitive impairment (per SD, OR = 1.15 [95% CI: 0.72-1.86] P = 0.55), but this relationship may likely have arisen by chance. Including a quadratic term for biomarker level did not significantly improve the models for adiponectin (P = 0.41) or resistin (P = 0.17), but did significantly improve the model for leptin (P = 0.01). Across quartiles of leptin, ORs (95% CIs) of cognitive impairment were 1.00 (ref), 0.90 (0.65-1.24), 0.54 (0.37-0.80), and 0.51 (0.31-0.82). **CONCLUSIONS:** Our findings are consistent with a potential neuroprotective role of leptin, raising the hypothesis that intervening on leptin-related processes may influence cognitive performance in adults. Whether adiponectin and resistin relate to cognition is unclear; adiponectin may be more promising than resistin and warrants further investigation.

601-S/P

ASSOCIATIONS OF SEX HORMONE-BINDING GLOBULIN WITH BRAIN VOLUMES IN A BI-RACIAL COHORT: THE CORONARY ARTERY RISK DEVELOPMENT IN YOUNG ADULTS (CARDIA) BRAIN MRI SUB-STUDY. Martine Elbejjani*, Pamela Schreiner, Nick Bryan, David Siscovick, Lenore J Launer (Laboratory of Epidemiology and Population Sciences, National Institute on Aging, National Institutes of Health)

Evidence from experimental studies suggests a neuro-protective role of testosterone in the brain. However, current results on the relationships of testosterone with brain structures and brain diseases in men are mixed. One proposed explanation for these discrepant findings is the important role of sex hormone-binding globulin (SHBG) in regulating the availability and action of sex-hormones and subsequently influencing brain measures. In the present study, we examined the associations of SHBG levels during adulthood with brain volumes in 267 middle-age men participating in the Coronary Artery Risk Development in Young Adults CARDIA-brain magnetic resonance imaging (MRI) sub-study. SHBG levels were measured between the ages of 24 and 41 and brain volumes were measured at the ages of 42 to 56. Multivariable linear regression model analyses, adjusted for potential confounders, revealed that higher levels of SHBG were associated with larger WM volumes and smaller GM volumes (one z-score increase in SHBG concentration was associated with a 3.52 cm3 increase (95% confidence interval (CI) = 0.39, 6.66) in WM volume and a 3.08 cm3 decrease (95%CI= -5.84, -0.30) in GM volume). These results remained unchanged after adjusting for testosterone levels and were not modified by testosterone levels. Fractional polynomial analyses revealed linear relationships between SHBG levels and WM and GM volumes. Results suggest a relationship between levels of SHBG -which might be reflecting differential production and regulation of sex-hormones- and WM and GM volumes in middle-age men. Together with findings documenting associations of SHBG with cognitive and psychiatric disorders, our results emphasize the value of incorporating and exploring SHBG levels in future studies on sex-hormones and brain and behavioral outcomes in men.

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MONTH OF BIRTH AND RISK OF MULTIPLE SCLEROSIS IN KUWAIT: A POPULATION-BASED REGISTRY STUDY. Saeed Akhtar*, Raed Alroughani, Ahmad Al-Shammari, Jarrah Al-Abkal, Yasser Ayad (University of Kuwait)

Background: Multiple sclerosis (MS) is a complex immune-mediated disorder of central nervous system with undefined etiology. This study examined the month of birth effect on subsequent multiple sclerosis (MS) risk later in the life in Kuwait. **Methods:** The month of birth of MS patients enrolled in Kuwait MS Registry between January 1, 1950 and April 30, 2013 was compared with the month of births in general population during the comparable period. Multivariable log-linear Poisson regression model was used to analyze the data. **Results:** Data on 1035 confirmed MS patients were collected, of which 65.2% were female and 77.1% were Kuwaiti. The overall risk of MS births (per 105 births in general population) was 28.5 (95% CI: 26.8 - 30.3). Multivariable log-linear Poisson regression model showed a significant (p = 0.004) peak in the number of MS births during December (θo = 340o). During this month, the risk of MS birth was 1.3 times the risk of MS birth in the trough month after adjusting for the effects of gender and nationality (adjusted relative risk = 1.3; 95% CI: 1.1-1.6). The amplitude (± SD: 0.13 ± 0.014) of sinusoidal curve showed a significant (p = 0.004) difference of 13% from the mean to maximum MS births during peak month. **Conclusions**: This study showed a statistically significant month of birth effect on MS risk with 13% excess MS births during December in Kuwait. Future studies may contemplate to ascertain the seasonal factors eliciting the observed association. The insight by unraveling such factors may help curtail MS risk in this and other similar settings in the region.

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MULTIPLE SCLEROSIS PROGRESSION IS ACCELERATED AMONG TOBACCO SMOKERS: META-ANALYSES ACROSS 8,871 INDIVIDUALS. Michaela F. George*, Farren B. S. Briggs (University of California, Berkeley)

Background: MS is the leading cause of neurological disability in young adults. Fifteen years after diagnosis, 20% of MS patients have no functional limitation, 50-60% require assistance ambulating, and 75% are unemployed; therefore elucidating the etiological mechanisms pertaining to disease progression is critical. In 2011, a meta-analysis of 2,037 individuals failed to observed a significant association between smoking and transition from relapsing remitting MS (RRMS) to secondary progressive MS (SPMS) (p=0.06). Several studies have investigated this relationship, but here additional to relationships between tobacco smoke other clinically relevant phenotypes were investigated. **Objective:** To investigate the relationship between tobacco smoke and MS progression measured by: transition from RRMS to SPMS and clinically isolated syndrome to clinically definite MS, time to Expanded Disability Status Scale (EDSS) scores of 4 and 6, and the mean difference of EDSS, MS Severity Score, T2-weighted lesion load, and contrast enhancing lesion load. **Methods:** Fifteen English-language studies met inclusion criteria. Summary measures of association between tobacco smoke exposure and each phenotype were calculated using random-effects models. **Results:** Ever smokers were 60% more likely to have a severe phenotype than non-smokers over the same time period (SPMS/EDSS=6 vs. RRMS/EDSS<6; N=7,713; summary risk ratio (SRR)=1.63; p=<0.001). Ever smokers were also two times as likely to transition to SPMS (N=2,437; summary risk ratio (SRR) =1.93; p=0.013); require unilateral ambulatory assistance (N=5,007; SRR=1.32; p=0.042), and have a higher T2 lesion load (N=2,122; summary mean difference=0.17; p<0.001) than non-smokers over the same time period. **Conclusions:** These results strongly demonstrate smoking results in the accrual of neurological deficits associated with MS disability. Smoking cessation efforts may clinically benefit MS patients throughout the course of the disease.

604-S/P

OBESITY GENES DEMONSTRATE DIRECT AND INDIRECT EFFECTS ON MULTIPLE SCLEROSIS. Milena Gianfrancesco*, Xiaorong Shao, Brooke Rhead, Ling Shen, Hong Quach, Alan Berstein, Cathy Schaefer, Lisa Barcellos (School of Public Health, Dept of Epidemiology, UC Berkeley, Berkeley, CA)

Multiple sclerosis (MS) is characterized as an autoimmune, neurological disorder resulting in significant disability and decreased quality of life. Recently, obesity has emerged as a significant risk factor for MS onset. It is plausible that there are common biological pathways that contribute to obesity and result in susceptibility to MS, as both are characterized as inflammatory diseases. Utilizing genetic variants associated with obesity as an exposure in an observational study represents a unique method of study that avoids reverse causation and may infer causality. Obesity genes may exhibit indirect effects on MS through their association with increased body mass index (BMI), or direct effects through some mechanism independent of BMI. Direct and indirect effects of obesity variants on MS were analyzed using the regression-based mediation analysis proposed by Valeri and VanderWeele (2013) to estimate the controlled direct effect (CDE), natural direct effect (NDE) and natural indirect effect (NIE) for changes in exposure level. Participants included non-Hispanic Caucasian members of Kaiser Permanente (1,104 MS cases, 10,536 controls). Analyses examined 32 obesity variants, measuring the direct and indirect effect of having no risk alleles (a = 0) versus having two risk alleles (a = 1) at each locus on MS onset. The mediator was specified as BMI (kg/m2) at age 18 or 20. Models were adjusted for sex, year of birth, ancestry, smoking and number of HLA-DRB1*1501 alleles, the strongest genetic predictor of MS. Analyses were bootstrapped with 100 replications. Results indicated significant NIE for 11 of the 32 variants associated with obesity ($P < 0.01$) and significant CDE for 2 variants, rs1475219 [1.23 95% CI (1.01, 1.67)] and rs7250850 [1.45 95% CI (1.11, 1.84)]. Findings provide new information that aid in the understanding of disease pathogenesis, provide important predictors for disease risk, and offer insight into targets for future therapeutic strategies.

605-S/P

PREDICTED PLASMA 25-HYDROXYVITAMIN D LEVEL AND RISK OF MULTIPLE SCLEROSIS IN U.S. WOMEN. Alexandra Purdue-Smithe*, Elizabeth Bertone-Johnson, Kimberly Bertrand, Tanuja Chitnis, Susan Hankinson, Alberto Ascherio, Kassandra Munger(Division of Epidemiology and Biostatistics, School of Public Health and Health Sciences, University of Massachusetts, Amherst, MA)

Multiple sclerosis (MS) is a progressive, autoimmune neurodegenerative disorder affecting nearly 350,000 people in the United States and resulting in significant disability. As an immunomodulator, vitamin D may play a role in the development of MS. Previous studies have observed an inverse association of 25-hydroxyvitamin D (25OHD) levels and MS risk in younger populations; however, whether this relationship persists in older adults remains unclear. We prospectively investigated the association between predicted 25OHD level and incident MS in the Nurses' Health Study (NHS) (n=121,701) and NHS II (n=116,430). 25OHD levels were predicted using validated regression models that include important determinants of vitamin D status, including race, UV-B flux (based on state of residence), physical activity, body mass index, dietary vitamin D intake, alcohol consumption and post-menopausal hormone use. Data on these factors were self-reported on NHS and NHS II questionnaires starting in 1986 and 1991, respectively, and updated every 2-4 years. MS diagnoses were ascertained by self-report and confirmed by medical records. Cox proportional hazards models adjusted for age, ethnicity, latitude of residence at age 15, and BMI at age 18 were used to estimate hazard ratios (HR)s and 95% confidence intervals (CI)s. Analyses were conducted separately for each cohort and pooled using a fixed-effects model. During 18 years of follow-up, we documented 179 definite/probable cases of MS with first symptoms after baseline. Multivariable HRs comparing highest and lowest quintiles of predicted 25OHD were 1.09 (95% CI: 0.40-2.96) in NHS, 0.52 (95% CI: 0.28-0.95) in NHS II, and 0.63 (95% CI: 0.38-1.06) in the pooled analysis. Higher predicted plasma 25 -hydroxyvitamin D may be modestly associated with lower risk of MS, particularly in younger women.

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AN INNOVATIVE APPROACH TO OCCUPATIONAL CANCER RESEARCH. PA Demers*, Jill Hardt, Anne Harris, Mieke Koehoorn, Christopher McLeod (Occupational Cancer Research Centre)

Objective: Although Canada collects timely and high quality information on new cancers through provincial tumor registries, occupational cancer surveillance is limited by a lack of any information on occupation or industry. This pilot project assesses the feasibility of linking workers compensation records to the Ontario Cancer Registry (OCR) to estimate the risk of cancer in occupation and industry groups. **Methods:** A 20% sample of 1975-2011 lost-work time claims (981,320 among 851,141 people) were linked with 1965-2012 OCR records using probabilistic record linkage, after excluding cancer claims. Hazard ratios (HRs) were calculated using Cox Proportional Hazards modelling adjusting for age and sex. **Results:** The linkage yielded 81,010 matched pairs. Increased risks among occupational groups for cancers consistent with established associations were observed. For example, lung cancer among miners (HR=1.42, 95% CI=1.27-1.59) and breast cancer among teachers (HR=1.57, 96% CI=1.37-1.81). Despite excluding compensated cases, mesothelioma excesses were observed among expected (e.g. construction workers, HR=1.78, 95% CI=1.26-2.53) and unexpected (e.g. education workers, HR=1.36, 95% CI=1.23-1.51) groups. The latter excess was limited to maintenance and cleaners and no cases were observed among teachers. **Conclusions:** This linkage was found to be cost effective and useful means of surveillance to identify to new associations for investigation. Future plans include using 100% of available records and expanding the linkage to other databases to improve the accuracy of follow-up and range of outcomes, as well as using a job exposure matrix and risk factor survey data in analysis. The implications of using non-represenative samples of the labor force will be discussed.

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ASSESSED MATERNAL OCCUPATIONAL EXPOSURE TO CHLORINATED, AROMATIC AND STODDARD SOLVENTS DURING PREGNANCY AND RISK OF FETAL GROWTH RESTRICTION IN OFFSPRING. Tania A. Desrosiers*, Lawson, Christina C., Meyer, Robert E., Stewart, Patricia A. Waters, Martha A., Correa, Adolfo, Olshan, Andrew F. (Department of Epidemiology, Gillings School of Global Public Health, UNC Chapel Hill, NC)

Background: Previous experimental and epidemiologic research suggests that maternal exposure to some organic solvents during pregnancy may increase the risk of fetal growth restriction (FGR). We evaluated the association between expert-assessed occupational solvent exposure and risk of small for gestational age (SGA) in a population-based sample of women from 8 US states in the National Birth Defects Prevention Study. **Methods:** We analyzed data from 2,886 mothers and their infants born between 1997 and 2002 without a major congenital anomaly. Job histories and information about other factors during pregnancy were self-reported via interview. Probability of occupational exposure to 6 chlorinated, 3 aromatic, and 1 petroleum solvent was assessed by industrial hygienists. SGA was defined as birthweight <10th percentile of birthweight-by-gestational age in a national reference. Logistic regression was used to estimate ORs and 95% CIs to assess the association between SGA and exposure to any solvent or specific solvent classes, adjusting for maternal age and education. **Results:** Approximately 8% of infants in the sample were classified as SGA. Prevalence of exposure to any solvent was approximately 10% and 8% among mothers of SGA and non-SGA infants, respectively. Any exposure to solvents was not associated with an increased odds of SGA (OR=1.16; 95% CI=0.73, 1.83). Among women with ≥50% exposure probability, we observed elevated but imprecise associations between SGA and exposure to any solvent (1.71; 0.86, 3.40), chlorinated solvents (1.70; 0.69, 4.01), and aromatic solvents (1.87; 0.78, 4.50). **Conclusions:** This is the first population-based study in the US to investigate the potential association between FGR and assessed maternal occupational exposure during pregnancy to distinct classes of organic solvents. The potential associations observed between SGA and exposure to chlorinated and aromatic solvents are based on small numbers and merit further investigation.

612-S/P

ASSOCIATION BETWEEN JOB STRAIN AND ASPECTS OF THE CORTISOL DIURNAL CYCLE: THE MULTI ETHNIC STUDY OF ATHEROSCLEROSIS. Kara E. Rudolph*, Brisa N. Sanchez, Elizabeth A. Stuart, Benjamin Greenberg, Kaori Fujishiro, Gary S. Wand, Sandi Shrager, Teresa Seeman, Ana V. Diez, Roux, Sherita H. Golden (University of California, Berkeley and University of California, San Francisco)

We estimate the association between having a high-strain versus non-high-strain job and salivary cortisol's diurnal rhythm. We use the Multi Ethnic Study of Atherosclerosis (MESA) Stress I study, a racially, ethnically, and occupationally diverse sample of 1,002 participants. Cortisol is sampled across the entire diurnal cycle for multiple days. We use a propensity score matching approach on an extensive set of sociodemographic and health variables coupled with a penalized functional mixed outcome regression model. Our approach addresses several previous limitations in the literature: small sample size; racially/ethnically homogeneous samples that do not generalize; failure to account for measurement error and day-to-day variability of the cortisol features; and residual confounding. We find that having a high-strain job is associated with lower salivary cortisol levels, particularly later in the day, and lower total area under the cortisol curve (AUC). We find no association between job strain and the cortisol awakening response (CAR). In a sensitivity analysis, we find evidence that the relationship between job strain and cortisol may be modified by level of income/wealth.

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BREAST CANCER INCIDENCE IN A COHORT OF US FEMALE FLIGHT ATTENDANTS: EXPOSURE-RESPONSE ANALYSES. Lynne Pinkerton*, Misty Hein, Jeri Anderson, Mark Little, Alice Sigurdson, Mary Schubauer-Berigan (National Institute for Occupational Safety and Health, Cincinnati, OH)

Objective: To examine the association of breast cancer incidence with cosmic radiation dose and metrics of circadian rhythm disruption, adjusted for non-occupational breast cancer risk factors, in a cohort of 6,093 US female flight attendants. **Methods:** We evaluated the association of breast cancer incidence with cumulative cosmic radiation absorbed dose, time spent working during the standard sleep interval, and time zones crossed (all lagged by ten years) using Cox regression. Individual exposure estimates were derived by linking work history data with domicile- and era- specific exposure estimates. Breast cancers were identified from telephone interviews and state cancer registries, and covariate data were obtained from telephone interviews. **Results:** Breast cancer incidence in the overall cohort was not associated with exposure. Significant, positive associations in breast cancer incidence were observed with all three exposures only among women with parity of three or more. Adjusted excess relative risks (95% confidence intervals) for women with parity of three or more were 1.6 (0.14 -6.6), 0.99 (-0.04-4.3), and 1.5 (0.14-6.2) per 10mGy, per 2000 hours spent working in the standard sleep interval, and per 4600 time zones crossed, respectively. **Conclusions:** Positive exposure-response relations occurred only in a small subset of the cohort. We recommend that future studies of breast cancer incidence in flight crew and other workers with circadian rhythm disruption assess interaction with parity to see if our findings are confirmed.

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CANCER INCIDENCE AND METOLACHLOR USE IN THE AGRICULTURAL HEALTH STUDY: AN UPDATE. Sharon R. Silver*, Steven J. Bertke, Cynthia J. Hines, Michael C. R. Alavanja, Jane A. Hoppin, Jay H. Lubin, Jennifer A. Rusiecki, Dale P. Sandler, Laura E. Beane Freeman (National Institute for Occupational Safety and Health)

Background: Metolachlor, a widely used herbicide, has been classified as a possible human carcinogen (Group C) by the U.S. Environmental Protection Agency based on an increase in liver neoplasms in female rats. Epidemiologic studies of the health effects of metolachlor have been limited. **Methods:** The Agricultural Health Study (AHS) is a prospective cohort study including licensed private and commercial pesticide applicators in Iowa and North Carolina enrolled 1993-7. In this update, we extended follow-up for cancer incidence through 2010 (NC) and 2011 (IA). We used Poisson regression to evaluate relations between two metrics of metolachlor use (lifetime days, intensity-weighted lifetime days) and cancer incidence. **Results:** Of the 49,616 applicators, 53% reported ever using metolachlor. We saw no association between metolachlor use and incidence of all cancers combined (n=5701 with a 5-year lag) or most site-specific cancers. However, for liver cancer, trends for both lifetime and intensity-weighted lifetime days of metolachor use were positive and statistically significant with an unexposed reference group; in analyses restricted to exposed workers, elevations observed at higher categories of use were not statistically significant. A similar pattern was observed for follicular-cell lymphoma, but no other lymphoma subtypes. **Discussion:** This update of pesticide applicators in the Agricultural Health Study is the first occupational epidemiology assessment to report positive associations between metolachlor use and liver cancer in humans and echoes observation of increased liver neoplasms in some animal studies. However, our findings for both liver cancer and follicular-cell lymphoma warrant further follow-up to better differentiate effects of metolachlor use from other factors.

615-S/P

DO LONG WORKING HOURS INCREASE PERCEIVED MEDICAL ERRORS AND ATTENTIONAL FAILURES AMONG KOREAN INTERNS AND RESIDENTS? Ja Young Kim*, Hyoju Sung, Ji-Hwan, Kim, Hyemin Lee, Seung-Sup Kim(BK21PLUS Program in Embodiment: Health-Society Interaction, Department of Public Health Sciences, Graduate School of Korea University)

Objectives This study sought to examine the association between extreme long working hours and patient safety related outcomes among Korean interns/residents.**Methods** We conducted a cross-sectional survey of 1,821 Korean interns/residents to examine the association between working hours per week and patient safety related outcomes in 2014. Working hours per week were classified into 5 groups: less than 60, 60-79, 80-99, 100-119, 120 or more hours. Medical errors, near miss medical errors, and attentional failures were assessed by three questions: "Over the past 3 months, have you 1) actually made any major medical errors?, 2) nearly made any major medical errors?, 3) unintentionally fallen asleep at work?" Respondents could answer "Yes" or "No" for each question. Logistic regression was applied to examine the association after adjusting for potential confounders including the year of training program, specialty, and hospital size.**Results** Although no significant association was found in the analysis with medical errors, dose-response relationship was observed between long working hours and near miss medical errors and attentional failures. Compared to the interns/residents who are working less than 60 hours per week, the odds for near miss medical errors for those who are working 60-79, 80-99, 100-119, and 120 hours or more were 1.86 (95% CI: 1.26, 2.75), 3.46 (95% CI: 2.40, 4.98), 5.02 (95% CI: 3.44, 7.33), and 6.11 (95% CI: 4.25, 8.80), respectively. And the odds for attentional failures for those working 60-79, 80-99, 100 -119, and 120 hours or more were respectively 1.89 (95% CI: 1.30, 2.74), 2.80 (95% CI: 1.91, 4.11), 6.90 (95% CI: 4.21, 11.30), and 6.07 (95% CI: 3.72, 9.90). **Conclusion** This study found that Korean interns/residents are working extremely long hours and it is associated with higher risk of experiencing near miss medical errors and attentional failures, which can threaten patient safety.

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EXAMINATION OF GENERAL SURGERY RESIDENTS' RADIATION EXPOSURES, KNOWLEDGE, ATTITUDES, AND SAFETY PRACTICES. Hayden Smith*, Richard A. Sidwell, James P. Halsey, Matthew J. McFarlane (Iowa Methodist Medical Center, Des Moines, IA, United States; University of Iowa, Carver College of Medicnine, Iowa City, Iowa, United States)

INTRODUCTION: Ionizing radiation in medical imaging constitutes a risk to patients and medical professionals. Surgical residents engage in widely varying healthcare tasks involving radiation. There are no available data on surgical resident exposures or exposures by rotation type. Study objective was to investigate general surgery resident ionizing radiation exposures, knowledge, attitudes, and safety practices. **METHODS:** An observational study was conducted based on radiation film badge dosimeters. A survey was developed examining radiation knowledge, attitudes, and precautions. Study sample included residents who wore a badge for the previous year and completed study instrument. **RESULTS:** Fourteen surgical residents (100%) engaged in 168 rotations during the study year, primarily: General Surgery (n=103, 61%); Night Float (n=16, 10%); Trauma (n=15, 9%); and Vascular (n=13, 8%). Radiation exposures were greater than a null value during the majority of rotations, with no exposure above occupational thresholds. Certain rotations, namely Vascular and Trauma, had increased exposures. Residents also ranked these rotations as potentially risky for occupational exposures. When asked if protective efforts changed during higher risk rotations, responses revealed they Increased (64%) or Did Not Change (36%). A low Cronbach alpha (α=0.2634) demonstrated precaution use was not universal and had varied rationale. Percent of correct radiation knowledge questions was 62%, which was greater than chance ($p<0.0001$). A multilevel model predicting exposure had a significant multiplicative cross-level interaction term ($p< 0.0001$) between resident-level and rotation type.**CONCLUSIONS:** Study demonstrated detectable radiation exposures. Stochastic and dose-response effects of radiation exposures make any dose a concern. Attempts to lessen exposures are worthwhile, with study results identifying a need for greater safety precaution education and adherence.

617-S/P

EXPERIENCE OF WORKPLACE VIOLENCE IS ASSOCIATED WITH DEPRESSIVE SYMPTOMS AMONG MEDICAL RESIDENTS IN SOUTH KOREA: 2014 KOREAN INTERN/RESIDENT SURVEY. Ji-Hwan Kim*, Ja Young Kim, Hyoju Sung, Yugyun Kim, Seung-Sup Kim BK21PLUS Program in Embodiment: Health-Society Interaction, Department of Public Health Sciences, Graduate School of Korea University)

Objective: This research sought to assess the prevalence of workplace violence and its perpetrators, and to examine the association between workplace violence and depressive symptoms outcomes among medical residents in South Korea. **Methods:** We conducted a cross-sectional survey, entitled 2014 Korean Intern/Resident Survey to understand working environment and health conditions among medical residents in South Korea. This research sought to examine how experience of workplace violence was associated with depressive symptoms among 1,215 medical residents in South Korea. We assessed experience of three different workplace violence (i.e. physical violence, verbal assault, sexual harassment) during the past 12 months and its perpetrators (i.e. faculty members, senior residents/fellow, resident in same training year, patient or caretaker). Depression during the past one week was assessed using a 10-question version of the Center for Epidemiologic Studies Depression Scale questionnaire. **Results:** High prevalence of workplace violence was observed: 43.9% for verbal assaults, 11.4% for physical violence, and 5.6% for sexual harassment. After adjusting for potential confounders including working hour, medical specialty, training year, and hospital size, depression was associated with experience of physical violence (PR: 1.30, 95% CI: 1.06-1.59), verbal assault (PR: 1.38, 95% CI: 1.16-1.64), and sexual harassment (PR: 1.63, 95% CI: 1.29-2.06). Compared to those who never experienced workplace violence, prevalence ratio for having depressive symptoms for respondents who experienced one, two, and three workplace violence were 1.33 (95% CI: 1.10-1.61), 1.58 (95% CI: 1.26-1.98), and 2.02 (95% CI: 1.43-2.86), respectively. **Conclusions:** This study found that medical residents are frequently exposed to workplace violence and that their experience of workplace violence is associated with depression.

618-S/P

EXPERIENCE OF WORKPLACE VIOLENCE IS ASSOCIATED WITH MUSCULOSKELETAL PAIN AMONG WAGED EMPLOYEES IN SOUTH KOREA. Jaehong Yoon*, Hyoju Sung, Jooyoung Park, Ji-Hwan Kim, Seung-Sup Kim (School of Health Policy & management, Korea University)

Background We sought to examine the association between experience of workplace violence and musculoskeletal pain among waged employees in South Korea. **Methods** We analyzed a cross-sectional survey of 29,601 workers from the third wave Korean Working Conditions Survey in 2011. Experience of workplace violence was assessed through three questions, "Over the past 12 months, have you ever experienced: (1) physical violence, (2) bullying, or (3) sexual harassment at workplace?" MSDs were measured using the three questions, "Over the past 12 months, have you ever experienced; (1) low back pain, or (2) upper limbs pain (i.e. shoulder, neck, and arm), or (3) lower limbs pain (i.e. hip, leg, knee, and foot)?" Workers could answer 'Yes' or 'No' for each of the three questions. Multivariable Poisson regression with robust variance was applied to examine the association between workplace violence and MSD after adjusting for confounders including physical work factors. All analyses were performed using STATA/SE version 13.0. **Result** Physical violence was associated with low back pain (PR: 2.17, 95% CI: 1.77, 2.65), upper (PR: 1.65, 95% CI: 1.45, 1.88) and lower limb (PR: 1.80, 95% CI: 1.52, 2.14) among male workers whereas it was related to upper (PR: 1.86, 95% CI: 1.53, 2.26) and lower limb pain (PR: 2.95, 95% CI: 2.47, 3.53) among female workers. Significant association was observed between sexual harassment and upper (PR: 1.26, 95% CI: 1.01, 1.56) and lower limb pain (PR: 2.41, 95% CI: 1.98, 2.93) among female workers whereas the association was only significant in the analysis with lower limb pain (PR: 1.86, 95% CI: 1.17, 2.95) among male workers. Bullying was associated only with lower limb pains among both male (PR: 1.77, 95% CI: 1.32, 2.37) and female (PR: 2.10, 95% CI: 1.69, 2.61) workers. **Conclusion** This study found that experience of workplace violence, particularly physical violence and sexual harassment, was associated with musculoskeletal pain among Korean workers.

619-S/P

HEALTH EFFECTS OF SILICA DUST EXPOSURE IN TACONITE MINING: UNDERSTANDING MIXED DUST EFFECT. Nnaemeka Odo (University of Minnesota School of Public Health)

Objective: The objective of this study was to understand mixed dust health effects in taconite mining. We explored the effect modification and interaction effects of other respirable dust fractions present in mining on the association between respirable silica and lung health abnormalities. **Methods:** The Respiratory Health Study was a cross-sectional health assessment of current and former Minnesota taconite industry miners. The primary exposure was respirable silica, a fraction of total respirable dust measured onsite and stratified into high and low levels by the median. Other exposures measured, elongate mineral particles (EMPs), as well as the remaining fraction of total respirable dust ('other dust') were also stratified into dichotomous levels. The health outcomes analyzed were parenchymal abnormalities on chest x-ray and spirometric restriction outcomes. Based on dichotomous exposure levels, we present, (i) the ORs for each exposure (silica, "other dust", EMP) stratum with the lower level exposure as reference for each of the outcomes (parenchymal abnormality and spirometric restriction); (ii) the ORs for respirable silica within strata of EMP; (iii) interaction measures on additive and multiplicative scales; and (iv) stating confounding variables adjusted for each model. Step (ii) above was repeated for strata of "other dust" to study effect modification. Step (ii) was also repeated to study interaction by stratifying EMP and "other dust" exposures on dichotomous silica levels. Measures of interaction on the additive (RERI) and multiplicative scale (ratio of ORs) are presented with 95% CIs. Discussion: Dust exposures encountered by miners in the taconite industry are mixed. Respirable silica is a fraction of total respirable dust generated in the mining process. This study presents results examining mixed dust effects to better understand the relationship between silica dust and respiratory disease in mining.

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ISCHEMIC HEART DISEASE INCIDENCE IN RELATION TO FINE VERSUS TOTAL PARTICULATE MATTER EXPOSURE IN THE U.S ALUMINUM INDUSTRY. Andreas M Neophytou*, Elizabeth M Noth, Sa Liu, Sadie Costello, Daniel M Brown S Katharine Hammond, Mark R Cullen, Ellen A Eisen (Division of Environmental Health Sciences, UC Berkeley School of Public Health)

Incident ischemic heart disease (IHD) has been linked to occupational exposures to airborne particles with a diameter <2.5 μm (PM2.5). These smaller particles are more likely to cause IHD than the larger particles measured as total particulate matter (TPM), but routine industrial exposure surveillance is generally focused on TPM. We compared the exposure-response between particulate matter concentrations in each to the two different particle size fractions and IHD risk in a cohort of actively working aluminum manufacturing workers in the U.S. To account for the presence of time varying confounding by health status we applied marginal structural Cox models in a cohort followed with medical claims data for IHD incidence from 1998 to 2012. Analyses were stratified by work process into smelters (n=7,105) and fabrication (n=8,331). Binary exposure was defined by the 10th-percentile cutoff from the respective TPM and PM2.5 exposure distributions for each work process. Hazard Ratios (HR) comparing those always exposed above the cutoff with those always exposed below the cutoff were higher for PM2.5, with HRs of 1.68 (95% CI: 1.12 – 2.63) and 1.42 (95% CI: 0.99 – 2.03) in smelters and fabrication, respectively. For TPM, the HRs were 1.18 (95% CI: 0.90 – 1.53) and 1.18 (95% CI: 0.84 – 1.66) for smelters and fabrication respectively. While overall concentrations of TPM and PM2.5 were correlated in this population, results indicate that, consistent with biologic plausibility, PM2.5 is a stronger predictor of IHD risk than TPM in the aluminum industry.

621-S/P

JOB INSECURITY AND DEPRESSION AMONG 564 AUTOMOBILE SALES WORKERS: A SEVEN YEAR FOLLOW-UP STUDY. Yugyun Kim*, Ji-Hwan Kim, Ja Young Kim, Hyoju Sung, Seung-Sup Kim (BK21PLUS Program in Embodiment: Health-Society Interaction, Department of Public Health Sciences, Graduate School of Korea University)

Job insecurity is everyday threat of future uncertainty which could have long-term health effects. Previous studies have reported that job insecurity could be a critical risk factor for worker's mental health. This study sought to examine the effect of job insecurity on depression among automobile sales workers. We analyzed the longitudinal cohort data of 564 sales workers from an automobile company, the dataset was collected twice in 2007 and 2014. Job insecurity was measured by 5-item questions from Korean occupational stress scale such as "I can hardly be fired or unemployed", "Undesirable changes (i.e. downsizing) will come to my job", and "I can easily find a new job equal to the condition of the current job". Based on worker's reporting of job insecurity in 2007 and 2014, change of job insecurity was classified into four groups: 'secure-secure', 'secure-insecure', 'insecure-secure', and 'insecure-insecure'. Depression was assessed by Beck's Depression Index. After adjusting for potential confounders including depression in 2007, compared to 'secure-secure' group, 'secure-insecure' (OR: 2.23, 95% CI: 1.23- 4.02) and 'insecure-insecure' group (OR: 1.95, 95% CI: 1.12- 3.38) had higher odds of having depression in 2014 whereas no significant was observed among 'insecure-secure' group. Our study found that job insecurity could be relevant risk factor for developing depression among sales workers in an automobile company. Given that our study population is relatively homogeneous, who are engaged in same job from the same company, our results could overcome the drawbacks in previous studies which could confound the association due to the worker's various job characteristics.

622-S/P

LONG WORKING HOURS AND ITS ASSOCIATION WITH MUSCULOSKELETAL PAIN AMONG INTERNS/RESIDENTS IN SOUTH KOREA. Hyoju Sung*, Hyemin Lee, Ja Young Kim, Yugyun Kim, Seung-Sup Kim (BK21PLUS Program in Embodiment: Health-Society Interaction, Department of Public Health Sciences, Graduate School of Korea University)

Objective: It has been reported that interns/residents in South Korea are working extreme long hours on average of more than 90 hours per week. This study sought to examine the association between long working hours and musculoskeletal pains among Korean interns/residents. **Methods:** We analyzed a cross-sectional survey of 1,619 Korean Interns and Residents (2014). Working hours per week was categorized into five groups: less than 60, 60-79, 80-99, 100-119, 120 or more. Experience of three different musculoskeletal pains (i.e. upper limb, low-back, and lower limb pains) over the past 3 months were measured through self-reports. Based on whether the pain interferes with work, each musculoskeletal pain was categorized into three groups: (1) no pain, (2) pain without interfering with work (3) pain interfering with work. **Results:** After adjusting for potential confounders including medical specialties and self-reported physical work factors, long-working hours were associated with upper limb pain and low-back pain, particularly when those pains interfered with work. Compared to 'working less than 60 hours', long-working hours had a dose-response relationship with upper limb pain interfering with work: 60-79 hours (OR: 1.46, 95% CI: 0.89, 2.40), 80-99 hours (OR: 2.38, 95% CI: 1.43, 3.95), 100-119 hours (OR: 3.06, 95% CI: 1.76, 5.31), and 120 hours or more (OR: 4.39, 95% CI: 2.52, 7.65). Similar dose-response relationship was observed in the analyses with low back pain. However, no significant relationship was observed in the analyses with lower limb pains except the association between 'working 120 hours or more per week' and lower limb pain interfering with work (OR: 2.34, 95% CI: 1.22, 4.49). **Conclusions:** Long working hours may increase risk of musculoskeletal pains among interns/residents in South Korea. Interns/residents who are working 120 hours or more per week was significantly at higher risk of having all three different musculoskeletal pains interfering with work.

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MATERNAL WORK IN A TECHNICAL FIELD IS ASSOCIATED WITH AUTISM SPECTRUM DISORDER. EC McCanlies; C Ma, J Gu; D Fekedulegn , and I Hertz-Picciotto (National Institute for Occupational Safety and Health)

Previous research indicated that paternal occupation in a technical field is positively associated with autism spectrum disorder (ASD). However, another report only found this relationship with maternal occupation. We conducted a case-control study to determine if parent occupation in a technical field was associated with ASD in 978 children (556 ASD, 423 typically developing). Our participants consisted of families enrolled in the Childhood Autism Risks from Genetics and Environment (CHARGE) study. Parental occupational information up to six months prior to pregnancy until birth was analyzed. Using Standard Occupational Classification codes occupational data were divided into white collar technical or nontechnical and blue collar technical or nontechnical groups. ORs and 95% CIs were calculated using logistic regression controlling for child age, race, regional center catchment area, parent's age and education level. Fathers of children with ASD were more likely to work in business and finance (7.5% vs. 2.8%, p=0.002) and less likely to work in construction and extraction (5.9% vs. 11.3%; p=0.004) compared to fathers of typically developing children. Mothers of children with ASD were more likely to work in computer and mathematical sciences compared to mothers of typically developing children (4.2% vs. 1.2%; p=0.02). Among parents who only worked in a white collar occupation, mothers who worked in computer and mathematical sciences were more likely to have a child with ASD (OR=3.6; 95% CI=1.2-11.0) compared to mothers who worked in white collar non-technical jobs. This relationship was not observed for fathers. These results support previous research showing that ASD is associated with maternal, but not paternal occupation in a technical field, after controlling for parental education and age. This study is limited by a small sample size; further prospective research is needed to confirm these results and help explain the etiology underlying these associations.

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WHO IS WORKING WHILE SICK?: NON-STANDARD EMPLOYMENT AND ITS ASSOCIATION WITH ABSENTEEISM AND PRESENTEEISM IN SOUTH KOREA. Seung-Sup Kim*, Ja Young Kim, Hyoju Sung, Joohee Lee, Carles Muntaner (Department of Public Health Sciences, Korea University, South Korea)

Objectives: Previous studies have reported that non-standard employment is not or negatively associated with absenteeism. This study sought to examine the relationship of non-standard employment with presenteeism as well as absenteeism in South Korea. **Methods:** We analyzed a cross-sectional survey of 26,611 full-time employees from the third wave of the Korean Working Conditions Survey (2011). Experience of absenteeism and presenteeism during the past 12 months were assessed through self-reports. And employment condition was classified into six categories based on two contract types (parent firm Vs subcontract) and three different contract durations [permanent, long-term (longer than 1 year, but fixed), short-term (1 year or less, but fixed)]: 1) 'parent firm-permanent', which has been traditionally regarded as a standard employment, 2) 'parent firm-long term', 3) 'parent firm-short term', 4) 'subcontract-permanent', 5) 'subcontract-long term', and 6) 'subcontract-short term.' **Results:** We found opposite trend between absenteeism and presenteeism analyses after adjusting for potential confounders including working hours, having labor union at workplace, and company size. Absenteeism was not or negatively associated with all form of employment condition except 'parent firm-long term' (OR: 1.87, 95% CI: 1.56, 2.25), compared to 'parent firm-permanent'. However, presenteeism was positively associated with 'parent firm-long term' (OR: 1.65, 95% CI: 1.42, 1.92), 'subcontract-long term' (OR: 1.63, 95% CI: 1.13, 2.36), and 'subcontract-short term' (OR: 1.29, 95% CI: 1.04, 1.60). **Conclusion:** This study found that most non-standard employment may increase risk of presenteeism, not absenteeism. The results suggest that previous findings about the protective effects of non-standard employment on absenteeism may be explained by that non-standard workers were enforced to work although they were sick because of job insecurity and disempowerment at workplace.

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ASSOCIATION BETWEEN EXCLUSIVE BREASTFEEDING HISTORY AND DIETARY VARIETY AMONG PRETERM CHILDREN AGED 1-3 YEARS. Jesse S. Husk*, Sarah A. Keim (Research Institute at Nationwide Children's Hospital)

Among full-term infants, breastfeeding history is associated with increased dietary variety and vegetable consumption. Pre-term birth limits early feeding options while increasing risk for negative health outcomes that could be mitigated by diet. We analyzed data from two clinical trials investigating the effect of fatty acid supplementation on cognitive development for 10-39 month old children born before 35 weeks gestation (n=189). Mothers reported breastfeeding history and completed a 161-item food frequency questionnaire (modified Willett) for their child's diet at trial baseline. Dietary variety was assessed via: (1) proportion food items consumed at least once, (2) servings of given food item consumed relative to total food servings, (3) daily probability of consuming a given food item. Overall, 47% of children were ever exclusively breastfed (mean duration=38 days, range=0-240). On average, children consumed 44% (SD=12%) of all foods, 66% (SD =15%) of grains, 52% (SD =15%) of fruits, 49% (SD =19%) of meats/fishes, and 48% (SD =18%) of vegetables at least once per month. Dietary variety for vegetables and meats/fishes increased with exclusive breastfeeding duration for all 3 variety measures (e.g. proportion of vegetables consumed increased by 1.47% (95% CI=0.15-2.82), and meats/fishes by 1.68% (95% CI=0.36-3.00) for each extra month of exclusive feeding, after adjustment for age, race, sex, weeks gestation, maternal age, parental education, family income, and WIC participation). These results are consistent with those in full term children, and could support exclusive breastfeeding as a means of improving diet and health in preterm children if the association is causal.

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ASSOCIATION OF INTIMATE PARTNER VIOLENCE WITH SLEEP DISTURBANCES DURING PREGNANCY. Qiu-Yue Zhong, Bizu Gelaye, Suhayla Islam, Sixto Sanchez, Michelle A. Williams (Harvard T.H. Chan School of Public Health)

Objectives: Intimate partner violence (IPV), an important health risk to mothers and fetuses, is a serious global health problem. We examined the associations of IPV with stress induced sleep disturbance measured by the Ford Insomnia Response to Stress Test (FIRST) and sleep quality measured by the Pittsburgh Sleep Quality Index (PSQI) during pregnancy. **Methods:** This cross-sectional study included 634 pregnant Peruvian women. In-person interviews were conducted in early pregnancy to collect information regarding IPV history, and sleep disturbances. Adjusted odds ratios (aOR) and 95% confidence intervals (95%CIs) were calculated using logistic regression procedures. **Results:** Lifetime IPV was associated with a 1.54-fold increased odds of stress induced sleep disturbance (95%CI: 1.08-2.17) and a 1.93-fold increased odds of poor sleep quality. Compared with women experiencing no IPV during lifetime, the aOR (95%CI) for stress induced sleep disturbance associated with each type of IPV were: physical abuse only 1.24 (0.84-1.83), sexual abuse only 3.44 (1.07-11.05), and physical and sexual abuse 2.51 (1.27-4.96). The corresponding aORs (95%CI) for poor sleep quality were: 1.72 (1.13-2.61), 2.82 (0.99-8.03), and 2.50 (1.30-4.81), respectively. Women reporting any IPV in the year prior to pregnancy had increased odds of stress induced sleep disturbance (aOR=2.07; 95%CI: 1.17-3.67) and poor sleep quality (aOR=2.27; 95%CI: 1.30-3.97) during pregnancy. The odds of stress induced sleep disturbance and poor sleep quality were not significantly elevated among women experiencing physical abuse only and physical and sexual abuse in the year prior to pregnancy. **Conclusion:** Lifetime and prevalent IPV exposures are associated with stress induced sleep disturbance and poor sleep quality during pregnancy. Our findings suggest that sleep disturbances may be important mechanisms that underlie the lasting adverse effects of IPV on maternal and perinatal health.

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CAN SERUM PROGESTERONE CONCENTRATION IN EARLY PREGNANCY PREDICT PRETERM BIRTH? Song-Ying*, Shen, Jian-Rong He, Wei-Dong Li, Jin-Hua Lu, Wan-Qing Xiao, Yong Guo, Fang Hu, Yu Liu, Xing-Xuan Wen, Hui-Min Xia, Xiu Qiu (Division of Birth Cohort Study, Guangzhou Women and Children's Medical Centre, Guangzhou Medical University, Guangzhou, China)

Background: The corpus luteum is the main source of serum progesterone before 7 weeks of gestation and the placenta take over this function around 7 to 9 weeks. Since serum progesterone level could be an indicator for the placental function, we hypothesized that the serum progesterone during early pregnancy is predictive for preterm birth (PTB, birth < 37 weeks of gestation). **Methods:** This study was embedded in an ongoing prospective study, the Born in Guangzhou Cohort Study, China. Participants were recruited between February 2012 and June 2014, who had at least once serum progesterone test from 4 to 10 weeks of gestation and gave singleton live birth. A total of 2502 pregnant women were included. The relationships between progesterone concentration and the risk of preterm birth were evaluated by logistic regression model, adjusted for maternal age, pre-pregnancy BMI, parity, previous history of preterm delivery, vaginal bleeding, used assisted reproductive technology, et al. The performance of progesterone alone or combined with other risk factors for the prediction of PTB were assessed by receiver operating curve (ROC) analysis. **Results:** The mean (SD) of progesterone levels from 4 to 10 weeks of gestation presented a "V" shape. There was no significant difference in progesterone levels between women with PTB and those term delivered, with the exception of 8 weeks of gestation [66.0 (21.2) for term birth vs. 58.5 (20.1) nmol/L for PTB, P=0.05]. The risk of PTB increased 39.7% (95% CI, 2.2-91.0) for per 10 nmol/L progesterone decrease at 8 weeks. Combined with other risk factors, progesterone level at 8 weeks of gestation had a sensitivity and specificity of 74.1% (95% CI, 51.9-88.9) and 69.4% (95% CI, 47.9-79.5) for the prediction of PTB, respectively. **Conclusion:** The combined use of progesterone level at 8 weeks of gestation and other risk factors had a reasonable sensibility and specificity for the prediction of PTB.

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CONSTRUCT VALIDITY AND FACTOR STRUCTURE OF THE PITTSBURGH SLEEP QUALITY INDEX AMONG PREGNANT WOMEN IN A PACIFIC-NORTHWEST COHORT. Chunfang Qiu*, Bizu Gelaye, Qiu-Yue Zhong, Daniel A. Enquobahrie, Ihunnaya O. Frederick, Michelle A. Williams (Center for Perinatal Studies, Swedish Medical Center, Seattle, WA)

Objectives: Poor sleep quality during pregnancy is associated with adverse obstetric and neuropsychiatric outcomes. Despite its routine use as a sleep quality assessment scale among men and non-pregnant women, the psychometric properties of the Pittsburgh Sleep Quality (PSQI) have not been assessed among US pregnant women. We sought to evaluate the construct validity and factor structure of the PSQI among 1,488 pregnant women. **Methods:** A structured interview was used to collect information about demographics and sleep characteristics in early pregnancy. The Patient Health Questionnaire-9 (PHQ-9) and the Depression, Anxiety, and Stress Scale-21 (DASS-21) were used to assess symptoms of depression, anxiety and stress. Consistency indices, exploratory and confirmatory factor analyses (EFA and CFA), correlations, and logistic regression procedures were used. **Results:** The reliability coefficient, Cronbach's alpha, for the PSQI items was 0.74. Results of the EFA showed that a rotated factor solution for the PSQI contained two factors with eigenvalues greater than 1.0, which accounted for 52.9% of the variance. The PSQI was significantly positively correlated with the PHQ-9 (r=0.47) and DASS-21 (r=0.42) total scores. Poor sleepers (PSQI global score >5) had increased odds of experiencing depression (OR=6.47; 95%CI: 4.96-9.18), anxiety (OR=3.59; 95%CI: 2.45-5.26) and stress (OR=4.37; 95%CI: 2.88-6.65) demonstrating evidence of good construct validity. CFA results corroborated the two-factor structure finding from the EFA; and yielded reassuring measures indicating goodness of fit (comparative fit index of 0.975) and accuracy (root mean square error of approximation of 0.035). **Conclusions:** The PSQI has good construct validity and reliability for assessing sleep quality among pregnant women. Further assessment and validation studies are needed to determine whether the two factor-specific scoring of the PSQI is favored over the PSQI global score in pregnancy.

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DEVELOPMENT OF A RISK PREDICTION MODEL FOR CESAREAN DELIVERY AFTER LABOR INDUCTION. Valery A Danilack*,. Jennifer A Hutcheon, Elizabeth W Triche, David D Dore, Janet H Muri, Maureen G Phipps, David A Savitz(Brown University School of Public Health, Women & Infants Hospital of Rhode Island)

Labor induction may increase the risk of cesarean delivery in certain women, but prediction models to date have had limited ability to help guide clinical practice. Unlike prior studies that focused on characteristics at the onset of induction, we used demographic factors, maternal conditions, and pregnancy complications to develop a prediction model for cesarean delivery after labor induction. Starting with k=50 candidate predictors, we used logistic regression with forward stepwise selection and determined the best model based on incremental improvement in the area under the receiver operating characteristic curve (AUC). We assessed model calibration and discrimination and used bootstrapping to evaluate internal validation. We examined predictive ability of the model by hospital size, teaching status of hospital, and whether the induction was medically indicated. The final model contained 10 variables - gestational age, maternal race, parity, maternal age, obesity, fibroids, excessive fetal growth, chorioamnionitis, placental abruption, and high station - and was well-calibrated with good risk stratification at the extremes of predicted probability. The model had an AUC of 0.81 (95% confidence interval: 0.81-0.82), with average bias of 0.001 with internal validation. A predicted probability ≥ 17% to define a positive test had 84% sensitivity and 63% specificity. There was minimal difference in AUC by hospital size or teaching status, but non-medically indicated inductions had a higher AUC than medically indicated inductions. While external validation is still needed, such a prediction model could be used by clinicians to estimate an individual's risk of cesarean delivery when considering whether to induce labor.

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DIFFERENCES IN MORTALITY RATES FOR VERY PRETERM BIRTHS ACROSS EUROPE: THE EPICE STUDY. Bradley Manktelow*, Elizabeth Draper, Mercedes Bonet, Jennifer Zeitlin on behalf of the EPICE Group (University of Leicester, UK)

Background: Wide variation in the mortality rates for very preterm births (VPTBs) across Europe has been reported. Here we investigate the contribution of potential explanatory factors to this variation using the standardised population-based cohort of VPTBs from 19 regions in 11 European countries participating in the EPICE (Effective Perinatal Intensive Care in Europe) study. **Methods:** All births between 22+0 and 31+6 weeks gestational age in each EPICE region were included in the cohort. Standardised data collection was undertaken in each region and ascertainment validated against birth registers. All VPTBs were followed to death or discharge home. Mortality rates were calculated for the total cohort (n=10,328), live born infants and those admitted for neonatal care as appropriate. Potential maternal and infant explanatory factors for the variations in mortality rates were investigated. **Results:** Over half of the observed variation was due to variations in terminations of pregnancy (TOP) and major congenital anomalies. Excluding TOPs and major congenital anomaly, crude in-hospital mortality rates for the regions for all VPTBs ranged from 19.7% to 35.8%, 7.9% -20.1% for live births and 6.0%-14.9% for admissions to neonatal care. Following adjustment for maternal and infant characteristics, the range in these rates reduced to 18.6%-30.8%, 7.7%-18.7% and 4.9%-13.9% respectively. Variation persisted by gestational age and by time of death. **Conclusions:** Only a small proportion of the variation in mortality rates was explained by maternal and infant factors. Variations in perinatal and neonatal care provision require investigation to identify factors that may account for the remaining variation in mortality.

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DOES INFANT SEX PREDICT EARLY BIRTH DIFFERENTLY IN INFANTS OF BLACK AND WHITE PARENTS? Olga Basso*(McGill University, Montreal, Canada)

Although more boys than girls are born preterm, previous reports suggest that little or no preterm male excess is seen in Black infants. I examined the association between male sex and birth before 34 completed weeks in singleton US infants born between 2004 and 2008 to White and Black parents, taking father's race into consideration. Among all stillbirths (for whom only mother's race was reported in all years), the proportion of boys was slightly higher in Blacks than Whites (0.514, vs. 0.526). After "cleaning" gestational age, there were 15,138,553 live births for analysis. Of these, 63.4% had two White parents (WW), 1.9% had a White mother and a Black father (WB), 0.6% had a Black mother and a White father (BW), and 8.9% had two Black parents. The percent of birth before 34 weeks (VPTB) was 1.6, 2.3, 3.0, and 3.9 in WW, WB, BW and BB infants, respectively. Male sex was associated with an OR of 1.20 (95% CI: 1.19, 1.21) for VPTB in WW babies, 1.15 (1.10, 1.20) in WB babies, 1.09 (1.02, 1.16) in BW babies, and 1.02 (1.00, 1.03) in BB babies. Among these very preterm infants, the proportion of boys ranged from 0.515 (95% CI: 0.511, 0.519) in BB babies to 0.558 (0.556, 0.560) in WW ones, and the percent of neonatal death was 10.1, 10.5, 12.6, and 12.5 in WW, WB, BW, and BB babies, respectively. Being a male was more strongly associated with neonatal death when the mother was Black (OR: 1.23, 95% CI 1.17, 1.28 in BB babies, and 1.29, 95% CI 1.06, 1.56 in BW ones). When the mother was White, the association was weaker. Among neonatal deaths, the proportion of boys ranged from 0.559 among BB babies to 0.588 in BW ones. These results corroborate previous findings that male sex has a weaker association with preterm birth in Whites, and suggest a possible role of father's race. In Blacks, male sex was less predictive of birth before 34 weeks, but it was more strongly associated with neonatal death among these babies, especially when the mother was Black.

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DURATION OF PUBERTY IN PRETERM GIRLS IN THE CHINESE BIRTH COHORT ''CHILDREN OF 1997'' L.L. HUI* C.M. SCHOOLING, H.S. LAM, G.M. LEUNG (School of Public Health, University of Hong Kong)

Objectives: Preterm birth is associated with altered pubertal timing, but the effect on pubertal duration has rarely been assessed. Here we tested the hypothesis that preterm birth is associated with shorter duration of puberty. **Method:** In the Chinese birth cohort "Children of 1997", we used multivariable linear regression to assess the association of preterm status with duration of puberty from thelarche/pubarche to menarche, adjusted for socio-economic position, mother's birth place, maternal smoking during pregnancy and mother's age of menarche. **Findings:** The mean duration of puberty from thelarche to menarche was 2.53 years. Comparing with term birth (37 to 42 gestational weeks, n=3476), preterm birth (≤36 gestational weeks, n=170) was associated with shorter duration from thelarche to menarche by 2.6 months, (95% CI 0.5 to 4.7 months). Age of menarche did not differ by preterm status but preterm girls had later thelarche. Preterm birth was not associated with shorter duration from pubarche to menarche. **Conclusions:** Lower in-utero exposure to estrogen was associated with shorter duration of puberty from thelarche to menarche, either through effects on the drivers of thelarche or on the drivers of pubertal progression. These differences may have implications for subsequent risks of cardiovascular disease and hormonal cancers.

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EARLY CHILDHOOD HEIGHT GROWTH AND ADULT WORKING MEMORY OUTCOMES. Mary Kilty, Ezra Susser, Mary Beth Terry, Ying Wei, Jill Goldstein, Pam Factor-Litvak (Department of Epidemiology, Mailman School of Public Health, Columbia University)

Background. Epidemiologic research suggests that height growth in certain age ranges is positively associated with subsequent cognitive abilities. We hypothesized that early childhood height growth is positively associated with adult working memory in the Early Determinants of Child Health Study, a follow up of two birth cohorts, the Child Health and Development Studies (CHDS) and the New England Family Study (NEFS). **Methods.** Height growth was assessed as height percentile change (HPC) over growth periods. Working memory was assessed by tests measuring verbal recall, attention, audio-vigilance and processing speed in adults (mean age=44 years). We analyzed associations in the growth periods birth to 4 months, 4 months to 1 year, and 1 to 4 years. Cohorts were analyzed separately and, depending on the growth period, sample size ranged from 136 to 160 in the CHDS and 188 to 193 in the NEFS. Mixed models were used to account for inter-sibling correlations. **Results.** We found positive and inverse associations between HPC and test scores. Results were inconsistent between cohorts. In CHDS, we found that for a 10-point increase in HPC from 4 months to 1 year, the mean attention score increased 0.61 points (0.18 standard deviation units (sdus), p=0.002). We also found that for a 10-point increase in HPC from 1 to 4 years, the mean verbal recall score increased 0.47 points (0.07 sdus, p=0.11). The OR for a high audio-vigilance score given a 10-point increase in HPC from birth to 4 months was 0.85 (95% CI 0.71, 1.02). In NEFS, we found inverse associations between a 10-point increase in HPC and the verbal recall score. For HPC from birth to 4 months the mean verbal the mean verbal recall score decreased 0.30 points (0.05 sdus, p=0.13) **Conclusions.** These results provide limited evidence that height growth is positively associated with adult working memory ability in certain scenarios.

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EARLY PREGNANCY SEAFOOD INTAKE AND FETAL GROWTH: THE OMEGA STUDY. April F Mohanty*, David S Siscovick, Mary Lou Thompson, Thomas M Burbacher, Michelle A Williams, Daniel A Enquobahrie (George E. Whalen Veterans Affairs Medical Center, Salt Lake City, UT)

Background: Previous reports of associations of maternal seafood intake with fetal growth were inconsistent. Further, little is known whether associations differ across seafood subtypes or fetal growth indices. **Methods:** Among 3,141 participants of the Omega study, a pregnancy cohort study, we investigated associations of periconceptional shell-, lean-, and fatty-fish intake with fetal growth indices. We categorized food frequency questionnaire reported seafood intake into frequencies of: <0.2 servings/month, 0.2 servings/month-<0.5 servings/week, 0.5-1 servings/week, and >1 servings/week. We abstracted birthweight, birth length, and head circumference from medical records. Using generalized linear models with a log link, the Poisson family, and robust standard errors, we estimated relative risks and 95% confidence intervals (CIs) for low birthweight (LBW, <2,500 g) and linear regression models to estimate mean differences for continuous fetal growth indices across seafood intake categories. **Results:** Medians (interquartile ranges) of shell-, lean-, and fatty-fish intake were 0.3 (0-0.9), 0.5 (0-1.0), and 0.5 (0.1-1.0) servings/week, respectively. Lean fish intake of >1 servings/week (versus <0.2 servings/month) was associated with a 2.2 -fold higher risk of LBW [95% CI: 1.2, 4.1]. Shellfish intake of >1 servings/week (versus <0.2 servings/month) was associated with a 0.6 kg/m3 higher mean ponderal index [95% CI: 0.0, 1.2 kg/m3]. There was no evidence for associations of total seafood or seafood subtype intake with other fetal growth indices. **Conclusions:** Higher intakes of lean- and shell-fish were associated with a higher risk of LBW and higher mean ponderal index, respectively. Findings highlight the importance of considerations of seafood subtype in similar investigations.

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GENETIC PREDISPOSITION IS A MAJOR RISK FACTOR FOR ATRIOVENTRICULAR SEPTAL DEFECTS AMONG INFANTS WITH DOWN SYNDROME. Cynthia Kusters*, Mieke Kerstjens-Frederikse, Marian Bakker,Rolf Berger, Henk Groen,Hermien de Walle (University of Groningen, University Medical Center Groningen, Department of Genetics, Eurocat Registration Northern Netherlands, Groningen, The Netherlands)

Objective: 40-55% of Down Syndrome (DS) patients are born with a congenital heart defect (CHD), predominantly, atrioventricular septal defects (AVSD). This study investigates "genetic" and exogenous risk factors for AVSD among children with DS.**Methods:** This population-based case-control study used birth defects registry data from 1997 through 2012. Patients with a DS diagnosis and a prenatal (≥16 weeks gestation), postnatal or post-mortem cardiac screening were selected (n=274). DS patients with an AVSD were classified as cases (n=80) and DS patients without a CHD were classified as controls (n=194). "Genetic" risk factors were defined as risk factors with at least partly a genetic origin, such as gender, ancestry and family history. Information was collected using medical records and parental questionnaires. Univariable and multivariable logistic regression analyses were performed. **Results:** Significant risk factors in the univariable logistic regression analyses were: African ancestry (OR 3.03 (95%CI: 1.05-8.74)); a positive family history of CHD (OR 3.79 (95%CI: 1.03-13.85)); female gender (OR 1.78 (95%CI: 1.05-3.01)); low parental education (OR 2.57 (95%CI: 1.04-6.34)); and body mass index less than 18.5 (OR 10.93 (95%CI: 1.19-100.64)). The risk factors for AVSD in the forward selection multivariable regression analysis were: African ancestry (OR 4.22 (95%CI: 1.16-15.33)); positive CHD family history (OR 5.09 (95%CI: 1.20-21.62)); and female gender (OR 1.83 (95%CI: 1.01-3.33)). **Conclusion:** This study suggests that the pathomechanism of AVSD among DS patients is primarily a result of a genetic predisposition. Therefore, intervention on exogenous risk factors may only slightly reduce the prevalence of AVSD. Further research using a larger cohort is warranted to determine the exact reasons why these risk factors lead to an increased prevalence of AVSD in children with DS.

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INVESTIGATING THE CHANGING TIDE IN US PRETERM BIRTH RATES: AN AGE-PERIOD-COHORT ANALYSIS. Gandarvaka L Miles*, Jocelyn R Wilder, Derek A Chapman (University of North Carolina Chapel Hill Gillings School of Global Public Health)

After steadily increasing for several decades, the rate of preterm birth (live birth at <37 completed weeks gestation) in the US began to decline in 2006. We sought to determine whether this trend reversal can be explained by birth cohort effects. Using 1985-2013 US natality data, we conducted an age-period-cohort analysis of preterm delivery among first births to white and black mothers (N=41,013,331) using the median polish method. This method isolates cohort effects by removing the additive effects of age and period from contingency table data through a series of iterative steps. Delivery years and maternal ages were collapsed into 5-year groups producing 12 synthetic birth cohorts (e.g. 1940-1944, 1945-1949…1995-1999). The median polish residuals were regressed on birth cohort indicators to produce relative estimates of cohort effects (prevalence ratios and 95% confidence intervals) using the 1960-1964 birth cohort as a reference. Strong effects of both age and period (year of delivery) on the prevalence of preterm birth were observed across both races in stratified analysis. Compared to the referent cohort, the 1940-1944 birth cohort of white women were more likely to have a first birth result from a preterm delivery (1.11 [1.05, 1.18]). In contrast, earlier cohorts of nulliparous black women were less likely to deliver preterm (1940-1944: 0.79 [0.73, 0.85]; 1945-1949: 0.94 [0.89, 0.99]; 1950-1954: 0.95 [0.91, 0.99]). These findings point to racial differences in the effect of birth cohort prior to 1955, but do not provide evidence that recent trends in preterm birth are due to cohort effects.

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MATERNAL APOLIPOPROTEIN E PHENOTYPE AS A POTENTIAL RISK FACTOR FOR POOR BIRTH OUTCOMES IN A BIRACIAL POPULATION: THE BOGALUSA HEART STUDY. Emily Harville*, Marni Jacobs, Tanika Kelly, Lydia Bazzano, Wei Chen (Tulane University School of Public Health and Tropical Medicine, Department of Epidemiology)

Apolipoprotein E (apoE) genotype, which encodes isoforms of a protein integral to cholesterol metabolism, has been investigated as a risk factor for preeclampsia and pregnancy loss. However, no existing studies have assessed the association between apoE and preterm birth (PTB) or low birth weight (LBW), two of the most common pregnancy complications. The aim of the present study was to assess the association of maternal apoE phenotype with LBW, PTB, and small-for-gestational age (SGA) in a biracial cohort. Women who underwent apoE phenotyping (n=688) were linked to 1,065 singleton births occurring in Louisiana from 1990-2009. LBW, PTB, and SGA were categorized dichotomously in the first birth and any subsequent birth identified. ApoE allele frequencies were compared among outcome groups, and risk of each outcome was estimated among women having at least one e2 or e4 allele compared to those with the most common phenotype (e3/e3) using logistic regression. The e2 allele was more common among women who had a LBW or SGA birth ($p < 0.01$) but not a PTB. Compared to the e3/e3 phenotype, women with an e2 allele were more likely to have a LBW or SGA birth, controlling for mother's age, education, race, and tobacco use during pregnancy (OR = 2.44, 95% CI = 1.06 – 5.60, and OR = 2.17, 95% CI = 1.08 – 4.37, respectively). Results suggest that apoE genotype may be a marker for risk of poor birth outcomes. More studies are needed to fully examine the influence of maternal apoE genotype on fetal growth.

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MATERNAL GESTATIONAL DISORDERS AND PERINATAL OUTCOMES. Chaitali Ghosh, Martha Wojtowycz, Donna Bacchi (SUNY College at Buffalo, Buffalo, NY)

Objective: Many modifiable maternal behaviors and experiences before and during pregnancy are associated with adverse health outcomes. The relationship between a number of maternal gestational disorders and perinatal outcomes (preterm, low birth weight and neonatal intensive care unit (NICU) admission) in the Central New York population is determined using the Statewide Perinatal Data System, in a retrospective population-based cohort study. Singleton deliveries excluding newborns with congenital anomalies among 165,739 women between 2004 and 2012 are included in this study. **Methods:** Multivariate logistic regression analysis is used to estimate ORs and CIs adjusted for maternal age, race, education, employment, parity, body mass index, number of prenatal visits, smoking, drug use, depression, number of spontaneous and induced abortions, gender of child, and hospital level. **Results:** Pre-pregnancy diabetes and hypertension, gestational hypertension, eclampsia, abruptio placenta, vaginal bleeding and having a previous pre-term infant are independently associated with more than a 3-fold risk of having a preterm birth, newborn with low birth weight, and NICU admission. Among them, abruptio placenta, eclampsia and pre-pregnancy diabetes are the largest risk factors for all three perinatal outcomes. Among infections, bacterial vaginosis is retained in the multivariate model as a risk factor for preterm and low birth weight while hepatitis C is a risk factor for NICU admission. **Conclusion:** Our findings suggest the continued importance of addressing the need to provide preconception and interconceptional care for women, since many modifiable risk factors need to be addressed well before the woman becomes pregnant.

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MEASURING ESTROGEN RESPONSE IN VAGINAL AND URETHRAL EPITHELIAL CELLS OF INFANTS: A STUDY OF SOY-BASED INFANT FORMULA FEEDING. Margaret Adgent*, David Umbach, Babetter Zemel, Andrea Kelly, Joan Schall, Eileen Ford, Walter Rogan, Virginia Stallings (National Institute of Environmental Health Sciences)

Soybeans contain isoflavone compounds that are estrogenic. Infants who are exclusively fed soy-based formula are exposed to high levels of isoflavones, but their physiologic response to this estrogenic exposure is uncharacterized. Here, we apply a classic marker of estrogen response in adult women, cytological evaluation of urogenital epithelial cells, to a study of soy-fed infants. Methods: We analyzed urogenital epithelial cells from 283 infants, all fed either breast milk (BF) (n=70), cow's milk formula (CMF) (n=111), or soy formula (SF) (n=102) since birth. Cells were collected through non-invasive urethral or vaginal swabs at birth and at 2-4 week intervals until 28 (boys) or 36 (girls) weeks of age. We assigned each sample a Maturation Index (MI) using standard gynecologic methods (Pap smear), where higher scores suggest more estrogenization. We used restricted cubic splines to estimate MI trajectories with increasing age, by feeding group. Results: Demographic characteristics differed between breast- and formula-fed infants, but not between CMF and SF infants. For SF girls, the MI trajectory was above and increasingly divergent with age from the trajectory of both CMF (p=0.02) and BF girls (p=0.01). SF boys demonstrated higher MI than CMF or BF boys until approximately 20 weeks, but all converged thereafter (p=0.08 vs. CMF; p=0.11 vs. BF). No difference in MI was observed between CMF and BF infants of either sex. Conclusions: Consistent with an estrogen response, soy formula feeding is associated with elevated MI in vaginal and, transiently, male urethral tissue. The long-term significance of these effects is unknown.

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POSTPARTUM DEPRESSIVE SYMPTOMATOLOGY IN IMMIGRANT AND US-BORN WOMEN IN NEW YORK CITY. Hannah R. Simons*, Lorna E. Thorpe, Heidi E. Jones, Teresa Janevic, Jennifer Beam Dowd (Planned Parenthood Federation of America)

Background: Postpartum depression affects 10–15% of new mothers in the US. Studies conducted outside of the US have found a higher prevalence of postpartum depression in immigrant compared to native-born women. US studies have been less consistent but have used convenience samples and lacked appropriate comparison groups. **Objectives:** To compare prevalence and risk factors for postpartum depressive symptomatology (2-4 months after birth) between immigrant and US-born women in New York City (NYC). **Methods:** In a cross-sectional analysis of NYC Pregnancy Risk Assessment Monitoring System data (2009–2010), we used log-binomial regression to assess the association between nativity and postpartum depressive symptomatology and to determine whether effect measure modification by age, race/ethnicity, and education were present on the additive and multiplicative scales. Among immigrant women only, we assessed the relationship between exposure to the US (e.g. time since and timing of migration) and postpartum depressive symptomatology. **Results:** Prevalence of postpartum depressive symptoms was comparable between immigrant and US-born women (adjusted Prevalence Ratio [aPR]=1.08, 95% CI .74–1.58), but varied by race/ethnicity and education. Non-Hispanic White immigrant women were at elevated risk compared to their US-born counterparts (aPR=2.46, 95% CI 1.27–4.77; interaction contrast [IC]White v. Black=-.11, P=.01; ratio of prevalence ratios [RPR] White v. Black =.22, 95% CI .08–.61), as were immigrant women with high school degrees or more compared to their US-born counterparts (aPR=1.73; 95% CI .95–3.14; IC=-.09, P=.01; RPR=.35; 95% CI .14–.88). There was a slightly elevated, non-significant risk of depressive symptomatology among immigrant women with greater compared to less exposure to the US. **Conclusions:** Routine screening and referral to culturally appropriate support/treatment might be offered to subgroups of immigrant women (i.e. non-Hispanic White immigrant women).

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PRENATAL POLYBROMINATED DIPHENYL ETHER (PBDE) AND PERFLUOROALKYL SUBSTANCE (PFAS) EXPOSURE AND EXECUTIVE FUNCTION IN SCHOOL-AGE CHILDREN. Ann M Vuong*, Kimberly Yolton, Glenys M. Webster, Andreas Sjödin, Antonia M. Calafat, Joseph M. Braun, Kim N. Dietrich, Bruce P. Lanphear, Aimin Chen (University of Cincinnati)

Prenatal PBDE exposure has been associated with adverse neurodevelopment, but studies of prenatal PFASs have yielded inconsistent results; no study has examined the relation between these contaminants and executive function. We used data from the Health Outcomes and Measures of the Environment Study, a prospective birth cohort (Cincinnati, Ohio) with enrollment from 2003 to 2006, to examine the association between maternal serum PBDE and PFAS concentrations at 16 weeks gestation with executive function in 256 children at 5 and 8 years of age in models with repeated measurements. Executive function was assessed with the Behavior Rating Inventory of Executive Function (BRIEF) survey, which yields summary measures of behavioral regulation index [BRI] (i.e., emotional control), metacognition index [MI] (i.e., plan/organize), and global executive composite [GEC]. A 10-fold increase in BDE-153 was associated with poorer behavior regulation (β=4.48, 95% CI 1.42, 7.53) and global executive functioning (β=3.29, 95% CI 0.09, 6.50) at age 8. In addition, higher odds of BRIEF scores in a range that is clinically relevant (≥60) was observed in BRI with 10-fold increases in BDE-153 (OR=5.94, 95% CI 2.10, 16.82) at age 8. A unit increase in ln-transformed perfluorooctane sulfonate (PFOS) was associated with poorer scores at 8 years on the BRI (β=3.15, 95% CI 0.35, 5.94), MI (β=3.24, 95% CI 0.22, 6.26), and GEC (β=3.41, 95% CI 0.52, 6.30). Finally, higher odds of a clinically relevant GEC score (OR=3.55, 95% CI 1.40, 8.98) was observed at age 8. These findings suggest that prenatal exposures to BDE-153 and PFOS are associated with executive function deficits in school-age children.

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PREPREGNANCY BODY MASS INDEX UNIT-SPECIFIC OPTIMAL GESTATIONAL WEIGHT GAIN IN RELATION TO SMALL- AND LARGE-FOR-GESTATIONAL AGE OUTCOMES. Aimin Chen*, Changchun Xie, Ann M Vuong, Tianying Wu, Emily A DeFranco (University of Cincinnati)

The Institute of Medicine (IOM) 2009 gestational weight gain (GWG) guidelines are: 12.5-18, 11.5-16, 7-11.5, and 5-9 kg for underweight, normal weight, overweight, and obese women, respectively. We intended to determine optimal GWG for each prepregnancy body mass index (BMI) unit in relation to small- and large-gestational-age (SGA and LGA) infants. This may help refine the GWG guidelines with granularity and avoid abrupt changes at BMI cutoffs. We used data from 831,103 Ohio birth records from 2006 to 2012 after restricting to singleton live births at 22-44 weeks of gestation who had mothers with GWG from the 2.5-97.5th percentile by prepregnancy BMI unit. We used generalized additive models with logit link to regress binomial SGA or LGA as a function of smoothing splines of both prepregnancy BMI and GWG, generating a 3D surface plot as the basis for prediction. We adjusted for maternal age, race, education, smoking, marital status, nutrition supplemental program enrollment, Kotelchuck index, urbanicity, infant sex, live birth order, and birth year in the regression models. We calculated optimal GWG by prepregnancy BMI unit based on the criterion that both outcome probabilities do not exceed 35% of their individual predicted probability range at the respective BMIs. The calculated optimal GWG in relation to SGA and LGA was 16-20, 12.5-18, 11-16.5, 9.5-14, 7-11, 7-9, 7-8, and 5.5-8.5 kg for prepregnancy BMIs 15, 20, 25, 30, 35, 40, 45, and 50 kg/m2, respectively. The calculated optimal GWG was generally larger than IOM guidelines for prepregnancy BMIs 25-35 kg/m2, but similar for BMIs <25 or >35 kg/m2. This research suggests that it is possible to refine GWG recommendations at an individual level with a large perinatal dataset. However, more work is needed to identify representative validated datasets of BMI and GWG for analysis and incorporate additional adverse birth outcomes.

648-S/P

SELECT ADVERSE PREGNANCY OUTCOMES AMONG WOMEN VETERANS DEPLOYED IN SERVICE OF OPERATION ENDURING FREEDOM/OPERATION IRAQI FREEDOM: FINDINGS FROM THE NATIONAL HEALTH STUDY FOR A NEW GENERATION OF US VETERANS. Jodie Katon*, Yasmin Cypel, Mubashra Raza, Laurie Zephyrin, Gayle Reiber, Elizabeth M Yano Shannon Barth, Aaron Schneiderman (VA Puget Sound Health Care System, Health Services Research and Development)

Introduction: The number of women in the military is increasing rapidly raising concerns regarding deployment and reproductive health, including pregnancy outcomes. **Objective:** To determine if deployment to Operation Enduring Freedom/Operation Iraqi Freedom (OEF/OIF) is associated with increased risk of select adverse pregnancy outcomes among women Veterans. **Methods:** We conducted a cohort study using data from the National Health Study for a New Generation of US Veterans. This analysis only used data from the women respondents reporting at least one pregnancy resulting in a live birth. The unit of analysis was the individual pregnancy. Pregnancies were categorized as occurring among non-deployers, before deployment, during deployment, or after deployment. Adverse pregnancy outcomes included preterm birth, low birth weight, and macrosomia. The association of deployment with adverse pregnancy outcomes was estimated using separate logistic regression models adjusting for maternal age at outcome, race/ethnicity, and lack of independence of outcomes among women contributing multiple pregnancies. **Results:** There were 2,276 live births, including 191 preterm births, 153 low birth weight infants, and 272 macrosomic infants. Compared with pregnancies occurring before deployment, pregnancies among non-deployers and those occurring after deployment were at greater risk of preterm birth (non-deployers: Odds Ratio (OR)=2.16, 95% Confidence Interval (CI) 1.25, 3.72; after deployment: OR=1.90, 95% CI 0.90, 4.02). A similar pattern was observed for low birth weight. Deployment was not associated with risk of macrosomia. **Conclusions:** Compared with non-deployers, deployers to OEF/OIF have lower risk of preterm birth and low birth weight prior to deployment, but similar risk post-deployment. Continued research efforts are needed to understand potential pathways through which deployment may increase risk of preterm birth and low birth weight.

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SELECT PRECONCEPTION CARE BEHAVIORS AMONG HISPANIC WOMEN IN THE UNITED STATES. Julia Interrante*, Alina Flores (CDC)

Background: Folic acid consumption and counseling for medication use are elements of preconception care for improving pregnancy outcomes; however, Hispanic women are less likely to consume folic acid and receive preconception risk counseling than women of other race/ethnic groups. **Methods:** We used data from Porter Novelli's 2013 Estilos survey sent to 2,609 U.S. Hispanic adults of the Offerwise QueOpinas Panel. Surveys were completed by 1,000 individuals and results were weighted to the 2012 U.S. Census Hispanic proportions for sex, age, income, household size, education, region, country of origin, and acculturation level (based on years in the United States, language spoken at home, cultural self-identification, and use of Spanish language media). We analyzed questions about multivitamin use and healthcare provider counseling about medication use with descriptive statistics and chi-square tests. **Results:** Fifty percent of respondents were female. Of those, 37% reported daily multivitamin use. Women with medium and high acculturation reported significantly higher daily use (47% and 37%, respectively) than women with low acculturation (25%, p<0.01). Forty percent of women had a child under age 18 years and were asked about medication counseling before or during their last pregnancy. Of those, 47% reported counseling before pregnancy. Women with medium and high acculturation received significantly less preconception counseling (44% and 26%, respectively) than women with low acculturation (57%, p<0.01). **Conclusions:** Literature indicates preconception care disparities between Hispanics and other race/ethnic groups. These data suggest that differences in preconception care, specifically daily multivitamin use and preconception medication counseling, also exist among Hispanic sub-segments based on level of acculturation.

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SEX SPECIFIC ASSOCIATIONS BETWEEN PRENATAL ALCOHOL EXPOSURE AND CHILD MOTOR FUNCTION AT 11 YEARS OF AGE. Beverly J Insel*, Pam Factor-Litvak, Xinhua Liu, Virginia A. Rauh, Robin M. Whyatt (Department of Epidemiology, Mailman School of Public Health, Columbia University, New York, New York, USA)

Introduction: Previous studies have found associations between prenatal alcohol exposure and deficits in child motor function. Most of these observed negative associations only when maternal consumption exceeded specific quantities. None evaluated whether this association varied by sex of the child. **Methods:** In a follow up of 298 inner-city women and their children from the Columbia Center for Children's Environmental Health birth cohort, the Bruininks-Oseretsky Test of Motor Proficiency (BOT-2), short form, was administered to the children at age 11. The BOT-2 provides an efficient measure of fine and gross motor skills. Linear regression was used to estimate the relationship between prenatal alcohol use, reported by the mother during pregnancy, and child motor skills. We controlled for ethnicity, child age at BOT-2 administration, and child standardized body mass index. To evaluate whether associations differed by child sex, we conducted analyses separately by sex, and assessed whether the estimated coefficients differed using the Wald test. **Results:** Prenatal alcohol consumption did not vary by child sex. Among the 69 (23%) women who acknowledged drinking during pregnancy, 5 women reported having at least 3 alcoholic drinks daily, while the remaining women stated they consumed less than one drink per day. Prenatal alcohol exposure was not associated with motor skills among the 137 boys. In contrast, among the 161 girls, prenatal alcohol was significantly associated with gross motor skills (b: −1.13, 95% confidence interval [CI]: (−2.10, −0.16)) and marginally associated with fine motor skills (b: −1.09, 95% CI: (−2.50, 0.33)). The child sex difference between prenatal alcohol intake and gross motor skills was significant (p=0.01). **Conclusion:** Low daily alcohol intake during pregnancy may decrease gross motor skills among girls. Because prior research focused on high daily alcohol intake and ignored sex differences, these results deserve further replication.

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THE ASSOCIATION OF MATERNAL SOCIAL/DEMOGRAPHIC FACTORS AND 12 MONTHS OLD CHILDREN'S TV/VIDEO SCREEN TIME. Sahel Hazrati* (Inova Health System)

Objective: To explore the association between maternal social/demographic factors and 12 months old children's TV/video screen time **Design/Methods:** Over 1,700 families from various races or ethnicities have been recruited in prenatal stage, in the longitudinal genomic study of "First 1000 Days of Life", at Inova Translational Medicine Institute. Participants' biological specimens were collected and their clinical and social data were documented. Families receive a survey every six months after birth. We used the 12 months survey data to investigate if there is any association between maternal socio-demographic factors to 12 months old children's screen time. We analyzed the association of maternal variables such as maternal confidence, social support, race/ethnicity, age and education to screen time variables including TV/video time, computer/ tablet time and feeding child while TV is on, using Chi-square or Fisher's exact test and logistic regression. **Results:** Data analysis indicated that 96% of 12 month old children had some type of screen time including computer and TV. Younger and more educated mothers provided more computer/tablet time for their children compared to less educated or older mothers (p-Value<0.01). Furthermore, non-Hispanic mothers with lower social support score fed children in front of the TV more frequently, compared to Hispanic mothers or mothers with higher social support score(OR=4.35). **Conclusions:** There is a significant association between certain maternal/demographic factors and children's screen time. In the next phase of this study we will explore the impact of such technologies on children's development. The study of "First 1000 Days of Life" provides the foundation for future studies to investigate the correlation of screen time to attention deficit problems, anxiety, and obesity as well as assessing the age relevant developmental milestone.

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THE REPORTING OF STABILIZED AND RISK-ADJUSTED RATES OF STILLBIRTH AND NEONATAL DEATH IN THE UNITED KINGDOM: MBRRACE-UK. Bradley Manktelow*, Lucy Smith, Alun Evans, Elizabeth Draper,David Field, Jennifer Kurinczuk on behalf of MBRRACE-UK (University of Leicester, UK)

Background: The routine collection, analysis and reporting of perinatal death is vital in order to facilitate improvements in obstetric and neonatal care. From 2013 information on all late fetal losses, stillbirths and neonatal deaths in the United Kingdom (UK) has been collected by MBRRACE-UK. **Methods:** MBRRACE-UK data, together with individual-level data on all UK births, enables for the first time the calculation of UK-wide case-mix adjusted mortality rates. This was undertaken using an approach based on the CMS 'Hospital Compare' methodology. A mixed effects logistic regression model was developed comprising fixed terms for baby and mother characteristics (gestational age, socio-economic status, mother's age, ethnicity, sex of baby, multiple birth) and a random term for local government area (n=217). The SMR was estimated for each area by the ratio of predicted to expected outcomes, which was then multiplied by the national average to obtain a stabilized and risk-adjusted rate. Areas were identified as potential outliers if the probability of their rate being over 10% greater than the national average was >0.5. **Results:** In 2013 there were 780211 births, with 3173 stillbirths (4.07/1000 births) and 1334 neonatal deaths (1.72/1000 live births). The ranges of case-mix adjusted rates for the local government areas were 3.77-4.56 per 1000 births for stillbirths (1 potential outlier), 1.46-2.11 per 1000 live births for neonatal death (13 potential outliers). **Conclusions:** This methodology provides robust information to support the delivery of high quality care, and is vital to monitoring changes over time and to local, national and international comparisons.

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TIME TRENDS OF SELECTED MATERNAL EXPOSURES IN THE NATIONAL BIRTH DEFECTS PREVENTION STUDY. April Dawson*, Hilda Razzaghi, Annelise Arth, Mark Canfield, Samantha Parker, Jennita Reefhuis (NCBDDDD, CDC)

Our objective was to describe time trends in selected pregnancy exposures in the National Birth Defects Prevention Study (NBDPS). We analyzed data from the NBDPS for mothers of live-born infants without birth defects (controls), with an expected date of delivery (EDD) from 1998 – 2011. Mothers from the 10 participating centers across the United States were interviewed by phone between six weeks and two years after the EDD. We focused on maternal race-ethnicity and five maternal risk factors: obesity, use of folic acid-containing multivitamins, opioid analgesics, selective serotonin reuptake inhibitors (SSRIs), and the antihistamine, loratadine, because of their prevalence of use and some reports of associations with major birth defects. Prevalence time trends were examined using the Kendall's τβ test statistic. The exposure trend analysis included 11,484 control mothers. We observed a significant increase in obesity prevalence among control mothers (from 15% to 23%), as well as use of SSRIs (from 2.4% to 5.9%) and loratadine (from 3.6% to 6.4%). We also observed an increase in the periconceptional use of folic acid-containing multivitamins (from 48% to 60%). No remarkable change in the overall use of opioid analgesics was observed. The racial/ethnic distribution of mothers changed slightly during the study period. Different trends over time were observed for individual SSRIs. Long-term, population-based case-control studies continue to be an effective way to assess exposure-birth defects associations and provide guidance to health care providers. However, investigators examining rare outcomes covering many years of data collection need to be cognizant of time trends in exposures.

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CONFOUNDING BY DRUG FORMULARY RESTRICTIONS IN PHARMACOEPIDEMIOLOGIC RESEARCH. Kristian B. Filion*, Maria Eberg, Pierre Ernst (Center for Clinical Epidemiology, Lady Davis Institute, Jewish General Hospital, McGill University, Montreal, Quebec, Canada)

Background: The potential consequences of confounding due to drug formulary restrictions in pharmacoepidemiologic research remain incompletely understood. Our objective was to illustrate this potential bias using the example of fluticasone/salmeterol combination therapy (Advair©), an oral inhaler used for the treatment of asthma and chronic obstructive pulmonary disease (COPD), whose use is restricted in the province of Quebec, Canada. **Methods:** We identified all new users of fluticasone/salmeterol in Quebec's administrative health databases and classified those who received their initial dispensation of fluticasone/salmeterol between September 1, 1999 and September 30, 2003 as users from the liberal use period and those who received their initial dispensation between January 1, 2004 and October 31, 2006 as users from the restricted period. The primary outcome was time to first hospitalization for respiratory causes within 12 months of cohort entry. **Results:** Our cohort included 77,212 new users of fluticasone/salmeterol, 72,154 from the liberal period and 5,058 from the restricted period. Compared with the liberal period (crude rate=18.7 events per 100 person-years [PYs], 95% CI=18.3, 18.9), the restricted period (crude rate=26.2 events per 100 PYs, 95% CI=24.7, 27.9) was associated with an increased rate of hospitalization for respiratory causes (crude hazards ratio [HR]=1.41, 95%=1.32, 1.51). Subsequent adjustment for age, sex, and hospitalization for respiratory causes in the previous year attenuated the association (HR=1.05, 95% CI=0.98, 1.12). Further adjustment for comorbidities, respiratory and non-respiratory medications, prescribing physician specialty, and season resulted in a significantly lower rate during the restricted period (HR=0.78, 95% CI=0.73, 0.83). **Conclusions:** Drug formulary restrictions can result in substantial and unexpected confounding and should be considered during the design and analysis of pharmacoepidemiologic studies.

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MATERNAL SMOKING IN PREGNANCY AND CHILDHOOD AUTISM IN CALIFORNIA. Ondine von Ehrenstein*, Ondine von Ehrenstein, Hilary Aralis, Xin Cui, Beate Ritz

Background: Prenatal exposure are suspected to contribute to the risk of autism in childhood. Few studies have investigated smoking during pregnancy in relation to childhood autism and findings are equivocal. Aims: We hypothesize that maternal smoking may increase risks for their offspring to develop autism. **Methods:** We used a registry linkage design; this analysis includes statewide California birth data 2007 – 2008 retrieved from birth rolls. Autism cases born 2007-08 (n=6,970) and diagnosed before age 6 years were identified through records maintained by the California Department of Developmental Services and linked to their respective birth records. Controls were matched randomly by sex and birth year. Information on maternal smoking, other maternal and social demographic data were derived from birth records. Associations between maternal smoking and child autism were examined using logistic regression models. Results: Preliminary analyses indicated among all mothers who had information on smoking recorded on the birth record, 2.5% reported smoking in the first trimester. For mothers' who reported smoking more than 20 cigarettes in the first trimester the odds ratio for having a child with autism was 1.66 (1.17, 2.36) compared to non-smoking mothers, adjusting for maternal age, education and race/ethnicity. **Conclusion:** These preliminary findings suggest that maternal smoking in early pregnancy may increase their offspring's risk for developing autism.

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HEALTHY PEOPLE 2020 LEADING HEALTH INDICATORS: A SNAPSHOT OF THE NATION'S HEALTH. David T. Huang* (CDC/ National Center for Health Statistics)

The Healthy People 2020 Leading Health Indicators (LHIs) are a concise subset of the 1,200 Healthy People 2020 objectives chosen to provide a snapshot of the health of the nation and to communicate high-priority health issues and actions that can be taken to address them. The 26 LHIs, grouped into 12 topics and drawn from 17 of the 42 Healthy People 2020 topic areas, were developed by an interagency workgroup within the Department of Health and Human Services (HHS), based on recommendations from the Institute of Medicine (IOM). Using the most recent data available from 12 nationally representative federal data sources, we examine statistical significance of trends in progress toward achieving HP2020 targets through a cross-sectional analysis of the LHIs. SUDAAN was used to control for complex sample design and all estimates were age-adjusted to the 2000 standard population where applicable. We also report statistically significant health disparities at the most recent data point by demographic variables such as race/ethnicity, sex, education, income, geography, and health insurance status where data are applicable and reliable. Indicators for which targets have been met on a national level include those related to environmental quality, homicides, preterm live births, adult physical activity and muscle strengthening, and adolescent cigarette and substance use. On the other hand, indicators which track mental and oral health are getting worse, and disparities continue to persist on a national level for all indicators. This work highlights the usefulness of the LHIs as a targeted set of national health objectives for identifying areas of improvement as well as ongoing challenges.

661-S/P

THE EVIDENCE FOR PRIMARY PREVENTION IN THE UNITED STATES: RESULTS OF A PREVENTION SCIENCE META-REVIEW. Stephanie Kujawski*, Sabrina Hermosilla, Catherine Richards, Peter Muennig, Abdulrahman M. El-Sayed, Sandro Galea(Department of Epidemiology, Columbia University Mailman School of Public Health)

American health outcomes lag while costs lead compared to other high-income countries. This fact has contributed to increasing calls for investment in primary prevention efforts. Despite these calls, it is unclear where investments should go as little is known about the relative efficacy of various primary prevention interventions. We performed a systematic review of the meta-analytic literature of primary prevention interventions published between January 2000 and March 2014. Primary prevention interventions targeting causes of death with >1000 attributable deaths in the United States in 2010, from the International Classification of Diseases, tenth revision list of 358 causes of death and their risk factors, were searched in PubMed and the Cochrane Library. Inclusion criteria included statistical significance, heterogeneity ($I^2<75\%$ and/or the chi-square for heterogeneity p-value>0.10), and risk of bias deemed low to medium based on criteria reflected from the Cochrane Collaboration. Eighty-seven protocols out of 1,853 (4.70%) queried met our inclusion criteria. Twenty-four different causes of death or risk factors were represented. Anti-cholesterol interventions were best represented (N=14). The human papilloma virus vaccine was the most efficacious intervention. We found three principal limitations to the literature: first, there were relatively few primary prevention protocols found to be efficacious in rigorous meta-analyses. Second, in comparing the top 10 causes of death to the top 10 most efficacious interventions, only two leading causes of death had efficacious primary prevention interventions against them: suicide and pneumonia. Third, we found no prevention protocols targeting environment or context. Our findings suggest that more research is needed to support primary prevention efforts in the US.

670-S/P

A PROSPECTIVE COHORT STUDY OF CESAREAN DELIVERY AND SUBSEQUENT FECUNDABILITY. Rose Radin*, Ellen Mikkelsen, Kenneth Rothman, Elizabeth Hatch, Henrik Toft Sorensen, Anders Riis, Wendy Kuohung, Lauren Wise (Boston University School of Public Health)

BACKGROUND: Primary cesarean delivery (CD) has been associated with fewer subsequent births relative to vaginal delivery. It is unclear whether these results reflect effects of CD complications or other phenomena because prior studies had limited data on factors such as the indication for CD, history of infertility, and intention for further childbearing. **METHODS:** We evaluated the association between CD and fecundability among women with one previous singleton live birth in a prospective cohort study of pregnancy planners in Denmark, 2007-2012. We used questionnaire data from 910 women to measure cycles to pregnancy and covariates including body size, history of infertility, and last contraception method. Data on prior obstetric complications and delivery were obtained via linkages to the Danish Medical Birth Registry and National Registry of Patients. A proportional probabilities model estimated adjusted fecundability ratios (aFR) and 95% CI. **RESULTS**: Fecundability was not reduced among 112 women who had an emergency CD for an infant in cephalic presentation, the largest sub-group of CD (aFR=0.99, 95% CI: 0.80, 1.22 relative to spontaneous vaginal delivery). However, fecundability was reduced among 61 women who had a CD for an infant in breech presentation (aFR=0.72, 95% CI: 0.53, 0.97), and among 15 women who had an elective CD for an infant in cephalic presentation (crude FR=0.51, 95% CI: 0.25, 1.02). **CONCLUSION:** The differences in the association between CD and future fecundability by fetal presentation at the time of CD suggest that underlying maternal medical conditions or chance variation produced the inverse associations with fecundability.

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ANTI-MÜLLERIAN HORMONE IS NOT ASSOCIATED WITH PREGNANCY LOSS. Shvetha M. Zarek*, Emily M. Mitchell, Lindsey A. Sjaarda, Robert M. Silver, Jean Wactawski-Wende, Janet M. Townsend, Anne M. Lynch, Laurie L. Lesher, Joseph B. Stanford, Noya Galai, David Faraggi, Karen C. Schliep, Torie C. Plowden, Rose G. Radin, Robin A. Kalwerisky, Neil J. Perkins, Alan H. DeCherney, Sunni L. Mumford, Enrique F. Schisterman (Epidemiology Branch, Division of Intramural Population Health Research, Eunice Kennedy Shriver National Institute of Child Health and Human Development, National Institutes of Health)

Background: The association of anti-Müllerian hormone (AMH), a marker of ovarian reserve, and pregnancy loss is understudied. **Methods:** Fertile women (n=1228) attempting pregnancy with one to two prior pregnancy losses participated. Preconception AMH levels were categorized as low (<1.25 ng/mL), normal (referent group, 1.25 to 4.0 ng/mL), and high (>4.0 ng/mL) based on clinically relevant cut-points. Log binomial model with robust variance assessed RR for pregnancy loss (prevalence=12%), adjusting for age and BMI. Analyses were repeated within three domains of reproductive history, stratified across 1) history of 1 or 2 prior pregnancy losses, 2) time since most recent loss of ≤ 1 or >1 year, and 3) history of 0 or ≥1 prior live birth. **Results:** There were no significant associations observed between low or high versus normal AMH levels and pregnancy loss among women with 1 (Low AMH: RR, 1.14, 95% CI 0.7, 1.8; High AMH: RR 1.09, 95% CI 0.8, 1.5) or 2 (Low: RR, 1.44, CI 0.8, 2.3; High: RR 1.06, CI 0.6, 1.7) prior pregnancy losses. Similarly, no associations were observed when women were stratified by time since most recent loss or by history of live birth, with the exception of a higher risk of pregnancy loss with low versus normal AMH (RR 1.39, CI 1.1, 1.9) among women with a history of 2 prior pregnancy losses and/or at least one prior live birth. **Conclusion:** In fertile women with a history of loss, AMH was not consistently associated with risk of subsequent pregnancy loss. Support: NICHD, NIH

672-S/P

BODY MASS INDEX, PHYSICAL ACTIVITY AND FECUNDABILITY IN A PRECONCEPTION COHORT STUDY. CJ McKinnon*, EE Hatch, KJ Rothman, AK Wesselink, LA Wise (Boston University)

Body mass index (BMI, kg/m2) and physical activity (PA) have been associated with fertility in prior studies. We examined the relation between BMI, PA, and fecundability among 1,378 female participants from the Pregnancy Study Online (PRESTO), a North American web-based preconception cohort study. At baseline, women reported their height, weight, and hours spent performing vigorous PA (biking, jogging, swimming, racquetball, aerobics, and free weights) and moderate PA (walking and gardening). Pregnancy status was updated every 8 weeks until clinically-recognized pregnancy, fertility treatment, loss-to-follow-up, or 12 cycles, whichever came first. Fecundability ratios (FR) and 95% confidence intervals (CI) were derived from proportional probabilities models, controlling multiple covariates including age, male BMI, intercourse frequency, and PA subtype. FRs for BMI <18.5, 25-29, 30-34, and 35+ versus 18.5-24 were 1.18 (CI: 0.81-1.70), 0.99 (CI: 0.85-1.15), 0.92 (CI: 0.73-1.15), and 0.66 (CI: 0.51-0.86), respectively. FRs for 1-2, 3-4, 5+ hours/week of vigorous PA versus <1 hour/week were 0.97 (CI: 0.82-1.15), 1.01 (CI: 0.85-1.21), and 1.02 (CI: 0.83-1.26). FRs for 1-2, 3-4, 5+ hours/week of moderate PA versus <1 hour/week were 1.17 (CI: 0.87-1.57), 1.04 (CI: 0.77-1.37), and 1.03 (CI: 0.77-1.37). When we created a composite PA measure (total metabolic equivalents) or stratified PA results by BMI, there was little evidence of an association with the exception of a positive association between PA and fecundability among women with BMI 25+ (5+ vs. <1 hour/week: FR=1.31, CI: 0.99-1.72). Our findings agree with prior research showing that obesity adversely affects female fecundity. Whether vigorous PA enhances fertility among overweight/obese women warrants further study.

673-S/P

COUPLE PREGNANCY INTENTION AND RAPID REPEAT PREGNANCY: A STRATIFIED ANALYSIS BY RACE AND ETHNICITY. Susan Cha*, Saba W. Masho (Department of Family Medicine and Population Health, School of Medicine, Virginia Commonwealth University)

Background: Rapid repeat pregnancy (RRP) is a major public health concern leading to detrimental perinatal outcomes. Further research is needed to assess the role of male partners in reproductive decision-making. This study examines racial/ethnic differences in the association between discordant couple pregnancy intentions and RRP among women of childbearing age in the U.S. **Study Design:** Data came from the National Survey of Family Growth (2006/10). Multiparous women who lived with one partner/husband at time of conception for second pregnancy were included in the study. Dyads of couple pregnancy intention were created based on questions about maternal and paternal feelings about the second pregnancy prior to conception. RRP was defined as a second pregnancy occurring less than 24 months from a previous birth (yes vs. no). Separate logistic regression models provided OR's and 95% CI's. Stratified analysis assessed for racial/ethnic differences. All analyses were conducted in SAS to account for the complex sampling design. **Results:** Nearly half of all women experienced RRP and 15% reported discordant couple pregnancy intentions. Among non-Hispanic white and Hispanic women, those who reported discordant pregnancy intentions (i.e. paternal intended and maternal unintended) were more likely to have RRP than couples who both intended the pregnancy (OR [white]=3.4, 95% CI=2.2-5.1; OR[Hispanic]=7.6, 95% CI=3.3-18.0). Couples who did not intend to get pregnant had significantly increased odds of RRP than those who did intend to get pregnant; estimates were most robust among Hispanic and non-Hispanic other groups. **Conclusions:** Findings highlight the importance of male partners and couple dynamics in reproductive decisions. Increased education is needed to prevent unintended or RRP in couples who both do not desire pregnancy. Clinicians and public health workers should consider partners in family planning discussions.

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DIETARY IRON INTAKE AND TIME-TO-PREGNANCY: A PROSPECTIVE COHORT STUDY. Kristen A Hahn*, Lauren A Wise, Katherine L Tucker, Vibeke K Knudsen, Ellen M Mikkelsen, Anders H Riis, Kenneth J Rothman, Amelia Wesselink, Elizabeth E Hatch (Boston University School of Public Health)

Iron supplements and dietary non-heme iron have been suggested to increase pregnancy rates among women with fertility problems and decrease the risk of ovulatory infertility. We conducted parallel analyses of participants from two internet-based preconception cohort studies from North America (N=1100) and Denmark (N=905) (Pregnancy Study Online (PRESTO) and Snart Foraeldre). Analyses were restricted to women trying for 6 or fewer cycles at entry. We used validated population-specific food frequency questionnaires to estimate daily intake of heme, non-heme, and total iron (mg/day) at baseline. Participants completed follow-up questionnaires to update pregnancy status every 8 weeks for 12 cycles or until clinically-recognized pregnancy, whichever came first. We used proportional probabilities models to determine the cycle-specific probability of conception, expressed as a fecundability ratio (FR). Multivariable models included female age, education, BMI, physical activity, smoking, alcohol intake, last method of contraception, iron and vitamin C supplement use, dietary vitamin C and total energy. In PRESTO, we also adjusted for race/ethnicity. In PRESTO, compared with <8 mg/day of non-heme iron, the FRs for 8-10 and ≥11 mg/day were 1.08 (95% CI: 0.76, 1.52) and 1.15 (95% CI: 0.81, 1.62), respectively. In Snart Foraeldre the observed FRs for non-heme iron were 1.30 (95% CI: 0.96, 1.76) and 1.27 (95% CI: 0.87, 1.84) for 8-10 and ≥11 mg/day compared with <8 mg/day. Dietary intake of total iron and heme iron were not materially associated with fecundability. Our results suggest that higher levels of dietary non-heme iron may be associated with a small increase in fecundability.

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IS THERE AN ASSOCIATION BETWEEN THYROID-STIMULATING HORMONE (TSH) AND PREGNANCY LOSS? Torie Comeaux Plowden*, Lindsey Sjaarda, Aijun Ye, Neil J. Perkins, Shvetha Zarek, Karen Schliep, Robyn Kalwerisky, Enrique F. Schisterman, Jean Wactawski-Wende , janet Townsend, Anne Lynch, Robert Silver, Laurie Lesher, Noya Galai, David Faraggi, Rose Radin, Emily Mitchell, Alan H. DeCherney, Sunni Mumford (Epidemiology Branch, Division of Intramural Population Health Research, Eunice Kennedy Shriver NICHD)

Introduction: Overt hypothyroidism adversely impacts the female reproductive system. However, less is known about subclinical hypothyroidism, typically defined as TSH >4mIU/L with normal free thyroxine (fT4), and its effect on reproduction. Recent studies suggest that TSH levels 2.5-4 may also negatively affect reproduction. Our objective was to examine the association between pre-pregnancy TSH levels and pregnancy loss. **Methods:** This study is a secondary analysis of a large, randomized controlled trial evaluating healthy, fertile women who have had 1 or 2 prior pregnancy losses (n=1228). TSH and fT4 levels were measured from serum samples obtained at baseline. Participants were categorized as TSH <2.5 or ≥2.5 mIU/L. RR and 95% CIs for pregnancy loss were estimated using generalized linear models adjusted for age and body mass index and the probability of confirmed pregnancy using stabilized inverse-probability-weights. **Results:** Among women with an HCG detected pregnancy, 566 women had TSH<2.5 and 202 had TSH of ≥2.5. There was no statistically significant difference in pregnancy loss between the two groups (24% versus 26%, RR 0.92, 95% CI 0.70, 1.20). **Conclusion:** Women with a TSH level of ≥2.5 did not have a statistically significant difference in risk of pregnancy loss when compared to women with TSH level <2.5. Subclinical hypothyroidism may not influence early pregnancy loss in a healthy fertile population.

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MEASURING REPRODUCTIVE CAPACITY: BEYOND CLINICAL DEFINITIONS OF INFERTILITY. Melanie H. Jacobson*, Helen B. Chin, Ann C. Mertens, Jessica B. Spencer, Penelope P. Howards (Emory University, Department of Epidemiology)

Infertility and subfertility are defined differently in research and clinical settings. Clinical definitions are often based on a time period of unprotected sex without a resulting pregnancy, whereas observational studies use multiple definitions, including childlessness. Data from the FUCHSIA Women's Study, a retrospective cohort study of reproductive-aged women (22-45 years) allows for internal comparisons between various definitions of infertility and assessment of how many and which women are classified differently. The interview included many infertility metrics, such as periods of unprotected intercourse without conceiving (while trying to become pregnant and not), childlessness, failure to achieve desired family size, and physician diagnosis of infertility. Among the 2,353 women in this study, 830 (35.3%) reported that they had unprotected sex for 12 months or more without achieving pregnancy, 608 (25.8%) were childless at interview, 1155 (49.1%) had fewer children than desired, and 213 (9.1%) received a physician diagnosis of infertility. Fewer women with less than a college degree (versus ≥college degree) were classified as sub-fertile defined by childlessness compared with by 12 months of unprotected intercourse (23.2% versus 41.4%, respectively). Women who earned less than $100,000 (versus ≥$100,000) were more likely to be classified as sub-fertile by having fewer children than desired compared with by childlessness (among those with children, 44.3% versus 31.9% still had fewer than desired, respectively). These definitions may capture different aspects of a woman's ability to meet her reproductive goals, including factors beyond infertility. Variations exist in the frequency and demographic groups of women classified by each definition.

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NO ASSOCIATION FOUND BETWEEN PRENATAL EXPOSURE TO PCBS AND TOTAL SERUM TESTOSTERONE IN ADULT MALE OFFSPRING OF THE CHILD HEALTH AND DEVELOPMENT STUDIES. Linda G. Kahn*, Piera Cirillo, Barbara Cohn, June-Soo Park, Myrto Petreas, Pam Factor-Litvak(Department of Epidemiology, Mailman School of Public Health, Columbia University, New York, NY)

IntroductionThe coincident rise in widespread use of industrial and agricultural chemicals and reported decline in semen quality and increase in testicular cancer in developed countries has led researchers to hypothesize that persistent organic pollutants such as polychlorinated biphenyls (PCBs) might interfere with the production and/or regulation of male reproductive hormones. In contrast with cross-sectional studies of PCBs and testosterone, which suggest an inverse relationship between the two, investigations into the effect of prenatal PCB exposure on total testosterone have found no association at endpoints ranging from birth through adolescence. In this study, we explore whether this apparent lack of association between prenatal PCB and testosterone persists into adulthood. **Methods** Using data from a follow-up study of 196 men who were part of the Child Health and Development Studies birth cohort, we evaluated the associations between prenatal exposure to total PCBs as well as to 15 PCB congeners, both individually and grouped according to chlorination patterns and proposed biological mechanism, and testosterone measured at mean age 43. PCBs were measured in stored maternal blood samples taken immediately postpartum; testosterone and follicle stimulating hormone (FSH) were measured in blood samples collected from the adult male offspring. **Results**In multivariable linear regression analyses we found no association between total prenatal PCBs, individual PCB congeners, and PCB groupings and serum testosterone in the adult male offspring controlling for maternal weight, race, coffee intake, and income, and men's age, smoking status, perceived stress, and total serum lipids. We additionally found no association between prenatal PCBs and either FSH or the ratio of FSH to testosterone. **Conclusion** Prenatal exposure to PCBs is not associated with total serum testosterone in our data, confirming findings in other birth cohorts that included younger participants

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ONDANSETRON FOR THE TREATMENT OF NAUSEA AND VOMITING OF PREGNANCY AND THE RISK OF BIRTH DEFECTS. Samantha E Parker*, Carla Van Bennekom, Marlene Anderka, Carol Louik, Allen A Mitchell (Boston University School of Public Health, Boston, MA)

The off-label use of ondansetron to treat nausea and vomiting during pregnancy (NVP) has been increasing, yet information regarding its safety in pregnancy is inadequate. The association between first-trimester ondansetron use for NVP and the risk of specific birth defects was investigated in data from two case-control studies: the Slone Birth Defects Study (BDS) (1997-2013) and the National Birth Defects Prevention Study (NBDPS) (2005-2009*). Adjusted odds ratios (ORs) and 95% confidence intervals (CIs) were calculated to measure the association between first-trimester ondansetron use for NVP and the risk of selected birth defects compared to women with untreated first-trimester NVP. The prevalence of ondansetron use among controls increased from 0% to 6.7% in BDS (n=243) and from 2.6% to 7.2% in NBDPS (n=111) during their respective study periods. Previously-identified risks for specific defects were not supported in either data set, with the possible exception of cleft palate, which was modestly elevated (OR: 1.5; CI: 0.9,2.5) in the NBDPS but decreased (OR: 0.4; CI: 0.2,0.8) in the BDS data. We observed several previously undescribed associations with ondansetron use: in BDS, with a modestly increased risk of renal atresia (OR: 2.3; CI: 1.3,4.0) and in NBDPS, with a modestly increased risk of hypoplastic left heart syndrome (OR: 1.5; CI: 0.7,3.1) and diaphragmatic hernia (OR: 1.7; CI: 0.9,3.5). Despite the rapid increase in ondansetron use, the number of exposed cases in this data was small and risk estimates were unstable; given the current widespread use of ondansetron, further studies of its safety are needed. *Data from years 1997-2004 previously published

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PREDICTORS OF POOR FERTILIZATION FOLLOWING IN VITRO FERTILIZATION (IVF) WITH OR WITHOUT INTRACYTOPLASMIC SPERM INJECTION (ICSI) AMONG NOM MAL RESPONDERS. Laura E Dodge*, Julia S Sisti, Beth A Malizia, Alan S Penzias, Michele R Hacker (Beth Israel Deaconess Medical Center; Harvard Medical School)

BACKGROUND: Poor fertilization is a disappointing outcome for couples undergoing in vitro fertilization (IVF). This study aimed to identify predictors of poor fertilization among women undergoing IVF and IVF with intracytoplasmic sperm injection (ICSI) among normal responders. **METHODS:** Data were collected from women undergoing their first fresh non-donor IVF cycle at an academically-affiliated infertility treatment center from January 1995 through April 2012. Only normal responders were included in the analysis; these were women from whom ≥8 mature oocytes were retrieved. Poor fertilization was defined as having ≤2 mature oocytes normally fertilized, which was defined as having two pronuclei. Multivariable logistic regression was used to examine the relationship between each predictor and poor fertilization. **RESULTS:** A total of 6,797 cycles were performed among normal responders; 2,232 were ICSI cycles. The median number of mature oocytes retrieved in both the ICSI and non-ICSI groups was 11.5. Poor fertilization was found in 6% and 5% of ICSI and non-ICSI cycles, respectively. Fewer mature oocytes retrieved and male factor infertility were associated with poor fertilization among both ICSI and non-ICSI cycles (all P<0.001). Being underweight was associated with poor fertilization among ICSI cycles (P=0.006), while earlier year of cycle start (P<0.001) and older female age (P=0.02) were associated with poor fertilization among non-ICSI cycles. **CONCLUSION:** Having male factor infertility and fewer mature oocytes were significantly associated with poor fertilization regardless of ICSI utilization. While older female age was associated with poor fertilization in non-ICSI cycles, it had no effect among ICSI cycles.

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REPRODUCTIVE TECHNOLOGIES AND ETHNIC DISPARITY IN INFANT MORTALITY IN SOUTHERN ISRAEL. Ilana Shoham-Vardi*, Shakked Lubotzky-Gete, Eyal Sheiner, Natalya Bilenko(Ben Gurion University of the Negev)

Background: While infant mortality (IM) in southern Israel has declined in the years 2001-2010 in its two main ethnic groups; Jews and Bedouin-Arabs (4.7 to 4.3/1000 and 15.5 to 12.4/1000 live births, respectively), the disparity persists. At the same period of time the rate of births following fertility treatments (FT),which are covered in Israel by National Health Insurance, increased in both groups, but were more widely used by Jews (3.2% to 5% in Jews, and 0.5% to 1.4% in Bedouins). **Objective:** To examine the impact of fertility treatments on ethnic disparity in IM.**Methods:** Study population included 122,908 births (66,827 Jews and 56,081 Bedouins) at Soroka University Medical Center (SUMC), where 85.3% births in the region occur (75.4% and 95.8% of Jews and Bedouins, respectively). Information on IM was obtained from the Ministry of Health and clinical information from SUMC. **Results:** Of the Infant deaths, 19.7% in Jews and 1.5% in Bedouins occurred in infants born following FT. Population attributable IM risks associated with FT are 14.9% and 1.5% in Jews and Bedouin-Arabs, respectively. The IM risk associated with FT is mostly explained by low birthweight and prematurity. The relative IM risk associated with ethnicity (B/J) declined from 2001 to 2010 (3.29 compared to 2.88). However, when only naturally conceived pregnancies were considered, the RR(B/J) actually increased from 3.73 to 4.17. **Conclusion**: The higher prevalence of births following fertility treatments in Jews compared to Bedouins masks the trend of increasing disparity in IM among naturally conceived pregnancies

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SERUM 25-HYDROXYVITAMIN D (25(OH)D) AND MENSTRUAL CYCLE CHARACTERISTICS. Anne Marie Z. Jukic*, Kristen Upson, Quaker E. Harmon, Donna D. Baird (National Institute of Environmental Health Sciences)

In animals, diet-induced vitamin D deficiency is associated with ovarian cycle disturbances, but there are virtually no human data. We examined the association of serum 25(OH)D with menstrual cycle characteristics in African American women, 23-34 years of age (N=1696). In primary analyses, we excluded 594 women who either had no menstrual cycles in the past year or were on a medication that affects cycles. Participants reported their typical cycle length and problems with menstrual pain over the past year. Serum 25(OH)D, measured by chemiluminescence immunoassay, was used to estimate a seasonally-adjusted yearly average for each woman. We used polytomous logistic regression to estimate the association of 25(OH)D with menstrual cycle lengths categorized as "short" (<27 days, N=373), "long" (≥ 35 days, N=55), "normal" (27-34 days, N=623), or "too irregular to estimate" (N=51). The median 25(OH)D level was 15 ng/mL (IQR: 11-20). After adjustment for age, body mass index, education, income, smoking, alcohol use, and physical activity, women with higher 25(OH)D had lower odds of long menstrual cycles, with a doubling of 25(OH)D resulting in about half the odds of long cycles (OR(95%CI)): 0.54 (0.33, 0.89), p = 0.02); there was no significant association with irregular cycles. Increasing 25(OH)D was also associated with a lower odds of menstrual pain interfering with daily life "a lot," but this association was weakened when adjusting for smoking (p=0.14). Among all participants, after adjusting for ever smoking, women with a history of clinician-diagnosed vitamin D deficiency (N=223) were more likely to have reported using a hormonal contraceptive to treat either irregular cycles (OR(CI): 1.5 (1.1, 2.0), p = 0.009) or menstrual pain (OR(CI): 1.6 (1.1, 2.3), p=0.008). These findings suggest that vitamin D influences the ovarian cycle in humans. Further research should investigate whether vitamin D is on the causal pathway between smoking and menstrual pain.

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SUGAR-SWEETENED BEVERAGE CONSUMPTION AND MALE FECUNDABLITY. James J Michiel*, Lauren A Wise, Amelia K Wesselink, Kristen A Hahn, Ellen M Mikkelsen, Kenneth J Rothman, Elizabeth E Hatch (Boston University School of Public Health)

Sugar-sweetened beverage intake has been associated with a variety of adverse health outcomes, including poorer sperm motility, but its effect on male fecundability has not been examined. We assessed the association between weekly sugar-sweetened soda (SSS) intake and fecundability among male participants of the Pregnancy Study Online (PRESTO), a North American web-based preconception cohort study. At baseline, men reported detailed data on demographics, medical history, and lifestyle and behavioral factors, including their intake of SSS and diet soda. Men were linked with their female partners, and pregnancy status was updated every 8 weeks for up to 12 months or until clinically-recognized pregnancy. Fecundability ratios (FR) and 95% CIs were derived from proportional probabilities models, controlling multiple covariates including race/ethnicity, education, smoking status and BMI. Analyses were restricted to 469 couples who had been trying to conceive for ≤6 cycles at study entry. Intakes of SSS and diet soda were determined by summing total weekly soda intake (bottles/cans per week). FRs for SSS intake of 1, 2-7 and ≥8 bottles/cans per week versus no intake were 1.16 (CI: 0.85-1.57), 0.87 (0.68-1.12) and 0.65 (CI: 0.40-1.07), respectively. FRs for diet soda intake of 1, 2-7 and ≥8 bottles/cans per week versus no intake were 1.22 (CI: 0.87-1.71), 1.15 (CI: 0.88-1.49) and 1.03 (CI: 0.69-1.52), respectively. Our study is the first to examine the association between SSS intake and male fecundability. Preliminary findings on SSS agree with studies of sperm parameters. Future analyses will look at additional types of sugar-sweetened beverages, including juice.

683-S/P

TEXT MESSAGE FOLLOW-UP FOR MEDICAL ABORTION IN COLOMBIA: A PILOT RCT. Heidi Moseson*, Caitlin Gerdts, Margoth Mora, Teresa DePineres (Advancing New Standards in Reproductive Health, UCSF)

Background: For most women, a follow-up visit after medical abortion is medically unnecessary. This pilot RCT aims to establish the safety and feasibility of text-message (SMS) follow-up versus standard of care (in-person follow-up visit 15 days post procedure) after medical abortion at a clinic in Bogota, Colombia. **Methods:** Women in both intervention and control groups received wanted medical abortions according to clinic protocol. Following the procedure, women in both groups were verbally reminded to return in 15 days for a follow-up visit. Over the two weeks following, women in the intervention group received 5 text messages containing clinical information and supportive messaging. Eleven days following the procedure, women in the intervention arm were asked to respond to a simple set of self-assessment questions via text message. Women whose self-assessment indicated a need for follow-up were requested to return to the clinic as soon as possible. If follow-up was not indicated, participants were reminded to return to the clinic for the usual 15-day scheduled follow up visit. **Results:** A total of 173 women between the ages of 18-49 were enrolled in the study (intervention: n=77; control: n=96). On average, women traveled for 1.3 hours to the clinic. No serious medical complications occurred in either group, and the proportion of women returning to the clinic to be seen for side effects or mild complications before the scheduled follow-up visit was the same across study groups (4.7%). In both study groups, 92% of women were satisfied with their abortion and follow-up care. The large majority of women in both study groups would recommend the process to a friend (intervention: 86%, control: 89%), and 84% of the intervention group believed that SMS follow-up would help someone like them through the medical abortion process. **Conclusions:** SMS follow-up after medical abortion appears to be a safe and feasible method of follow-up for medical abortion care.

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THE EFFECTS OF PRECONCEPTION LOW DOSE ASPIRIN TREATMENT ON CLINICAL PREGNANCY AND LIVE BIRTH: THE IMPACT OF INFLAMMATORY STATUS. Lindsey Sjaarda, Emily Mitchell. Sunni L Mumford, Rose Radin, Shvetha Zarek Karen Schliep, Torie Plowden, Robyn Kalwerisky, Neil Perkins, Joseph Stanford, Jean Wactawski-Wende, Janet Townsend, Anne Lynch, Laurie Lesher, David Faraggi, Noya Galai, Robert Silver, Enrique F Schisterman (NICHD, NIH, Bethesda, MD)

The effects of low dose aspirin (LDA) on reproductive outcomes in women have varied among studies. Recently, preconception LDA (81mg) was reported to increase fecundability and live birth rates relative to placebo in a subset of women with a history of one recent pregnancy loss in the EAGeR randomized trial. However, the mechanisms of LDA's effects remain uncertain, and there is a need to better identify women who may benefit from treatment. We assessed high-sensitivity C-reactive protein (CRP), a marker of systemic inflammatory status, measured at baseline, in relation to subsequent clinical pregnancy, live birth, and pregnancy loss in 1184 women. Log-binomial models with robust variance assessed the association between log-transformed CRP and pregnancy outcomes, adjusted for age, BMI, race, and income. Women were divided into lower (≤1.65 mg/L, n=685) and higher (>1.65, n=499) CRP levels based on optimal cut-point analysis. LDA treatment increased clinical pregnancy in women with higher (RR: 1.19; 95% CI: 1.03, 1.38), but not lower (RR: 1.03; 95% CI: 0.94, 1.14) CRP at baseline. Likewise, LDA treatment was associated with increased live birth in women with higher (RR: 1.23; 95% CI: 1.02, 1.48), but not lower (RR: 1.02; 95% CI: 0.90, 1.17) CRP. There was no impact of LDA on pregnancy loss in either group. Thus, modifying inflammation may be a mechanism explaining LDA's previously observed effects on improving pregnancy and live birth rates in certain women. Higher CRP in women with a history of pregnancy loss may indicate a systemic inflammatory milieu amendable to improvement with preconception LDA treatment.

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A NOVEL ASSESSMENT OF POSSIBLE NEIGHBORHOOD EFFECTS ON PRETERM DELIVERY RATES. Alice David*, Cande V. Ananth, Enrique F. Schisterman, Sandra E. Echeverria, Kevin Henry, George G. Rhoads (School of Public Health - Rutgers University, NJ)

Background: Several reports demonstrate associations between preterm delivery rates and neighborhood socioeconomic characteristics that are not explained by measured maternal attributes. We explored if this might be due to unmeasured differences between women by examining preterm delivery rate for the same woman at two different neighborhoods, unlike any prior study. **Method:** We studied successive deliveries by women who changed neighborhoods between deliveries. We used a New Jersey birth certificate file with births to the same mother linked for the years 1996-2006 and with geocoded maternal addresses. Among 1,122,083 singleton births, we studied 168,864 pairs of successive siblings born at different addresses. A neighborhood deprivation score based on census tract characteristics was used to group the neighborhoods into three strata: bottom quintile ("DEPRIVED"), next quintile ("MARGINAL"), and the best three quintiles (grouped as "GOOD"). We conducted a paired analysis to examine whether moves between these strata were associated with preterm risk within the same woman. **Results:** There was a two and half fold gradient in preterm rates across race-neighborhood groups (14.7% for blacks in DEPRIVED stratum, 5.9% for whites in GOOD areas) at baseline. Combining all race/ethnicities, and, separately in whites and in Hispanics, we found no effect of neighborhood on preterm risk in any of the three possible comparisons: DEPRIVED/GOOD, DEPRIVED/MARGINAL, or MARGINAL/GOOD. Among blacks two of the three comparisons showed modest increments in risk in the more disadvantaged neighborhoods: OR's 1.15 ($p<0.05$,), 1.21 ($p<0.10$). Similar suggestive effects were found for women whose first delivery occurred below age 20. **Conclusion:** Moves between census tracts of different socioeconomic status have little effect on risk of preterm delivery although there may be a modest benefit of residing in a better environment in some high risk groups.

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DOES NEIGHBORHOOD SOCIAL COHESION MODIFY THE RELATIONSHIP BETWEEN NEIGHBORHOOD SOCIAL NORMS AND SMOKING BEHAVIORS IN MEXICO?, Paula Lozano*, Nancy L. Fleischer, Spencer Moore, Luz Myriam, Reynales Shigematsu, Edna Arillo Santillán, James F. Thrasher (Department of Epidemiology and Biostatistics, Arnold School of Public Health, University of South Carolina, Columbia, SC, USA)

BACKGROUND Neighborhood social norms and neighborhood social cohesion may in combination influence smoking behavior, however study results have been mixed. We examined the separate and combined relation of neighborhood social norms and neighborhood social cohesion with smoking behavior in a cohort of Mexican smokers. **METHODS** We used data from a panel of adult smokers and recent ex-smokers who participated in the 2011 and 2012 administrations of the International Tobacco Control Policy Evaluation Survey in Mexico. A total of 2144 participants were nested within 150 neighborhoods across 7 Mexican cities. Using generalized estimating equations, we estimated associations between neighborhood social factors and individual smoking behaviors. Neighborhood anti-smoking norms were measured as the proportion of residents in each neighborhood who believed that society disapproves of smoking. Social cohesion was measured using a 5-item cohesion scale and aggregated to the neighborhood level. **RESULTS** Neighborhood anti-smoking norms were associated with less successful quitting (RR=0.88, 95% CI 0.84–0.93). Neighborhood social norms were not associated with smoking intensity, quit attempts or relapse. However, neighborhood social cohesion modified the relation between neighborhood social norms and smoking intensity, such that residents of neighborhoods with weaker anti-smoking norms and low social cohesion had higher smoking intensity than other areas. Neighborhood social cohesion also modified the impact of neighborhood social norms on quit attempts: adults living in areas with weaker anti-smoking norms and low cohesion had fewer quit attempts than other areas. **CONCLUSIONS** Results from this research suggest that neighborhood-level anti-smoking norms may promote smoking cessation, particularly in neighborhoods with low social cohesion. Differences in results between this study and others performed in high-income countries may be due to variations in the social context.

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EARLY LIFE SOCIOECONOMIC POSITION AND IMMUNE RESPONSE TO PERSISTENT INFECTIONS AMONG ELDERLY LATINOS. Helen C.S. Meier*, Mary N. Haan, Carlos F. Mendes de Leon, Amanda M. Simanek, Jennifer B. Dowd, Allison E. Aiello(Epidemiology Branch, National Institute in Environmental Health Sciences, Research Triangle Park, NC)

Background: Individuals of low socioeconomic position (SEP) acquire persistent infections earlier in life and exhibit a higher immune response to such pathogens. It is unclear whether early or mid-life SEP is most important for shaping immune response to persistent pathogens in older age. **Methods:** Using data from the Sacramento Area Latino Study on Aging (n=1562), we evaluated two life course mechanisms to determine if early life SEP was associated with immune response to persistent infection: 1) a critical period model and 2) a chain of risk model. Early life SEP was measured as a latent variable, derived from father's and mother's education and occupation, food availability in early life and sibling mortality. Indicators for SEP in mid-life included adulthood education level and occupation. Individuals were categorized by serostatus as well as low, medium and high antibody level for four persistent infections: cytomegalovirus (CMV), herpes simplex virus-1 (HSV-1), Helicobacter pylori (H. pylori) and Toxoplasma gondii (T. gondii). Structural equation models were used to examine direct, indirect and total effects of early life SEP on each infection, controlling for age and gender using MPlus 7.2. **Results:** The independent direct effect of early life SEP on immune response was not statistically significant for any of the four infections. Higher early life SEP was associated with lower immune response through pathways mediated by mid-life SEP for T. gondii and H. pylori. For CMV, higher early life SEP was both directly associated and partially mediated by mid-life SEP. No association was found between early or mid-life SEP and HSV-1. **Conclusion:** Findings from this study support a chain of risk model, whereby early life SEP acts through mid-life SEP to affect immune response in later life. Understanding lifecourse SEP pathways that influence immune response may help explain the perpetuation of health disparities associated with these infections by SEP in the U.S.

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EDUCATIONAL MOBILITY AND TYPE-2 DIABETES AMONG LATINOS IN THE US. Allison E. Aiello*, Julia Ward, Lydia Feinstein, Adina Zeki-Al-Hazzouri, Jacqueline Torres, Mary Haan (University of North Carolina, Gillings School of Global Public Health)

Type-2 diabetes disproportionately affects Latinos in the US. Educational mobility across familial generations may play a key role in social disparities in diabetes prevalence, but few studies have collected data across multiple generations of Latinos in order to assess these pathways. We linked data from the community-based Sacramento Area Latino Study on Aging with a cohort of their adult offspring (N=591) participating in the Niños Lifestyle and Diabetes Study (NLDS) to examine the association between educational mobility over two generations with type-2 diabetes prevalence. Educational level of the offspring and their parent(s) was dichotomized as low (<12 years) versus high (≥12 years) and intergenerationally categorized as: low-low (low parent and low offspring education), low-high (low parent and high offspring education), high-high (high parent and high offspring education), or high-low (high parent and low offspring education). We defined type-2 diabetes as self-report of a doctor's diagnosis or reported medication use for type-2 diabetes or high blood sugar. We used marginal logistic regression models that accounted for sibling clustering to quantify the association between intergenerational educational mobility and type-2 diabetes among the offspring cohort. Adjusting for age and gender, participants with high-high educational mobility had 0.49 (95% CI: 0.26, 0.95) times the odds of diabetes and those with low-high educational mobility had 0.59 (95% CI: 0.34, 1.04) times the odds of diabetes, compared to participants with low-low educational mobility. There were too few subjects (n=5) in the high-low category for estimation. Educational attainment across generations is associated with lower odds of type-2 diabetes, with the greatest benefit among those with persistently high educational attainment. Future studies should examine potential underlying pathways that link educational mobility and type-2 diabetes among Latinos.

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NEIGHBORHOOD SOCIOECONOMIC CONDITIONS AND DEPRESSION: A SYSTEMATIC REVIEW AND META-ANALYSIS. Robin Richardson*, Tracy Westley, Arijit Nandi, Geneviève Gariépy, Nichole Austin (McGill University)

Background: The evidence linking neighborhood socioeconomic conditions (NSEC) with depression is mixed. We performed a systematic review of this literature, including a rigorous quality assessment that was used to explore if methodological or contextual factors explained heterogeneity across studies. **Methods:** A systematic literature search in MEDLINE (1950-Sept 2014), EMBASE (1947- Sept 2014), and PsycINFO (1967- Sept 2014) identified longitudinal studies among adolescents and adults living in high-income countries. Two independent reviewers screened studies for inclusion and performed data abstraction. We conducted a formal quality assessment, assessed publication bias, and investigated sources of study heterogeneity. Estimates were pooled using random effects models. **Results:** Our database search identified 3711 articles, 84 of which were determined to be potentially relevant, and 17 articles were included in the review. About half of the studies found a significant association between NSEC and depression, and pooled estimates suggest poorer socioeconomic conditions were associated with a higher odds of depression (OR= 1.14, 95% CI: 1.04, 1.25). Factors hypothesized a priori to explain differences across studies did not contribute to observed heterogeneity. However, study results varied by follow-up time. Among studies with less than 5 years of follow-up, there was a significant association between NSEC and depression (OR= 1.25, 95% CI: 1.13, 1.39), but funnel plots indicated that studies with null results appear to be missing from the published literature. Among studies with at least 5 years of follow-up, which showed no indication of publication bias, there was no association (OR= 1.02, 95% CI: 0.97, 1.07). **Conclusion:** We found inconsistent evidence in support of a longitudinal association between NSEC and depression, and this mixed evidence may be partially explained by publication bias affecting studies with shorter lengths of follow-up.

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REPORT OF APPLICATION FOR SOCIAL SECURITY DISABILITY INSURANCE BENEFITS AMONG NATIONAL HEALTH INTERVIEW SURVEY RESPONDENTS WHO RECEIVE DISABILITY BENEFITS. Patricia Lloyd*, Cordell Golden, Deborah Ingram, Jennifer Parker (National Center for Health Statistics/Centers for Disease Control and Prevention)

Adults with adequate work history who are unable to work due to long-term disability are eligible for income support via the Social Security Disability Insurance (SSDI) program. The National Health Interview Survey (NHIS) asked about prior application for SSDI benefits; we used linked survey-administrative data to evaluate responses among SSDI beneficiaries. We included 4,538 18-64 year old SSDI beneficiaries identified by SSA data in the 1998-2005 NHIS-SSA linked data files. Logistic regression was used to assess respondent reported age, sex, race/ethnicity, educational attainment, marital status, poverty level, region, health status, and health insurance coverage as potential predictors of reported SSDI application. Sixty-seven percent (n=3,045) of SSDI beneficiaries had a reported SSDI application. Reported SSDI application did not differ by poverty, gender, and marital status. Reported SSDI application was elevated for non-Hispanic white beneficiaries (OR=1.40, 95%CI:1.16,1.69) and lower for Hispanic beneficiaries (OR=0.73, 95%CI:0.56,0.94) compared to non-Hispanic black beneficiaries. Reported SSDI application was elevated for those with fair/poor health status compared to those with good/very good/excellent health status, for those aged 40-64 years compared to those aged 18-39 years, and for those with high school education or more compared to those with less than high school education. Reported SSDI application was elevated for Medicare-insured beneficiaries compared to uninsured beneficiaries, but did not differ between those with non-Medicare health insurance and without insurance. Various characteristics were associated with reported application of SSDI benefits among SSA-identified SSDI beneficiaries. Linked survey-administrative data can inform research by combining respondent-reported data with known program participation.

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RETIREMENT TRANSITIONS IN THE NEWCASTLE THOUSAND FAMILIES STUDY BIRTH COHORT. Mark. S. Pearce*, Josephine Wildman, Suzanne Moffatt (Newcastle University)

Background: Ageing populations, retirement and the retirement transition are increasingly important policy areas. Understanding the way in which experiences, including health, across the lifecourse influence retirement trajectories is key to informing early interventions to aid the transition to a happy and healthy retirement. We investigated this using data from the Newcastle Thousand Families Study (NTFS). **Methods:** The NTFS is a birth cohort, originally consisting of all 1142 babies born in May and June 1947 to mothers living in Newcastle-upon-Tyne, UK. They have been followed through their lives with measures including health, lifestyle, education and socio-economic status (SES) giving us rich longitudinal data, including that from the most recent follow-up in 2009.**Results:** All 432 participants who took part in the 2009 wave are included in this study. Around 50% reported they had retired from paid work. The most common reason given for retirement (34%), by both men and women, was to enjoy life while still young and fit enough. Those working in retirement and those who had retired to enjoy life were wealthier, healthier and had better psychological wellbeing than the cohort average. In contrast, the 14% who reported retiring due to ill health were poorer, reflecting disadvantages accumulated over the life course. **Conclusion:** Our results indicate that baby-boomer advantages, lives characterised by steady employment, rising prosperity and good pensions, are not equally shared; there is evidence of cumulative inequality persisting into retirement. It appears that, as for previous cohorts, ageing in the NTFS cohort is characterised by systematic patterns of intra-cohort inequality, perpetuated and magnified across the life-course. Higher status individuals are entering secure retirement well-resourced and healthy, while their less advantaged counterparts experience more precarious retirements characterised by constrained resources and poor health.

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SEXUAL ORIENTATION DISPARITIES IN HUMAN PAPILLOMAVIRUS VACCINATION. Brittany M. Charlton*, Jessica A. Kahn, Donna Spiegelman, Stacey A. Missmer, S. Bryn Austin (Boston Children's Hospital & Harvard Medical School)

Compared to their heterosexual peers, sexual minority (i.e., lesbian and bisexual) females are as likely to have had heterosexual intercourse and are more likely to exhibit other risky behaviors, such as initiating sex at a younger age and having more sexual partners. This puts sexual minorities at an increased risk for acquiring the human papillomavirus (HPV). Since we know sexual minorities are less likely to get preventive medical services (e.g., Pap tests), we hypothesize that they may also be underutilizing the HPV vaccine. We used multivariable regression with prospective data gathered from 4,598 females aged 26 to 32 in the Growing Up Today Study, a cohort of offspring from the Nurses' Health Study II. When stratified by sexual orientation group, 26% of completely heterosexuals (N=1,217/4,665), 28% of mostly heterosexuals (N=299/1,066), 18% of bisexuals (N=23/132), and 20% of lesbians (N=16/83) reported having at least one dose of the vaccine. After adjusting for age, race, and geographic region, bisexuals remained significantly less likely to have been vaccinated (risk ratio, 95% confidence intervals: 0.63 [0.43, 0.93]) compared to completely heterosexuals. There was no significant difference in vaccination among mostly heterosexuals (1.07 [0.96, 1.19]) or lesbians (0.74 [0.47, 1.17]) compared to completely heterosexuals. Nearly all participants who reported having the vaccine, regardless of their sexual orientation, had completed the three dose series rather than simply initiating it with either one or two doses. Among girls and young women across the United States, the HPV vaccine is profoundly underutilized. Despite being at increased risk for acquiring the HPV virus, bisexual females in this study were significantly less likely to have been vaccinated compared to their heterosexual peers. Public health efforts need to address the vaccine underutilization across the population while being aware of the disparity by sexual orientation.

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THE DEVELOPMENT AND VALIDATION OF A SOCIOECONOMIC POSITION INDEX IN AN OCCUPATIONAL COHORT OF MEXICAN WOMEN. Kelly Hirko*, Martin Lajous, Eduardo Ortiz Panozo, Ruy Lopez Ridaura, Paul Christine, Tonatiuh Barrientos Gutierrez(Harvard School of Public Health)

Socioeconomic position (SEP) is an important determinant of overall health and multiple health outcomes. Household assets are often used to distinguish an individual's SEP; however, these variables are limited to discriminate a person´s position within more homogeneous SEP groups, such as occupational cohorts. ESMaestras has been following 115,346 female teachers from Mexico since 2006-08. For this analysis, we included 39,782 women with complete data on 12 variables measuring multiple aspects of SEP (e.g. access to household assets and technology, educational status, and marital status) on two questionnaires (2008 and 2011). We conducted principal component analysis and identified 4 patterns: computer, health insurance, rural/household crowding and assets, and education/marital status that explain 65.4% of the variance. Factor scores were computed as a standardized score on each variable multiplied by the corresponding factor loading of the variable for that factor. We then calculated a SEP index score as a sum of the factor score multiplied by the proportion of variance explained by each factor. Using this index women with high vs. low SEP had a lower prevalence of diabetes (28.4% vs. 38.1%) and hypertension (31.0% vs. 35.6%), and were more likely to consume red meat, which is considered to be a marker of SEP in Mexico (1.6 vs. 1.4 servings/day), suggesting the construct validity of the developed index. Given the limited range of SEP within this occupational cohort, and the ability of the developed index to differentiate women based on health behaviors and outcomes, our findings suggest the utility of the developed SEP index for further research exploring health effects of SEP in this cohort. Methods to finely discriminate SEP within homogenous occupational groups are needed; SEP differences within an occupational group may seem small from a societal perspective, yet may implicate important differences for health outcomes.

699-S/P

UNPACKING THE ASSOCIATION BETWEEN NEIGHBORHOOD RACIAL SEGREGATION AND BIRTHWEIGHT: A MEDIATION ANALYSIS OF THE LIFE-COURSE INFLUENCES OF FETAL ENVIRONMENTS (LIFE) STUDY. Rebecca Kehm*, Dawn Misra, Theresa Osypuk (University of Minnesota)

Living in a racially segregated neighborhood increases risk of low birthweight, though the underlying causal mechanism is not fully understood. This study explores this gap. We utilize survey data, medical records, and geocoded addresses linked to 2010 Census data from the Life-course Influences of Fetal Environments (LIFE) study, a cohort of 1410 Black women ages 18-45 who gave birth in a Detroit-area hospital, 2009-2011. We test associations between residential segregation, operationalized as Census tract % Black (dichotomized at 75%), geocoded to address at birth, and birthweight (g) adjusted for gestational age, using multilevel linear regression decomposition. Initial models adjust for age, parity, and tract-level clustering. We then test 7 domains of potential mediators/confounders (1) socioeconomic position (SEP) (income, education, marital status), (2) behaviors and health (smoking and drinking in pregnancy, CES-D), (3) prenatal care (Kotelchuck Index), (4) current subjective neighborhood context (cohesion, disorder, victimization, safety, social ties, overall quality), (5) current objective neighborhood context (tract deprivation index), (6) childhood subjective context (control, disorder, victimization), (7) childhood objective neighborhood context (tract % Black, deprivation index). Results indicate that living in high segregation tracts is associated with lower adjusted birthweight (β= -52.0, p=0.05). At the individual level the association is most attenuated by SEP (β reduction of 21%). Accounting for current subjective context strengthens the segregation-birthweight association (β +52%) indicating countervailing mediation, while current neighborhood deprivation vastly attenuates the effect (β= -20.7, p=0.50; β reduction of 60%). Childhood neighborhood is not a significant confounder. Findings suggest that while individual SEP may partially mediate the segregation-birthweight effect, the association is primarily driven by neighborhood-level factors.

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BINGE DRINKING AMONG CANADIAN PARENTS: VARIATION BY GENDER, FAMILY STRUCTURE, AND RESIDENCE. Bonnie Janzen*, Mohsen Soltanifar (University of Saskatchewan)

OBJECTIVE: To examine the relationship between family structure (single/partnered), gender, urban/rural residence and binge drinking behavior in Canadian parents. **METHODOLOGY:** The data source was Statistics Canada's cross-sectional 2012 Canadian Community Health Survey (CCHS)–Mental Health. Analyses were restricted to a subsample of 3900 18 -64 year old parents (2232 mothers, 1668 fathers) who reported having at least one child under the age of 25 currently living in the home. The dependent variable was binge drinking defined as self-reported consumption of 4 (women) or 5 (men) drinks on one occasion at least once a month during the previous year. The primary independent variables were family structure (single parent, partnered parent), residence (urban, rural) and age (18-34, 35-49, 50-64). Analyses were conducted separately for women and men with multivariable logistic regression as the primary technique. Sampling weights and a bootstrap variance estimation program were used to address the complex sampling strategy of the CCHS. **RESULTS:** Unadjusted prevalences (95% CIs) of binge drinking, by gender and family structure, were: partnered fathers 63.6% (61.7-65.6); single fathers 62.7% (55.3-70.0); partnered mothers 15.4% (13.7-17.2); and single mothers 37.4% (29.8-45.1). In multivariable analyses, single mothers were significantly more likely than partnered mothers to binge drink (ORadj =3.36, 95% CI: 1.68-6.74); mothers' age and residence were unrelated to binge drinking. Among fathers, only age was associated with binge drinking: compared to 18-34 year olds, fathers 35-49 yrs (ORadj =0.78, 95% CI: 0.62-0.98) and 50-64 yrs (ORadj =0.62, 95% CI: 0.46-0.84) were significantly less likely to binge drink. **CONCLUSION:** Among Canadian mothers, single-parent status was associated with an increased risk of binge drinking; future research needs to examine the economic, social and psychological pathways which mediate this association. Limitations of the study are discussed.

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CONCENTRATION OF LEAD, MERCURY, CADMIUM, ALUMINUM, ARSENIC AND MANGANESE IN UMBILICAL CORD BLOOD OF JAMAICAN NEWBORNS. Mohammad H. Rahbar*, Maureen Samms-Vaughan, Aisha S. Dickerson, Manouchehr Hessabi, Jan Bressler, Charlene Coore Desai, Sydonnie Shakespeare-Pellington, Jody-Ann Reece, Renee Morgan, Katherine A. Loveland, Megan L. Grove, Eric Boerwinkle (Division of Clinical and Translational Sciences, Department of Internal Medicine, Medical School, University of Texas Health Science Center at Houston)

Previous studies reported that Jamaica has higher levels of metals in soil, including lead, mercury, arsenic, cadmium, aluminum, and manganese, as well as in fruits and root vegetables grown in contaminated areas. Exposure to some of these environmental toxins has been associated with poor birth outcomes. Using data from 103 pregnant mothers who were enrolled in 2011, we measured concentrations of the aforementioned metals in umbilical cord blood of 106 Jamaican newborns. Since 97% of cord blood cadmium concentrations and 79% of cord blood arsenic concentrations were below the limits of detection of 0.13μg/L, we investigated possible associations of cord blood concentrations of lead, mercury, aluminum, and manganese with sociodemographic and socioeconomic characteristics, and birth outcomes in Jamaica using General Linear Models (GLMs). The arithmetic mean (standard deviation) concentrations of cord blood lead, mercury, aluminum, and manganese were 0.90 (1.85 μg/dL), 4.32 (2.02 μg/L), 10.92 (9.10 μg/L), and 43.65 (17.65 μg/L), respectively. In univariable GLMs, the geometric mean cord blood aluminum concentration was higher for children whose mothers had completed their education up to high school compared to those whose mothers had any education beyond high school (12.30 μg/L vs. 6.33 μg/L; $P < 0.01$). After controlling for maternal education level and socioeconomic status (through ownership of a family car), the cord blood lead concentration was significantly associated with head circumference (adjusted $P < 0.01$). Our results not only provide levels of the aforementioned metals in cord blood that could serve as a reference for the Jamaican population, but also replicate previously reported significant associations between cord blood lead concentrations and head circumference at birth in other populations.

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ESTROGEN USE IS ASSOCIATED WITH INCREASED 25-HYDROXY VITAMIN D. Quaker E Harmon*, David M Umbach, Donna D Baird (National Institute of Environmental Health Sciences)

Vitamin D has been associated with a range of reproductive health outcomes. Interestingly, several small studies suggested that use of oral contraceptive pills is associated with elevated levels of 25-hydroxy-Vitamin D (25 (OH)D). We explored the association between current use of hormonal contraception and serum 25(OH)D levels in 1660 young black women (24-34 years old) from Detroit, MI enrolled in the Study of Lifestyle, Environment & Fibroids (SELF). We constructed a predictive model that accounted for season using a cosinor function and included dietary intake of Vitamin D, supplement use, behavioral factors, measured skin reflectance and use of contraception; we explored confounding and residual confounding by supplement use and other behaviors associated with choice of contraception. Levels of Vitamin D were low with 70% of women below the 20ng/ml level recommended by IOM. Supplement use and current use of an estrogen-containing contraceptive had the largest magnitude of effect on 25(OH)D. Use of an estrogen-containing contraceptive was associated with a 21% (95% CI: 15-28) increase in 25(OH)D levels. In young women, exogenous estrogen was associated with increased levels Vitamin D. This result raises several mechanistic and methodologic questions. Depending on the mechanism of action, natural fluctuations in endogenous estrogen may also result in changing levels of 25(OH)D. These natural fluctuations may impact clinical decision making and point to possible disease pathways. For other health outcomes, exogenous sources of estrogen should be considered as potential confounders. Further work to elucidate the association between both exogenous and endogenous estrogen and 25(OH)D is warranted.Acknowledgement: This research was support by the Intramural Research Program of the NIH, National Institute of Environmental Health Sciences.

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HYPERTENSIVE DISORDERS IN PREGNANCY AND THE RISK OF INCIDENT CARDIOVASCULAR DISEASE: THE IMPACT OF TIME-VARYING CONFOUNDING. Sonia M Grandi*, Maria Eberg, Robert W Platt, Karine Vallée-Pouliot, Roxane Arel, Olga Basso, Kristian B. Filion (McGill University)

Background: Previous studies have suggested an increased risk of later cardiovascular disease (CVD) in women diagnosed with hypertensive disorders in pregnancy. However, the effect of time-varying confounders on this association has not been investigated. **Methods:** We used the Clinical Practice Research Datalink to define a population-based cohort study of 156,967 women, aged 15-45 years, with a first pregnancy. Hypertensive disorders were defined using clinical diagnoses, blood pressure values, and medication prescriptions between 20 weeks gestation and 6 weeks postpartum. The primary outcome was a diagnosis of CVD. To account for time-varying confounders, marginal structural Cox models (MSM) with weights estimated as the product of the probability of exposure history, of being pregnancy, and of censoring, were used. We also performed an analysis analogous to intention-to-treat (ITT) by using the pregnancy that resulted in cohort entry to define each woman's exposure status; no time-varying confounders were considered in this analysis. To assess the impact of time-varying confounding on the association of interest, the results of the MSM and ITT analyses were compared. Sensitivity analyses were performed to assess the influence of weight truncation and exclusion of subjects with extreme weights on our MSM estimates. **Results:** Our MSM analysis resulted in a HR of 2.7 (95% CI 2.2, 3.3) for incident CVD. Sensitivity analyses resulted similar estimates compared to the primary MSM analyses. The results of the ITT analysis were similar to the weighted results (HR 2.4, 95% CI 2.0, 3.0). **Conclusions:** The similar estimates obtained with the MSM analysis (which accounted for time-varying confounding and the cumulative effect of exposure) and the ITT analysis (which measured the one-time effect) suggests that downstream confounding over multiple pregnancies did not impact the association of interest.

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IDENTIFYING WOMEN'S OCCUPATIONAL PATTERNS IN A LONG-TERM NATIONAL HEALTH STUDY. Aimee Palumbo*, Yvonne Michael, Carolyn Cannuscio, Anneclaire De Roos, Lucy Robinson, Jana Mossey, Robert Wallace (Drexel University School of Public Health)

Studies have found full-time employment predicts better health while aging. However, women are more likely to have intermittent work force participation throughout the life course compared to men. Despite increased labor force participation rates of women in recent decades, comprehensive, longitudinal studies describing women's work patterns are limited. Women between the ages of 50 and 79 were enrolled in the Women's Health Initiative Observational Study between 1993 and 2005 (n=93,605). Women provided information about the 3 longest held jobs. Latent class analysis (LCA) was conducted to assign women into classes of work patterns based on available work history and timing of children. LCA revealed 4 classes of work patterns. The 4-class model had the highest entropy value (0.93) and sufficiently distinct class parameter estimates. Class 1 had the lowest membership, 8% of the study sample, and described women who reported jobs of short duration early in adulthood. Class 2 described 40% of the women. Their 3 jobs spanned most of their adult life, with little or no gap between jobs. Class 3 described women whose 3 jobs were spread out over many years, but with gaps between these longest held jobs. Class 4 described women whose longest 3 jobs were held well after childbearing years. The 4 classes had markedly different levels of socioeconomic indicators. Women in class 2 were younger at baseline, had the most education, were more likely to be never married and have fewer children. Women in class 1 were older and more likely to be married and have high family income, whereas women in class 4 were more likely to have low family income. These findings suggest that work patterns revealed by latent class analysis are meaningfully distinct in terms of job timing and are associated with important indicators of socioeconomic status. The identification of these patterns is an important step in understanding women's employment patterns and their potential impact on health.

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REFINED GRAIN INTAKE AND RISK OF PREMENSTRUAL SYNDROME. Serena C Houghton*, JoAnn E Manson, Brian W Whitcomb, Sue E Hankinson, Carol Bigelow, Lisa M Troy, Elizabeth R Bertone-Johnson (University of Massachusetts Amherst)

Clinically significant premenstrual syndrome (PMS) is a common disorder affecting nearly 20% of reproductive aged women. Dietary factors including carbohydrates may be involved in the etiology of PMS. Women with PMS are often counselled to consume more whole grains and less refined grains. However, few studies have assessed prospectively whether these foods are associated with PMS development. We examined the association of PMS with intake of total carbohydrates, whole grains, and refined grains in a substudy nested within the prospective Nurses' Health Study 2. Participants were 27-44 years old and free of PMS at baseline. Cases were 1,018 women reporting a new clinician diagnosis of PMS, confirmed by menstrual symptom questionnaire, over 14 years of follow-up. We also identified 2,277 women reporting few if any premenstrual symptoms as a comparison group. Intakes of carbohydrates and grains were assessed by food frequency questionnaire four times during follow-up and adjusted for total energy intake. After adjustment for age, body mass index, smoking status, and other factors, refined grain intake at baseline was positively associated with PMS risk (p for trend = 0.02). For example, women reporting the highest refined grain intake (quintile median = 88g/day) were significantly more likely to develop PMS (odds ratio (OR) = 1.36; 95% confidence interval (CI) = 1.01-1.83) compared to women reporting the lowest intake (quintile median = 38g/day). Results were slightly attenuated when additionally controlling for whole grains and total carbohydrates (likelihood ratio test (LRT) P-value = 0.29; OR for quintile 5 vs. 1 = 1.31; 95% CI = 0.98-1.76). PMS risk was not associated with high intake of whole grains (LRT P-value = 0.21) or total carbohydrates (LRT P-value = 0.87). In conclusion, high intake of refined grains was modestly associated with PMS development and is consistent with recommendations to limit refined carbohydrate intake.

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THE PARAMETRIC G-FORMULA FOR CONTINUOUS OUTCOMES: SMOKING CESSATION AND LONG-TERM WEIGHT CHANGE. Priyanka Jain*, Goodarz Danaei, Miguel Hernan (Harvard T.H. Chan School of Public Health)

Weight gain after smoking cessation can lessen the health benefits of, and reduce the incentives for, quitting smoking. Randomized clinical trials of smoking cessation interventions have estimated this weight change only over short periods of follow-up. We provide an estimate of the effect of smoking cessation on long-term weight change in a prospective observational study using novel causal inference methods. We identified 1890 participants of the Framingham Heart Study who were smokers and had no history of diabetes, cancer, and cardiovascular disease at baseline in 1952. Participants were followed for 20 years or until death or loss to follow-up. We used the parametric g-formula, a generalized version of standardization, to estimate the mean weight in 1972 under (i) no intervention, and (ii) an intervention of smoking cessation (the number of cigarettes smoked per day was set to zero at all exams). Our estimates are adjusted for demographic, lifestyle, socio-economic factors, as well as blood pressure, total cholesterol, and cardiovascular disease diagnosis over the follow-up period. The mean weight at baseline was 69.4 kg. The mean weight at 20 years of follow-up under no intervention was 71.5 kg, and under the intervention of smoking cessation was 73.8 kg (mean difference= 2.3 kg, 95% CI= 1.6 kg to 3.4 kg). Among those who smoked $\geq$ 10 cigarettes per day at baseline (84%), the mean baseline weight was 69.8kg, the mean weight at end of follow-up under no intervention was 72.3 kg, and under intervention was 75.4 kg (mean difference= 3.1 kg, 95% CI= 2.2 kg to 4.4 kg). Our estimates suggest that smoking cessation can result in increases in body weight over long periods, and that these increases are greater in heavier smokers. While the parametric g-formula has previously been used to estimate the risk of binary survival outcomes, this work provides empirical proof that it can be used to estimate the mean of continuous outcomes under hypothetical interventions.

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CONFOUNDING AND TRANSPORTABILITY IN NETWORK META-ANALYSIS. Conrad Kabali*, Marya Ghazipura (Health Quality Ontario)

Network meta-analysis (NMA) has recently gained popularity in comparative effectiveness research for its ability to evaluate interventions that have never been directly compared. The validity of NMA rests on the assumption that for a given treatment, the distribution of treatment response would be similar across trials. Using the counterfactual framework, we show how confounding can occur in NMA when this assumption is violated. To address the problem, we generalize the conventional NMA approach to situations where the distribution of treatment response might differ across trials. Specifically, we demonstrate using the transport formula, how the distributions of treatment response can be calibrated, to allow for comparability of treatment effectiveness across trials. Furthermore, we present a statistical test that can evaluate the consistency between data and causal assumptions. We show using the hypothetical example how the transportability approach compensates for limitations of conventional NMA when trials are not similar. In conclusion, we recommend that the transport formula be considered whenever the assumptions underlying the conventional NMA approach are not applicable.

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TRIPLY-RANDOMIZED EXPERIMENTS AS AN IDEALIZED SYSTEM FOR CAUSAL INFERENCE. SR Cole*, JK Edwards, CR Lesko, D Westreich, MG Hudgens, MA Brookhart (UNC)

We use ideal randomized experiments to define a set of sufficient (not necessary) conditions to identify internally and externally valid causal effects. By "causal" we mean the effect of a treatment policy compared to a reference policy on a partially observed (possibly multivariate, continuous) outcome in a given population. The outcome is at best partially observed because we wish to learn about the outcome under at least two policies, at most one of which can be factual (i.e., natural course), though other sources of missing data arise (e.g., sampling, censoring). Step 1) Define k policies, the outcome Y, and the population defined by the joint distribution of a set of factors W. 2) Take a random sample (or census) of n units from the population, perhaps given W. 3) Allocate the n units to 1 of k policies at random, perhaps given W. 4) Measure the outcome on a random subsample (or census) of m$\leq$n units, perhaps given W. 5) Summarize results for each policy using (possibly penalized functions of) the empirical distribution function for Y. 6) Quantify uncertainty using non/semiparametric statistical inference. Random sampling/allocation ensures (in expectation) the factual sample m is exchangeable/permutable with the balance of the counterfactual populations on observed and hidden characteristics. We assume treatment-version irrelevance, no interference and no measurement error. When experimentation is infeasible, we may conduct pseudoexperiments (i.e., observational studies) or thought experiments where we additionally assume (i) conditional exchangeability given W; (ii) units for each policy at each level of W (positivity); and if we model the data due to high dimension of W, we assume (iii) the model forms are correct. If we do not have a census or randomization at steps 2-4, assumptions i-iii (or alternatives) are required to point-identify internally and externally valid causal effects.

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CAUSAL INFERENCE IN EPIDEMIOLOGY: THE ROLE OF COMPLEX SYSTEM MODELS. Matteo Convertino*, George Maldonado (University of Minnesota)

We propose to discuss how complex systems models – originally developed in biology, and recently introduced to epidemiology – can complement traditional epidemiologic statistical models in inferring causality in epidemiology. As a case study we consider obesity incidence in USA over space and time at the county scale. We use the obesity case study to compare and contrast the uses, power, assumptions, and limitations of complex system models and traditional statistical models. In particular we focus on the (i) determination of causal factors; (ii) hindcasting and forecasting of obesity incidence over space and time; (iii) definition of optimal management strategies to reduce incidence. We highlight common misconceptions about model types, uncertainty and sensitivity assessment, risk versus outcome, stochasticity, calibration and validation, objective-dependent complexity, and design by analogy. The complex system models presented are based on statistical mechanics principles that attempt to reproduce population wide dynamics using macroscopic laws of physics in analogy to other systems. In particular we will present information theoretical models related to reaction-diffusion systems as a general approach for combining multiscale data and providing counterfactuals/predictions by valuing uncertainty, detecting invariance regimes of disease determinants, assessing non-linear interactions, and predicting population health trajectories in space and time. We believe that in order to move forward with the discipline of epidemiology clarity is needed about what new models are, when statistical and complex systems models are better suited for the questions posed, what are their limitations, and what are the lexical commonalities and differences among different approaches developed in different disciplines. Lastly, we will also discuss about the practical actionable utility of the models presented in a consequentialist perspective for epidemiology.

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CUMULATIVE RISK AND ADVERSE BIRTH OUTCOMES: THE GROWH STUDY. Emily W. Harville*, Marni Jacobs, Arti Shankar, Jeffrey Wickliffe (Tulane University School of Public Health and Tropical Medicine)

Background: Although components of the physical environment (such as lead, mercury, and air pollution) and the social environment (poverty, trauma, discrimination) have been associated with worse pregnancy outcomes, it is common for people to be exposed to a combination of risk factors in both domains. Cumulative risk assessment, the characterization of combined risks to health from multiple types of stressors, aims to overcome this limitation. **Methods:** As part of the GROWH study, 261 women were interviewed about trauma, disaster, and poverty, and had metals measured in blood samples. Women gave a complete reproductive history. A cumulative risk scale was created by calculating the number of markers for which the woman was in the top quartile. Logistic regression was used to model the outcome of any history of low birthweight (<2500 g) or preterm birth (<37 weeks), adjusting for age and pregnancy status. **Results:** Median blood lead was 0.54 ug/dL, IQR 0.38-0.74, mercury was 1.59 ug/L, IQR 1.21-1.80, and cadmium was 0.60 ug/dL, IQR 0.35-0.68. 16% of the women were high (at least 1 SD above the mean) for the sum of the metals z-scores, while 18% were high for the total social adversity scale. 21% had had at least one low birthweight baby, while 23% had at least one preterm birth. A cumulative risk score based on metals and social adversities (trauma, disaster, economic hardship) was associated with low birthweight (aOR 3.96, 95% CI 1.48-10.61), but not preterm birth (aOR 1.04, 0.10-10.67). A cumulative risk score based on multiple metals and multiple trauma exposures only was associated with low birthweight (aOR 11.76, 2.29-60.47) and preterm birth (aOR 4.05, 95% CI 1.03-15.89). **Conclusion:** Cumulative risk scores are worth further study as possible predictors of adverse birth outcomes.

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ADVENTURES IN POSITIVITY: PARSING THE RELATIVE CONTRIBUTION OF ENVIRONMENTAL EXPOSURES AND SOCIAL FACTORS IN URBAN SETTINGS. Sheryl Magzamen*, Maggie Clark, Sammy Zahran (Colorado State University)

The strong environmental, demographic and socioeconomic antecedents of chronic disease coincide frequently in urban communities, and the ability to identify the direct causal effects of each of these distinct groups of exposures presents a methodological challenge. In community-based studies, the absence of observable populations that can represent the counterfactual for a given exposure state results in violations of the positivity assumption that underlie causal inference approaches such as marginal structural models. Though community cluster randomized trials have been suggested as a method to identify causal effects, feasibility constraints likely necessitate use of observational data. We present two examples from the lead exposure literature – difference-in-difference analysis of reduced soil lead levels on eclampsia in post-Katrina New Orleans and a quantile regression analysis of lead exposure on elementary school standardized test scores in Milwaukee – to understand the relative contribution of environmental exposures and social factors to health outcomes in urban settings. In New Orleans, mothers who resided in ZIP codes with reduced soil lead levels as a result of Hurricane Katrina flooding experienced a decrease in odds of eclampsia (OR: 0.62, 95% CI: 0.40, 0.96). In Milwaukee, elevated lead exposure was associated with lower standardized reading test scores (Wald test for heterogeneity: p=0.05), while there was no difference in parental education (p=0.27) and eligibility for free/reduced price lunch program (p=0.45) across the distribution of test scores. Analyses of natural experiments and quantitative approaches that focus on parameter estimates other than the mean may help to elucidate the role of environmental exposures on negative health outcomes, particularly in environmentally-mediated diseases.

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VALIDATING ADMINISTRATIVE SOCIAL STRESSOR INDICATORS ACROSS NEW YORK CITY FOR SOCIAL-ENVIRONMENTAL EPIDEMIOLOGY. Jane E. Clougherty *, Jessie L. Carr Shmool, Laura D. Kubzansky, Ogonnaya Dotson Newman, Peggy Shepard, John D. Spengler, (University of Pittsburgh)

Chronic psychological stress has been linked to respiratory health, both independently and in combination with air pollution. A biological stress response occurs when the demands of a stressor are perceived to overwhelm one's capacity to manage those demands effectively. Because individual level measures of stress are often unavailable, administrative social stressor indicators (e.g., crime rates) are frequently used as a proxy; however, the extent to which such proxies accurately represent individual stress perceptions is not well understood. We used survey and geographic information system (GIS) methods to characterize relationships between individual stress perception and administrative social stressor indicators, to identify valid stressor indicators for population-level analysis. Our spatially-stratified, citywide survey (n = 1549) assessed a range of psychosocial domains, including neighborhood disorder, buffering resources, and mental health. We assigned publicly-available, area-level stressor indicators (n = 20) to residential locations. We used linear mixed models to examine administrative stressor indicators as predictors of individual perceived stress, adjusting for season, and individual confounders. In our sample, perceived stress varied substantially across individuals. Administrative indicators of community violence and socioeconomic composition consistently predicted perceived stress ($p < 0.05$), while indicators of noise, built environment, and property crimes did not. We are currently evaluating differences in associations by community and socio-demographic characteristics (e.g., age, residential tenure). We are further examining combined effects of 'validated' stressor indices and chronic air pollutant exposures on self-reported and objective health outcomes (emergency department visits for asthma).

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RESIDENTIAL GREENNESS ASSOCIATED WITH REDUCED DEPRESSION RISK: FINDINGS FROM A NATIONWIDE PROSPECTIVE COHORT OF ADULT WOMEN. Rachel F. Banay*, Peter James,, Jaime E. Hart, Olivia I. Okereke, Donna Spiegelman, Laura D. Kubzansky, John D. Spengler, Francine Laden (Harvard T.H. Chan School of Public Health)

Background: Recent evidence suggests that lower levels of residential greenness may be associated with adverse mental health effects. Few studies, however, have considered depression, and most have been cross-sectional. The objective of this study was to examine residential greenness and depression risk prospectively in the Nurses' Health Study. **Methods:** A total of 45,090 women (mean age 63 [range 49.5-76.8]) without depression at baseline (2000) who had completed the three prior surveys were followed until 2006. Residential greenness was measured using the Normalized Difference Vegetation Index (NDVI) derived from data from NASA's Terra satellite, and defined as the mean greenness value in July of each year within a 1,250 meter radius of the nurses' mailing addresses. Depression was defined according to either self-reported physician-diagnosed depression or self-reported use of antidepressants. We used a Cox proportional hazards model to examine the relationship between greenness and depression incidence. **Results:** Over 212,688 person-years, 5,828 incident depression cases were identified. In models adjusted for race, educational attainment, marital status, physical activity, body mass index, social engagement, smoking status, mental health at baseline, and Census tract median home value, median income, and population density, living in the highest quintile of residential NDVI was associated with a 13% reduction in depression risk (HR= 0.87 [95% confidence interval (CI) 0.79, 0.95]) compared to the lowest quintile of greenness. Additionally, there was evidence of effect modification by area-level SES: the relationship was strongest in Census tracts with the highest and lowest home values. The association between greenness and depression did not appear to be mediated by physical activity or social engagement. **Conclusions:** In this population of women, we observed an inverse relationship between surrounding summer greenness and the risk of self-reported depression.

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COMPARISON OF ANALYTIC METHODS TO ACCOMMODATE MULTIPLE EXPOSURES IN ENVIRONMENTAL EPIDEMIOLOGY. Cheryl R Stein*, Ashley M Pajak, Roni Kobrosly, Susan L Teitelbaum, Chris Gennings, Mary S Wolff (Mount Sinai School of Medicine)

Individuals experience multiple exposures throughout the life course. Historically, environmental epidemiology examined a single exposure or a group of related exposures at a time. Understanding how multiple chemical and non-chemical factors act together to affect normal physiological processes, however, is essential to understanding health effects. Despite the acknowledged need there are limited methods and information on how to integrate the exposome in a biologically and statistically meaningful way. Using real world (n=192) and simulated (n=1200) data from a study of environmental exposure and age at puberty in girls we applied 13 approaches to analysis of multiple exposures, calculated cross-validation misclassification rates, and evaluated the approaches' strengths and limitations. Available covariates included urinary chemical biomarkers, dietary nutrients, physical activity, body mass index, demographics, and air pollution. The time period covered by these exposures ranged from in utero (e.g., maternal cigarette use) to concurrent to study enrollment (e.g., child body mass index). Methodological approaches were broadly grouped into automated variable selection, regularized/penalized regression, and emerging approaches like environmental risk scores (ERS) and environment-wide association studies (EWAS). Automated variable selection procedures showed a misclassification rate of about 26%. ERS and EWAS identified similar effects for 11 variables below the false discovery rate. Urinary enterolactone showed negative associations (ERS weight=-0.52, EWAS beta coefficient=-0.12) and air pollution showed positive associations (ERS weight=0.42, EWAS beta coefficient=0.05) with earlier breast development in the simulated data. We are implementing a multi-step analysis incorporating elements of several approaches including a meta-analysis of all results to make full use of available data and begin to account for multiple exposures from across the life course.

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OVERALL ENVIRONMENTAL QUALITY AND CANCER INCIDENCE. JS Jagai*, LC Messer, KM Rappazzo, CL Gray, SC Grabich, DT Lobdell (University of Illinois at Chicago)

Cancer is associated with individual ambient environmental exposures such as fine particulate matter and arsenic in drinking water. However, the role of the overall ambient environment is not well-understood. To estimate cumulative environmental exposures, an Environmental Quality Index (EQI) for 2000-2005 was constructed representing five environmental domains (air, water, land, built and sociodemographic) for each U.S. county (n=3141). Annual county-level, age-adjusted, cancer incidence rates (per 100,000) for 2006-2010 from Surveillance, Epidemiology, and End Results Program (SEER) were linked to the EQI. Sex stratified random intercept fixed slope linear models, for EQI quintiles and cancer incidence, were estimated, adjusting for county percentage of ever-smoked. Incidence rate differences (95% CI) comparing highest quintile/worst environmental quality to lowest quintile/best quality are reported. All cause cancer was positively associated with EQI in both sexes (males: 32.6 (16.3,48.9), females: 36.4(27.6,45.3)). Models were also stratified by four rural-urban continuum codes (RUCC) ranging from metropolitan urbanized (RUCC1) to rural (RUCC4). We observed positive associations between all cause cancer and EQI for most strata for males (RUCC1: 27.0(11.3,42.7); RUCC2: 11.3(-18.1,40. 7), RUCC3: 25.7(3.9,47.5), RUCC4: -12.1(-50.7,26.4)) and across all strata for females (RUCC1: 30.0(17.2,42.8); RUCC2: 28.5(14.4,42.7), RUCC3: 16.3 (2.1,30.5), RUCC4: 1.5(0.8,3.0)). The strongest associations were seen in the most urbanized areas for both sexes. In addition, we assessed associations with the primary cancer types for both sexes, lung, breast, prostate, and colorectal cancers. Associations by individual environmental domains (i.e., air, water, land, etc.) will also be presented. These results suggest that cumulative environmental exposure is associated with cancer risk, and associations vary by urbanicity. This abstract does not necessarily reflect EPA policy.

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OCCUPATIONAL EXPOSURE TO BERYLLIUM AND MORTALITY FROM LUNG CANCER AND BERYLLIUM DISEASE. Paolo Boffetta*, Tiffani A. Fordyce, Jack S. Mandel (Icahn School of Medicine at Mount Sinai)

We aimed at studying mortality from lung cancer and beryllium disease (BD, comprising acute and chronic disease) among workers exposed to soluble and insoluble beryllium compounds. We conducted a study of 16,115 workers (84% males) employed between 1925 and 2009 at 16 US beryllium manufacturing plants and distribution centers. Sixty percent of the workers were exposed to soluble beryllium and 36% to insoluble beryllium. Follow-up was through 2011; 0.6% of workers were lost to follow-up, and cause of death was missing for 7.6% of deceased workers; SMRs were calculated using national rates. The SMR for all causes was 1.00 (95% CI 0.98-1.02, 7,868 observed deaths), that for lung cancer was 1.01 (95% CI 0.93-1.09, 666 deaths) and that for 'other non-malignant respiratory diseases' (ONMRD), a category comprising BD, was 1.29 (95% CI 1.15-1.43). The SMR for lung cancer was 1.07 (95% CI 0.98-1.18) among workers exposed to soluble beryllium and 0.88 (95% CI 0.74-1.03) among those exposed to insoluble beryllium (p for heterogeneity [p-het] 0.04). Corresponding SMRs for ONMRD were 1.33 (95% CI 1.16-1.52) and 1.10 (95% CI 0.85-1.40; p-het 0.2). The SMR for lung cancer was 1.16 (95% CI 1.06-1.28) among workers hired before 1955 and 0.82 (95% CI 0.72-0.93) among workers hired in 1955 or later (p-het<0.001). Corresponding SMRs for ONMRD were 1.28 (95% CI 1.11-1.47) and 1.30 (95% CI 1.07-1.56) (p-het 0.9). The increased SMR for lung cancer among workers hired before 1955 was restricted to those exposed to soluble beryllium (SMR 1.24, 95% CI 1.12-1.38). This is the largest mortality study ever conducted among beryllium workers. It detected no increased mortality from lung cancer overall, and among workers exposed to insoluble beryllium or hired in 1955 or later. An increased mortality was observed among workers exposed to soluble beryllium and hired before 1955. Mortality from ONMRD, including BD, did not differ according to beryllium form or date of hire.

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STROMAL COLLAGEN FIBER ORIENTATION AND RECURRENT BREAST CANCER IN SITU. Ronald E Gangnon*, Amy Trentham-Dietz, Matthew W Conklin, Brian L Sprague, Kevin W Eliceiri, Jeremy S Bredfeldt, Nuntida Surachaicharn, Paul J Campagnola, Polly A Newcomb, Andreas Friedl, Patricia J Keely (University of Wisconsin)

20% of breast cancer diagnoses are ductal carcinoma in situ (DCIS). Treatment decision-making for DCIS is challenging since few predictors of disease-free survival are known; most women receive treatments with serious impacts on quality of life. We previously observed that, in invasive breast cancer, collagen fibers aligned perpendicularly from the lesion predicted worse survival than collagen fibers in primarily parallel patterns. To examine whether this fiber pattern is present in DCIS, we evaluated collagen alignment in 235 women diagnosed with DCIS in 1997-2000 followed for a median of 11.2 years (range 1-15). Stromal collagen alignment was evaluated from routine H&E tissue slides prepared at the time of diagnosis using second harmonic generation (SHG) microscopy, a label-free multiphoton laser scanning technique that selectively images collagen. SHG images were evaluated for 3-5 regions on each DCIS lesion and normal tissue slide for each patient; the angles of collagen fibers with respect to the DCIS lesion/stromal boundary were calculated using customized imaging software. Distribution of fiber angles in normal ducts and DCIS lesions were compared in women with and without recurrent DCIS using a novel probit (latent normal) model for ordinal compositional data. Dependence among measurements within a single subject was modeled using a compound symmetry correlation structure. In women without recurrence, collagen alignment was similar in normal ducts and DCIS lesions (mean difference on probit scale 0.003, 95% CI -0.036 to 0.043, p=0.85). In women with a recurrence (N=32, 14%), collagen alignment was shifted towards larger fiber angles in DCIS lesions (mean difference 0.106, 95% CI 0.002 to 0.210, p=0.05), corresponding to an absolute 3.5% increase in the proportion of fiber angles greater than 20 degrees. These results underscore the relevance of the tumor microenvironment to patient outcomes, in particular the arrangement of the collagen fiber matrix.

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ASSOCIATION OF COFFEE CONSUMPTION WITH OVERALL AND CAUSE SPECIFIC MORTALITY IN A LARGE U.S. PROSPECTIVE COHORT. Erikka Loftfield*, Neal D. Freedman, Barry I. Graubard, Kristin A. Guertin, Amanda Black, Wen-Yi Huang, Fatma M. Shebl, Susan T. Mayne, Rashmi Sinha (Yale School of Public Health and Division of Cancer Epidemiology and Genetics, National Cancer Institute)

Coffee is a common dietary exposure worldwide. Although inverse associations have been observed for overall mortality, relatively little data is available for decaffeinated coffee or for use of additives such as cream or sugar. In the large Prostate, Lung, Colorectal and Ovarian Cancer Screening Trial, coffee consumption was assessed at baseline using a food frequency questionnaire. Among, 90,317 adults, aged 55 to 74 years, who did not have a history of cancer, stroke, coronary heart disease or heart attack, 8,718 deaths occurred. We prospectively examined the hazard ratios (HR) for coffee consumption and subsequent mortality using multivariable adjusted Cox proportional hazards models. Following adjustment for smoking history and other potential confounders, we observed a statistically significant, inverse association between coffee consumption and overall mortality. Similar findings were observed in pre-specified subgroups, including never smokers, participants drinking caffeinated and decaffeinated coffee, and those who drank their coffee black, with sugar or with cream. Adjusted risk estimates for coffee drinkers, as compared with non-coffee drinkers, were as follows: HR=0.99 (95% CI 0.92-1.07) for <1 cup/day, HR=0.94 (95% CI 0.87-1.02) for 1 cup/day, HR=0.82 (95% CI 0.77-0.88) for 2 to 3 cups/day, HR=0.79 (95% CI 0.72-0.86) for 4 to 5 cups/day, and HR=0.84 (95% CI 0.75-0.95) for ≥6 cups/day. Inverse associations were also observed for deaths due to diseases of the heart, chronic respiratory diseases, diabetes, pneumonia and influenza and intentional self-harm, but not for cancer. Although similar associations were observed for participants who reported adding cream and sugar, we encourage individuals to follow current dietary guidelines, which recommend that individuals limit intake of calories from solid fats and added sugars. Future experimental and observational studies to understand potential mechanisms underlying these associations are needed.

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ETIOLOGIC RESEARCH ON CANCERS: POTENTIAL NICHES FOR ECOLOGIC STUDIES. Andreas Stang*, Bernd Kowall, Carsten Rusner, Britton Trabert, Freddie Bray, Katherine McGlynn, Oliver Kuss (Zentrum für Klinische Epidemiologie, Universitätsklinikum Essen, Essen, Germany)

Introduction: Many previous descriptive studies on cancer incidence focused on country-wide incidence estimates and found substantial international variation. A low within-country variation and a large between country variation in cancer incidence implicates that ecologic factors may be involved in the etiology of the disease. The aim of this study is to explore the within and between country variation of cancer incidence to motivate high-quality ecologic studies. **Methods:** We used Cancer Incidence in Five Continents, Volume X, to select population-based cancer registry data. We extracted age-standardized (world standard population) incidence rate estimates from 138 regions for the 10 most frequent invasive cancers for each sex. We fitted a weighted multilevel Poisson regression model with a random country effect for each cancer and sex separately. We estimated intraclass correlation coefficients (ICC) and 95% confidence intervals (95%CI). **Results:** The four cancer sites with the highest ICC among men included prostate cancer (0.96, 95%CI: 0.92-0.96), stomach cancer (0.77, 0.64-0.91), skin melanoma (0.77, 0.63-0.92), lung cancer (0.76, 0.64-0.89). Among women, these sites included lung cancer (0.84, 0.74-0.95), breast cancer (0.80, 0.69-0.91), skin melanoma (0.76, 0.62-0.91) and cervical cancer (0.70, 0.54-0.86). The two most prominent sex differences for ICC occurred for head & neck cancer (men: 0.71 (0.56-0.87), women: 0.19 (0.08 -0.30)) and breast cancer (men: 0.04 (0.01-0.07), women: 0.80). **Discussion:** ICCs varied by cancer site and sex indicating that ecologic studies may be more or less promising. For example, the ICC for head & neck cancers was quite high for men but quite low for women indicating that ecologic studies on these cancers may be more fruitful among men than women. Pancreas cancer, uterine cancer, ovarian cancer and leukemia show very low ICC and are not priority candidates for ecologic studies.

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PRE-DIAGNOSTIC SERUM LEVELS OF INFLAMMATION MARKERS AND RISK OF ENDOMETRIAL CANCER IN THE PROSTATE, LUNG, COLORECTAL AND OVARIAN CANCER (PLCO) SCREENING TRIAL. Britton Trabert*, Ligia Pinto, Patricia Hartge, Troy J. Kemp, Amanda Black, Mark E. Sherman, Louise A. Brinton, Ruth M. Pfeiffer, Meredith S. Shiels, Anil K. Chaturvedi, Allan Hildesheim, Nicolas Wentzensen (Division of Cancer Epidemiology and Genetics, National Cancer Institute, NIH, DHHS, Bethesda, MD)

Chronic inflammation has been suggested as an important factor in endometrial carcinogenesis, although the underlying mechanisms remain ill-defined. In support of this hypothesis, several well-established risk factors for endometrial cancer, including obesity, metabolic syndrome, and polycystic ovarian syndrome (PCOS) may contribute to a pro-inflammatory milieu. Given that few prospective studies have examined relationships of circulating inflammation markers and endometrial cancer risk, we evaluated these associations in the Prostate, Lung, Colorectal and Ovarian Cancer (PLCO) Screening Trial. We conducted a nested case-control study within the PLCO Screening Trial. Pre-diagnostic serum levels of inflammation-related biomarkers were measured in 284 incident postmenopausal endometrial cancer cases and 284 matched controls. Serum samples were collected up to 14 years before cancer diagnosis. Odds ratios (ORs) and 95% confidence intervals (CIs) were calculated using conditional logistic regression adjusted for parity, duration of oral contraceptive and hormone therapy use, smoking status, and body mass index (BMI). Endometrial cancer risk was associated with elevated levels of granulocyte colony-stimulating factor (G-CSF) [quartile (Q)4 vs. Q1: OR (95% CI) 1.64 (1.01-2.67), p-trend=0.04], plasminogen activator inhibitor-1 (PAI-1) [2.19 (1.25-3.81), 0.005], resistin [1.75 (1.03-2.98), 0.02] and vascular endothelial growth factor (VEGF) [2.53 (1.51-4.21), 0.004], independent of the association with BMI [obese vs. normal BMI: OR (95% CI) 3.67 (2.28-5.91)]. Increased risks with PAI-1, resistin, and VEGF remained in analysis restricted to specimens collected > 5 years prior to diagnosis. These results suggest that several circulating inflammation markers may lead to increased risk of developing endometrial cancer. Additional research is needed to confirm and extend these findings to illuminate the etiologic role of increased inflammation in endometrial carcinogenesis.

740-S/P

SELF-INJURIOUS BEHAVIORS IN CHILDREN WITH AUTISM SPECTRUM DISORDERS COMPARED TO CHILDREN WITH OTHER DEVELOPMENTAL DISABILITIES: THE STUDY TO EXPLORE EARLY DEVELOPMENT (SEED). Gnakub Norbert Soke*, Steve Rosenberg, Cordelia Rosenberg, Li-Ching Lee, Roma A. Vasa, Carolyn DiGuiseppi (Colorado School of Pubic Health)

Background: Self-injurious behaviors (SIB) are often observed in autism spectrum disorder (ASD) and developmental disorders (DD). Studies have reported a higher occurrence of SIB in ASD compared to DD, but did not examine potential confounding factors. **Objectives:** To compare the odds of SIB in children with ASD to those with DD after adjusting for sociodemographic, developmental and family characteristics **Methods:** SEED is a multi-site case-control study that explores the relationship between ASD phenotypes and etiologies. We included 1686 children aged 30-68 months identified from clinical and educational sources. The outcome, SIB ('ever injure self'), was obtained from the Social and Communication Questionnaire, a standardized parental interview. The exposure was case group: ASD (N=696) was determined by established ASD-specific evaluation tools; DD (n=990) included children with other developmental disorders (e.g., language delay, learning disability). To obtain an unbiased estimate of the association between case group and SIB, we employed a non-linear mixed model with site as a random effect, including all of the following covariates: child sex, age and IQ; maternal age, race, ethnicity, smoking status and neuropsychiatric conditions (depression, anxiety, learning disability); family income; and language spoken at home.**Results:** SIB was reported in 29% of the ASD group and 12% of the DD group. SIB was significantly higher in children with ASD compared to DD in both unadjusted (OR=2.94; 95%CI: 2.29, 3.78, p <0.0001) and adjusted analyses (aOR=2.34; 95%CI: 1.72, 3.19, p<0.0001). Child age and IQ, and maternal age, race, and education were also associated with SIB. **Conclusions:** This study confirmed higher risk of SIB (ever vs. never) in children with ASD compared to those with DD, independent of other sociodemographic and developmental factors. Clinicians should be aware of this risk in order to develop and implement effective prevention and treatment strategies.

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ADIPOSITY IN SCHOOL AGE CHILDREN. Tracie A. Barnett*, Andraea Van Hulst, Yan Kestens, Basile Chaix, Mélanie Henderson (Epidemiology and Biostatistics Unit, INRS-Institut Armand-Frappier, Université du Québec, Laval, Canada; and Centre de recherche du CHU Sainte-Justine, Montreal, Canada)

Background: Neighborhoods are complex multidimensional systems. However, the interrelation between multiple neighborhood dimensions is seldom taken into account in relation to childhood adiposity. We created a neighborhood typology using a wide range of built environment features and examined associations with adiposity in children aged 8-10 years. **Methods:** Data include 512 Montreal-area youth from the first wave of QUALITY, an ongoing study on the natural history of obesity in 630 Quebec youth (8-10 years at baseline) with a history of parental obesity. Anthropometrics and body composition based on dual energy x-ray absorptiometry were obtained. Multiple neighborhood features obtained through in-person neighborhood assessments and geocoded administrative data were summarized using principal components analysis, and contrasting neighborhood types were identified using cluster analysis. We examined associations between specific neighborhood typologies and indicators of total (body mass index z-score and fat mass index) and central (waist circumference and central fat mass %) adiposity using multivariable linear regressions. **Results:** Cluster analysis resulted in 5 distinct neighborhood types characterized by high, moderate or low levels of walkability and safety from vehicular traffic. Children living in neighborhoods characterized by lower levels of safety from vehicular traffic had significantly higher levels of both overall and central adiposity. **Conclusions:** Neighborhoods characterized by heavy road traffic with fewer traffic calming measures appear to be the most obesogenic to children, regardless of other features that are associated with walkability. Policies targeting the improved walkability of neighborhoods for children may need to prioritize safety from vehicular traffic.

742-S/P

RESPIRATORY DISTRESS SYNDROME IN MODERATELY PRETERM INFANTS AND RISK OF EPILEPSY: A POPULATION-BASED STUDY. Sandra Kruchov Thygesen*, Morten Olsen Lars Pedersen, John Rosendahl Østergaard, Henrik Toft Sørensen (Department of Clinical Epidemiology, Aarhus University Hospital, Denmark)

Background: Infant respiratory distress syndrome (IRDS) is a common respiratory disorder among preterm infants. Known morbidities include among others, intracerebral hemorrhage. However, data on long-term morbidity are sparse. **Objectives:** To examine the association between IRDS in moderately preterm infants and epilepsy in young adults. **Methods:** We conducted this population-based cohort study using individual-level data linkage among nationwide registries. The Danish Medical Birth Registry allowed us to identify all live infants born between 32 and 36 weeks of gestation during January 1, 1978 to December 31, 2009 in Denmark. Using the Danish National Registry of Patients covering all Danish hospitals, we then identified all infants diagnosed with IRDS in the same period. We computed the cumulative incidence proportion of epilepsy at age 15 with death as competing risk. Using Cox's proportional hazards regression, we computed hazard ratios comparing children with an IRDS diagnosis to those without adjusted for covariates including sex, birth year, gestational age, 5-minute Apgar score, multiplicity, and maternal age. We also stratified by these covariates. **Results:** We identified 96,120 children born during 32-36 weeks of gestation. Among these, 6,516 had an IRDS diagnosis as infants. The cumulative incidence of epilepsy by age 15 in IRDS patients was 2.0% (95% confidence interval (CI): 1.9%–2.1%). After adjustment, the corresponding hazard ratio was 1.3 (95% CI: 1.1–1.5). **Conclusion:** The risk of epilepsy is increased for children born during 32 to 36 weeks of gestation and diagnosed with IRDS compared to children without the IRDS diagnosis.

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BREAST IS BEST- THE PROTECTIVE EFFECTS OF BEING BREAST-FED ON LUNG FUNCTION IN EARLY ADOLESCENCE : THE GATESHEAD MILLENNIUM STUDY. Mark S. Pearce*, Kay D. Mann, Laura Basterfield, Kathryn N. Parkinson, Jessica K. Reilly, Charlotte M. WrightJohn J. Reilly, Ashley J. Adamson (Newcastle University)

Background: Impaired development in utero is suggested to increase the risk of poor respiratory health. However, previous studies have been unable to identify whether these associations are exclusively due to influences in very early life, or whether there are other critical periods later in life or other exposures. We sought to assess whether a range of factors in early life are associated with lung function at age 12 years in the Gateshead Millennium Study (GMS). **Methods:** The GMS is a population-based cohort of, originally, 1029 infants born in 1999-2000 in Gateshead, Northern England. Throughout infancy and early childhood, detailed information was collected, including birth weight, gestational age, breast-feeding, socioeconomic status and body mass index (BMI). BMI and lung function (measured using spirometry) were part of an assessment at around 12 years of age. Potential predictors were assessed in relation to forced expiratory volume in 1 second (FEV1) using linear regression, adjusting for height. **Results:** 485 (49% male) non-twin children had valid measures for analysis. In multivariable models including adjustment for height and confounders, breast-feeding duration and BMI at age 12 years remained significantly predictive of FEV1. In comparison to those that were formula fed, FEV1 increased by 0.07L (95%CI 0.01, 0.05) in those breast fed for less than 6 weeks, and by 0.13L (95%CI 0.03, 0.22) in those breast fed for between 6 weeks and 4 months. For each unit increase in BMI at age 12 years, FEV1 increased by 0.01L (95%CI 0.002, 0.02). **Conclusion:** We have shown significant associations between breast-feeding and contemporaneous BMI in relation to lung function in 12 year-old children, but no association with birth weight. Further research is needed to incorporate factors such as diet and physical activity, but continued efforts in increasing breast-feeding are likely to result in improvements in childhood lung function.

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CHANGING INEQUALITIES IN SURVIVAL AMONG CHILDREN WITH ACUTE LYMPHOBLASTIC LEUKEMIA BY RACE/ ETHNICITY, AGE AND SEX. Linwei Wang*, Smita Bhatia, Yutaka Yasui (School of Public Health, University of Alberta)

Survival inequalities among children with acute lymphoblastic leukemia (ALL) are known, with adverse prognosis reported in Black, Hispanic and American Indian/Alaska Native children (AIAN), children aged <1 and 10-19 years, and boys. With continued improvements in survival, how these inequalities have changed over time remains unclear. Children aged 0-19 with a first primary malignant ALL diagnosed in 1975-2010 in one of the nine original registries of Surveillance, Epidemiology and End Results program were included. Race/ethnicity was classified as non-Hispanic White, non-Hispanic Black, Hispanic, Asian/Pacific Islander (API), and AIAN. Overall 5-year survival was estimated by Kaplan-Meier methods. Multivariable Cox regression analyses were applied to estimate ALL-mortality hazard ratios (HRs) and 95% CIs. Age, sex and race/ethnicity effects were estimated by adjusting for each other, stratified by diagnosis period (1975-83, 1984-91,1992-99, and 2000-10), which was selected to accommodate improvements in treatment. Some inequalities in 5-year survival have narrowed over time, with smaller differences observed in 2000-10 between Black and White (87% vs. 91%), and between boys and girls (87% vs. 89%). Compared to White children, the HR in Black children dropped to 1.21 (0.74-1.96) in 2000-10 from the largest inequality seen in 1984-91 (2.09 (1.57-2.79)); the HR in Hispanic children increased, however, from 1.28 (0.98-1.66) in 1975-83 to 1.95 (1.48, 2.58) in 2000-10. API and AIAN children had HRs of 1.39 (0.92-2.11) and 2.31 (1.13-4.74), respectively, in 2000-10 with little change over time. Children aged <1 and 10-19 had HRs of 7.57 (4.85-11.80) and 4.01 (3.09-5.19) relative to children aged 1-9, respectively, in 2000-10 which increased from HRs of 4.22 (2.52-7.09) and 2.68 (2.12-3.39), respectively, in 1992-99. Survival inequalities changed differently across prognosis groups. Proper interventions are needed to reduce persistent inequalities in specific subgroups.

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ESTIMATING THE HISTORY OF INFLUENZA INCIDENCE USING CROSS SECTIONAL ANTIBODY TESTS. Justin Lessler* (Johns Hopkins Bloomberg School of Public Health)

Influenza's antigenic signature is constantly evolving. If unvaccinated, most of us will be infected multiple times over the course of our lives. Each influenza infection leaves an enduring mark in the form of antibodies that are detectable in the blood stream for decades. However, high levels of cross-reactivity in antibody tests and complex immunological interactions over a lifetime of infection make it nearly impossible to deduce an individual's infection history. The principle of dependent happenings tells us that infectious outcomes are correlated within a population. Hence, it may be possible to estimate historic influenza incidence rates from the antibody titer profiles of its members. Building on this principle, we developed a likelihood framework for estimating the force of infection of previously circulating influenza strains from antibody titer profiles. We estimated the force of infection for strains of H3N2 influenza circulating between 1968 and 2010 using data from 1,574 participants in the Fluscape cohort study living in randomly sampled households form communities in Guangdong province, China. We estimate that the annualized hazard of infection for H3N2 influenza ranged between 10% and 20% between 1968 and 2010, with a mean of 16%. The average annual incidence rate is estimated to have been 13.5 per 100 person years from 1968 to 1971 (when the original pandemic strain circulated) and 2 per 100 person years between 2009 and 2010 (when there was high competition with H1N1 strains); implying an effective reproductive number of 1.44 in the 1968 epoch, and 1.03 in the 2009 epoch. These are consistent with observational and phylogenetic studies of the epidemiology of H3N2. The ability to uncover past patterns of infection using cross sectional surveys could allow us to better understand the historic epidemiology of influenza using data that can still be collected today.

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EFFECT OF ART ON MORTALITY GENERALIZED TO NEWLY HIV-DIAGNOSED PERSONS IN THE US. Catherine R Lesko*, Stephen R Cole, H Irene Hall, Daniel Westreich, William C Miller, Joseph J Eron, Jianmin Li, Michael J Mugavero (University of North Carolina at Chapel Hill)

Background: The effect of antiretroviral therapy (ART) on survival among recently HIV-diagnosed persons in the United States (US) is unknown because published estimates of the effect of ART have been based on cohorts that are not representative of this target population. **Methods:** In this study, we estimated 5-year mortality risk differences for ART initiators versus non-initiators among patients (n=12,547) in the Centers for AIDS Research Network of Integrated Clinical Systems (CNICS) using the complement of adjusted Kaplan-Meier survival functions. We estimated the hazard ratio for mortality due to ART using a marginal structural Cox proportional hazards model. Bias due to confounding and drop out were controlled using inverse probability weights for treatment and drop out. We subsequently standardized estimates to persons diagnosed with HIV in the US between 2009 and 2011 using inverse probability of sampling weights. The target population was enumerated using national surveillance data in partnership with the Centers for Disease Control and Prevention. **Results:** The 5-year mortality risk among ART initiators in the CNICS was 10.6% (95% CI: 9.3%, 11.9%) compared to 28.3% (95% CI: 19.1%, 37.5%) among non-initiators. The 5-year risk difference due to ART initiation in the CNICS was -17.7 (95% CI: -27.0, -8.4). The protective effect of ART was stronger among patients with no history of injection drug use, lower CD4 cell count at baseline, no prior AIDS diagnosis, and non-Hispanic white race/ethnicity. We estimate that ART initiation would similarly have lowered mortality risk by -19.1% (95% CI: -30.5%, -7.8%) if it had been used among all recently HIV-diagnosed persons in the US. **Conclusions:** ART initiation substantially lowered mortality among persons in the CNICS and this benefit is expected to be similar among persons recently diagnosed with HIV in the US.

752-S/P

MODELING THE IMPACT OF IMPROVED HEALTHCARE INFRASTRUCTURE ON THE WEST AFRICAN EBOLA OUTBREAK. Eric T. Lofgren*, Caitlin M. Rivers, Bryan L. Lewis, Madhav V. Marathe, Stephen G. Eubank (Network Dynamics and Simulation Science Lab, Virginia Bioinformatics Institute, Virginia Tech)

The Ebola outbreak in West Africa is the largest of its kind, and has led to a large international response to contain it. As with many emerging infectious diseases, the response is made up of many different interventions, implemented in parallel, the individual effects of which are difficult to estimate. Mathematical models are well suited to separate the effect of one intervention from a broader basket. Here, we use a mathematical model of the Ebola outbreak to examine the impact of deploying specialized Ebola Treatment Units (ETUs) to Liberia, including several scenarios where the deployment of these ETUs was either larger or more aggressive than the planned approach. The modeled introduction of ETUs in Liberia resulted in a large reduction in infections (ranging from a ~30% to 50% reduction in cases depending on how well the ETUs were assumed to prevent hospital and funereal transmission). However, even when accounting for secondary effects such as reduced time to hospitalization, improved healthcare infrastructure is insufficient to explain the epidemic's gradual decline since Fall 2014. Only in combination with a reduction in transmission within the community does our model match the epidemic's trajectory, suggesting that emergent behavior change within the population may have been more important. These results show the utility of models in informing public health decision making in settings where observational studies are difficult to conduct. They show that the decrease in Ebola cases cannot, by and large, be attributed to the relatively late introduction of ETUs to the afflicted countries, though they did have considerable humanitarian benefits. Addressing Ebola epidemics through improved healthcare infrastructure must be done either prior to an outbreak as part of a general infrastructure investment, or be available to be deployed very early in an Ebola epidemic.

753-S/P

COMMUNITY-LEVEL ANTIRETROVIRAL THERAPY COVERAGE AND HIV ACQUISITION IN RURAL KWAZULU-NATAL, SOUTH AFRICA: AN INSTRUMENTAL VARIABLE ANALYSIS. Kathleen E. Wirth*, Frank Tanser, Eric J. Tchetgen Tchetgen (Department of Epidemiology, Harvard T.H. Chan School of Public Health, Boston, MA)

Antiretroviral therapy (ART) substantially reduced the HIV transmission to the uninfected sexual partner within a serodiscordant couple in the landmark HIV Prevention Trials Network 052 trial. In the Hlabisa sub-district of KwaZulu-Natal, South Africa, individual risk of HIV acquisition was found to be significantly lower in communities with high ART coverage (Tanser et al, Science 2013). Yet individuals in these communities may systematically differ from those in low ART coverage areas. To evaluate the potential impact of bias due to unmeasured confounding, we used a recently developed instrumental variable (IV) approach for Cox proportional hazards models (Tchetgen Tchetgen et al, Epidemiology, 2015) to analyze data from a population-based, cohort study of adults conducted in Hlabisa between 2004 and 2011. Eligible participants were HIV-uninfected at study entry and had ≥1 repeat HIV tests during follow-up. We used distance and travel time to the nearest ART clinic as instruments to re-estimate the effect of community-level ART coverage on individual HIV acquisition risk. We believe this approach is valid because introduction of ART services at clinics over time was based on logistical and budgetary constraints rather than local HIV incidence. We observed 1,413 HIV seroconversions during 53,605 person-years of follow-up for an HIV incidence of 2.6 infections per 100 person-years. Median (IQR) distance and travel time to the nearest ART clinic was 2.9 km (1.7-4.3 km) and 1.1 hours (0.6-1.4 hours), respectively. Both factors were strongly associated with community-level ART coverage (P<0.0001). In the IV-adjusted model, persons in communities with >40% ART coverage were 62% less likely to acquire HIV infection than those in communities with <10% ART coverage (HR:0.38; 95% CI:0.17-0.84). Our findings indicate that the effect of community-level ART coverage on HIV incidence was not only robust to unmeasured confounding but may be stronger than previously reported.

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EXAMINING THE JOINT EFFECTS OF EVERYDAY DISCRIMINATION AND LOW HOUSEHOLD AUTONOMY ON SMOKING DURING PREGNANCY AND LOW BIRTH WEIGHT AMONG ROMANI WOMEN. Teresa Janevic*, Kristefer Stojanovski, Daniel Gundersen, Janko Jankovic, Zeljka Nikolic, Blasko Kasapinov (Rutgers School of Public Health)

Romani women in the Balkans experience poor pregnancy outcomes in the context of social exclusion and patriarchal gender norms. Our objective was to assess the independent and joint associations between everyday discrimination and low household autonomy with smoking during pregnancy and low birthweight. In 2012-2013 we surveyed 410 Romani women in settlements in Serbia and Macedonia using purposeful sampling. We assessed exposures using a version of the Everyday Discrimination Scale validated among Romani women and a question regarding autonomy of health decisions. Outcomes were assessed by self-report, and low birthweight categorized as <2500g. Relative risks were estimated using log-Poisson regression with a robust variance estimator to account for clustering within settlements. In main effect models adjusted for maternal education, household wealth, parity, and maternal age, women who experienced high everyday discrimination compared to low were 1.7 times more likely to smoke during pregnancy (95%confidence interval(CI) =1.3, 2.2) and 2.3 times more likely to have a low birth weight infant (95%CI =1.2, 4.3). Low household autonomy was not associated with either outcome. In joint effect models, when compared with women with neither exposure, women with both exposures had an adjusted relative risk (aRR) of 1.9 (95%CI=1.1, 3.2), women experiencing only high everyday discrimination had an aRR of 2.0 (95%CI=1.2, 3.2), and women experiencing only low household autonomy had an aRR of 1.2 (95%CI=0.7, 2.2). In our study of Romani women, everyday discrimination was associated with both smoking during pregnancy and low birthweight but did not act synergistically with low household autonomy to influence these outcomes.

761-S/P

EXPOSURE TO NEIGHBORHOOD FORECLOSURES AND CHANGES IN CARDIOMETABOLIC HEALTH: RESULTS FROM THE MULTI-ETHNIC STUDY OF ATHEROSCLEROSIS.. Paul Christine*, Kari Moore, Natalie Crawford, Tonatiuh Barrientos-Gutierre ,Brisa Sánchez, Teresa Seeman, Ana V Diez Roux (University of Michigan School of Public Health)

Background: Home foreclosure is a disruptive and stressful event that can precipitate health declines for individuals losing their homes. Whether home foreclosures can "spillover" to affect the health of neighborhood residents is largely unknown. **Methods:** Using longitudinal data from the Multi-Ethnic Study of Atherosclerosis linked to neighborhood foreclosure data from 2005-2012, we assessed if greater exposure to neighborhood foreclosures was associated with temporal changes in three objectively measured cardiometabolic risk factors: body mass index, systolic blood pressure, and fasting glucose. We used econometric fixed effects models and linear mixed models to estimate mean 5-year changes in cardiometabolic risk factors associated with changes in neighborhood foreclosures over time. **Results**: Neighborhood foreclosure activity increased dramatically during the study period, from an average of 0.4 foreclosures within a ¼-mile buffer of participant residences in 2005, to 4.2 in 2011. In fixed effects models controlling for time-varying income, working status, medication use, neighborhood poverty, neighborhood unemployment, and age-, gender-, and race-by-time interactions, standard deviation increases in neighborhood foreclosures were associated with small increases in fasting glucose (mean change: 0.22 mg/dL [95% CI: -0.05, 0.50]) and small decreases in systolic blood pressure (mean change: -0.27 mmHg [95% CI: -0.49, -0.04]) over 5 years. Changes in neighborhood foreclosure were not associated with changes in BMI (mean change: 0.01 kg/m2 [95% CI: -0.01, 0.03]). Linear mixed models gave very similar results. **Conclusion:** In this longitudinal sample, greater exposure to neighborhood foreclosure activity had mixed associations of small magnitude with cardiometabolic risk factors over a 5-year period. With millions of mortgages still in default, further research with longer follow up is merited to clarify any potential health effects of neighborhood foreclosures.

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DOES WORK FLEXIBILITY LEAD TO BETTER PARENT'S HEALTH? A QUASI-EXPERIMENTAL STUDY OF THE 2003 WORK FLEXIBILITY ACT IN THE UNITED KINGDOM. Mauricio Avendano*, Lidia Panico (London School of Economics and Political Science, LSE Health, London, UK; Harvard School of Public Health, Department of Social and Behavioral Sciences, Boston, USA)

Two thirds of mothers and 90% of fathers aged 25-34 years in the United Kingdom (UK) are in employment. We examine the hypothesis that the availability of policies that grant parents the flexibility to combine work and childcare responsibilities can improve parent's health. We use unique longitudinal data (2000-2012) from the UK Millennium Cohort Study (MCS) to examine the impact of legislation that granted parents in the UK the right to request flexible work arrangements on the health and well-being of parents. To identify a causal effect we use a difference-in-differences approach, a quasi-experimental technique that compares changes in outcomes before and after the policy between a treatment (parents who had no access to flexible work prior to the reform) and a control group (parents who already had access to flexible work prior to the reform). There was a striking difference in trends in the use of flexible work arrangements between parents in the treatment and control groups. Parents in the treatment group experienced a large increase in the prevalence of part-time work (less than 30 hours a week) between 2001/2 and 2004/5, as well as in other forms of flexible working such as job sharing and working from home. In contrast, there was no change in part-time work in the control group from 2001 to 2012. Individual fixed effect logistic regression estimates suggest that the work flexibility act legislation led to a more than doubling in the probability that parents work par-time (Odds ratio[OR]=2.92, 95% Confidence Interval[CI] =2.17, 3.94), which resulted in a significant decline in the probability of a long-standing illness (odds ratio=0.73, 95%CI 0.54, 0.99). Providing parents with the right to request flexible work arrangements can improve their health by enabling them to work more flexible hours, thus reducing the stress of combining work and childcare roles.

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IMPACT OF SUSTAINED ECONOMIC HARDSHIP ON COGNITIVE FUNCTIONING. Adina Zeki AL Hazzouri*, Tali ElFassy, Stephen Sidney, David Jacobs, Kristine Yaffe (University of Miami)

Background: The association of low income and poor health is well established. Yet most studies have examined income at one time and very few examined cognitive health. **Methods:** We used income data collected in 1990, 1992, 1995, 2000, 2005, and 2010 from a cohort of young to middle-aged participants in the Coronary Artery Risk Development In Young Adults Study (N=3383), to examine the effect of economic hardship on cognition. Using U.S. Census information and family size, we defined economic hardship as a household income of less than 200% of the federal poverty level for the relevant year. We then defined sustained hardship by percent times between 1900 and 2010 that subjects were below the 200% federal poverty level: 'never', 'less than a third', 'more than a third' or 'always'. In 2010, participants underwent a cognitive battery consisting of the Rey Auditory-Verbal Learning Test of verbal memory, the Digit Symbol Substitution Test of processing speed, and the Stroop test of executive function. We transformed cognitive test scores into standardized z scores, with negative values indicating worse performance. **Results:** After adjustment for age, sex, race, marital status, smoking, BMI, blood pressure, blood glucose, total cholesterol, depression, and education, there were significant graded associations between economic hardship and all three measures of cognitive functioning. Compared with those 'never' in economic hardship, those in hardship 'more than a third' of times and 'always' were significantly more likely to have standardized differences indicative of worse performance on verbal memory (-0.1; 95%CI=-0.20, -0.00; and -0.2; 95%CI=-0.33, -0.06 respectively), processing speed (-0.31; 95%CI=-0.4, -0.22; and -0.65; 95% CI=-0.77, -0.52 respectively), and executive function (-0.14; 95%CI=-0.24, -0.04; and -0.37; 95%CI=-0.51, -0.23 respectively). **Conclusions:** Sustained economic hardship over 20 years was associated with poor cognitive health in middle-aged adults.

764-S/P

WIDENING EDUCATIONAL DISPARITIES IN LIFE EXPECTANCY AMONG WOMEN IN THE UNITED STATES: A STORY OF DETERIORATING LIFE CIRCUMSTANCES OR SELECTIVE SOCIAL MOBILITY? Elizabeth Rose Mayeda*, Jennifer M Montez, Mauricio Avendano, Anusha M Vable, Lisa F Berkman, M Maria Glymour (University of California, San Francisco)

Educational disparities in life expectancy grew among American women between 1980 and 2010. This trend may reflect deteriorating life circumstances for less educated women. However, compositional changes in education groups due to increased social mobility may also contribute to the trend. As educational access expanded in the 20th century, women with low education became an increasingly select and disadvantaged group who may have experienced shorter life expectancies regardless of their education. For white women in the 1992-2010 Health and Retirement Study (n=10,916, using first available report for each variable), we empirically examined compositional changes between high (≥ high school) and low (< high school) education women with respect to early life disadvantage. We estimated educational inequalities in indicators of disadvantage using measures unlikely to be substantially affected by the women's adult socioeconomic experiences, stratified by birth cohort (< 1924, 1924-1930, 1931-1941, 1942-1947, 1948-1953, 1954-1959). Across successive birth cohorts, low education women were increasingly disadvantaged in early life compared to their age peers with more education. For example, in the earliest cohort (born < 1924), high school graduates were on average 0.6 inches taller than women with < high school; in the most recent cohort (born 1954-1959), the height gap grew to 1.0 inch. The inequality in median mother's age at death between high and low education women grew from 5 years for women born < 1924 to 13 years for women born 1954-1959. As educational access expanded throughout the 20th century, the low education group was increasingly composed of the most vulnerable women. Our findings suggest compositional changes contribute to the widening gap in women's life expectancy by education, potentially challenging causal interpretations of deteriorating life circumstances for low education women.

765-S/P

POVERTY AND CHILD DEVELOPMENT: A LONGITUDINAL STUDY OF THE IMPACT OF THE EARNED INCOME TAX CREDIT. Rita Hamad*, David H. Rehkopf (Stanford University)

Background: Adverse socioeconomic conditions are correlated with worse child health and development. Little is known, however, about how poverty alleviation policies influence children. We examine the impacts on child development of changes in the earned income tax credit (EITC), the largest poverty alleviation program in the United States. To do so, we exploit quasi-random variation in the expansion of the program over time. We also employ causal inference methodologies to estimate the impacts of income itself. **Methods:** We use panel data from the National Longitudinal Survey of Youth (N=8,186) during 1986-2000, the years during which there is the greatest variation in the size of EITC payments. Outcome variables include two indicators of child development: the Behavioral Problems Index (BPI) and the Home Observation Measurement of the Environment inventory (HOME). We first employ child-level fixed effects models to examine associations between EITC payment size and child development. We next use EITC benefit size as an instrument for post-tax income to estimate its effects on these indicators of child development. **Results:** Higher EITC payments are associated with significantly improved BPI scores (β = -0.57 per $1,000, P=0.04), with a marginally significant improvement specifically among unmarried women in BPI (β = -0.57 per $1,000, P = 0.09) and HOME scores (β = 0.87 per $1,000, P = 0.09). In instrumental variables analyses, higher income is associated with improved BPI (β = -0.47 per $1,000, P=0.01) and HOME scores (β = 0.64 per $1,000, P=0.02). **Conclusions:** Our results suggest improvements in child health from both EITC benefits, particularly among unmarried women, and from income itself. These findings provide valuable information for health researchers and policymakers to better target disparities in child health and development among vulnerable families.

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INJECTION COCAINE USE AS A RISK FACTOR FOR CHRONIC RENAL IMPAIRMENT AMONG HEPATITIS C AND HIV CO-INFECTED PATIENTS RECEIVING CARE. Carmine Rossi* for the Canadian Co-Infection Cohort(Department of Epidemiology, Biostatistics and Occupational Health, McGill University)

There is evidence to suggest that cocaine use is associated with the development of specific nephropathies, however its relationship with chronic renal impairment (CRI) has not been investigated. We examined the association between injection cocaine use and CRI among hepatitis C virus (HCV) and HIV co-infected patients receiving care. Data was obtained from the Canadian Co-Infection Cohort, a multi-center, prospective cohort study of 1,381 HCV-HIV co-infected patients between January 2003 and October 2014. Study visits occurred every 6 months. We included patients with ≥ 2 study visits and normal renal function at baseline. Current injection cocaine use and frequency of use was obtained by self-report at each visit. CRI was defined by consecutive estimated glomerular filtration rate (eGFR) measurements of ≤ 70 mL/min/1.73 m2, obtained at least three months apart. Adjusted HRs were calculated using a discrete-time proportional hazards model. Of the 1,061 included patients, the median age was 44 years (interquartile range [IQR]: 39−50), 75% were male, 15% were Aboriginal and 79% were on stable ART, with a median CD4+ cell count of 399 cells/μL (IQR: 257−570). The median baseline eGFR was 104 mL/min/1.73 m2 (IQR: 94−112). A total of 125 (12%) patients developed CRI during follow-up and the median time-to-event was 2.6 years (IQR: 1.5−5.0). CRI incidence rates were 30.0 per 1,000 person-years among injection cocaine users and 31.4 per 1,000 person-years among non-users. After adjusting for demographic and clinical covariates, injection cocaine use was associated with CRI (HR 1.44, 95% CI: 0.90, 2.30). Compared to non-users, those who injected ≥ 3 days/week had a significantly elevated risk (HR 3.16, 95% CI: 1.13, 8.84). Among co-infected populations, injection cocaine use increases the risk of renal impairment, independent of traditional risk factors. Targeted interventions to reduce injection drug use may reduce the burden of renal disease in this population.

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MODERN METHODS FOR ANALYZING BEHAVIOR OVER TIME: EXAMPLES FROM THE MACC COMMUNITY-BASED COHORT. Darin Erickson*, Kathleen Lenk, Jean Forster (University of Minnesota)

The Minnesota Adolescent Community Cohort (MACC) study is a population-based, prospective cohort study designed to examine the effects of state and local tobacco control programs and policies on the initiation and progression of adolescent and young adult smoking. Participants were 12 to 16 years of age at baseline in year 2000 (N=4824 youth), and they were surveyed at 18 time points across a 14-year period. The study has numerous strengths including a population-based sample, a large sample size, very good response rates, consistent measurement, and an age distribution that spans an important developmental interval for tobacco initiation, escalation and quitting. The complexity of the data (e.g., many time points, unequal time intervals, non-normal distributions, missing data) also presents numerous analytic challenges. We have used a number of different analytic techniques appropriate for longitudinal data to both utilize these advantages and address the challenges. In this presentation, we discuss a number of these different analytic techniques that we have used to analyze the dataset, including a brief example of each. These include latent class growth models to classify youth based on tobacco use trajectories during adolescence, latent transition models to identify stages of smoking (e.g., nonsmoker, trier, regular smoker), and movement between stages over time, and cohort-sequential, zero-inflated Poisson growth mixture models to examine how individuals cluster based on their smoking behavior from age 12 to 28. We will discuss general issues that arise when using these techniques, guidance on appropriate interpretation of results, advantages and disadvantages of the various models, and recommendations for users.

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MEDICAL MARIJUANA LAWS AND ANNUAL OPIOID ANALGESIC SALES IN THE UNITED STATES. June H. Kim*, Julian Santaella, Magda Cerdá, Silvia Martins (Columbia University)

Aim: To date, 23 states have enacted some type of medical marijuana legislation (MML), and more states may soon pass similar laws. It has been hypothesized that the increased availability of medical marijuana has provided a viable substitute for opioids in the treatment of chronic pain, resulting in fewer overdose deaths. This study assesses whether state MMLs are associated with actual opiate use. **Methods:** Quarterly opioid sales for 1999-2013 were culled from the Automation of Reports and Consolidated Orders System (ARCOS). This data includes annual sales of seven major opiates (e.g., oxycodone) to pharmacies, hospitals and practitioners by state. Morphine equivalent doses (MED) per 100,000 residents were calculated for each state-quarter observation. States were classified as having a MML based on the date the law became effective. Mixed models with a fixed effect for time and state were used to estimate differences in the (natural log) average MED rate for states with and without MML. **Results:** For both states with and without MML, the mean MED increased from 1999 to 2013 (4156.2 mgs vs. 5515.4 mgs and 21385.2 mgs vs. 26324.8 mgs, respectively). We found that compared to states without MML, states that would eventually pass MML legislation had an average of 17% less opiate dispensed (β= -0.17, t-value=-2.95, p-value=0.003). However, while states that had passed MML legislation also dispensed less opiates compared to states without MML (β= -0.06, t-value=-1.27, p-value=0.204), this difference was non-significant. Further, when we limited the sample to only states that had previously passed MML, we found that MML implementation was associated with an 8% increase in opiates dispensed (β=0.08, t-value=2.69, p-value=0.007). **Conclusions:** These findings suggest that states that pass MML also dispense less opioids than states without MML. However, it remains unclear what impact MML may have on this association, if any. Further research is warranted.

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THE IMPACT OF ILLICIT DRUG USE ON ADHERENCE TO ANTIRETROVIRAL THERAPY (ART) AMONG HIV-INFECTED WOMEN IN THE UNITED STATES. Yuehan Zhang*, Tracey Wilson, Adebola Adedimeji, Dan Merenstein, Joel Milam, Jennifer Cohen, Mardge Cohen, Elizabeth T. Golub(Department of Epidemiology, Johns Hopkins Bloomberg School of Public Health)

Background: There is a paucity of research investigating the differential effects of specific illicit drugs on ART adherence among HIV-infected individuals. This gap is increasingly important in the era of marijuana legalization. We estimated the effects of overall illicit drug use, and specific use of crack and marijuana, on ART adherence among HIV-infected women. **Methods:** The Women's Interagency HIV Study is the largest prospective cohort study of HIV among US women. Participants were ART-exposed HIV-infected women, recruited during 1994-95, 2001-02 and 2011-12. Illicit drug use and ART adherence were self-reported at paired consecutive semiannual visits 4/2003-3/2014. We conducted multivariate Poisson regression analysis with generalized estimating equations to model suboptimal (<95%) adherence on exposure data collected at the previous visit. Missing values for drug use and covariates were imputed. **Results:** Among 1,800 women, illicit drug use was significantly associated with suboptimal adherence (RR=1.28; 95%CI: 1.14-1.43), adjusted for age, race, education, employment, marital status, AIDS diagnosis, CD4+ count, HIV viral load, clinical and depressive symptoms, current smoking, and alcohol. Compared to non-users, women who used crack, but not marijuana (RR=1.56; 95%CI: 1.30-1.86), women who used both crack and marijuana (RR=1.80; 95%CI: 1.44-2.25), and those who used other illicit drugs (RR=1.57; 95%CI: 1.30-1.89) all had higher likelihood of suboptimal adherence. Marijuana use only, however, was not significantly associated with suboptimal adherence (RR=1.08; 95%CI: 0.94-1.24). **Conclusions:** In this cohort of HIV-infected women, illicit drug use was significantly associated with suboptimal adherence to ART, with crack use having a stronger negative impact than marijuana. Findings highlight the importance of assessing, monitoring, and intervening on illicit drug use to maintain effective ART adherence and ultimately health outcomes among HIV-infected individuals.

774-S/P

INCIDENT NON-MEDICAL USE OF PRESCRIPTION OPIOIDS IS ASSOCIATED WITH HEROIN INITIATION AMONG U.S. VETERANS: A PROSPECTIVE COHORT STUDY. Geetanjoli Banerjee*, E. Jennifer Edelman, Declan T. Barry, William Becker, Magdalena Cerdá, Stephen Crystal, Julie R. Gaither, Adam J. Gordon, Kirsha Gordon, Robert Kerns, Silvia S. Martins, David A. Fiellin, Brandon DL Marshall (Brown)

Non-medical use of prescription opioids (NMUPO) has increased substantially in the United States over the past two decades. An estimated 25 million people initiated NMUPO between 2002 and 2011. Recent reports suggest that cost, abuse-deterrent opioid formulations and other interventions have resulted in transitions to heroin use. However, few prospective studies have examined the relationship between NMUPO and heroin initiation among previously low-risk populations engaged in medical care. This study aimed to determine whether new onset NMUPO is associated with heroin initiation among U.S. veterans receiving medical care who had no prior history of NMUPO, injection drug use, or heroin use. We analyzed data from the Veterans Aging Cohort Study (VACS), a prospective cohort study of HIV-infected and uninfected veterans in care. Incident NMUPO and date of heroin initiation were ascertained from surveys administered over six follow up interviews (2002-2012). We used Cox regression to examine the relationship between incident NMUPO and heroin initiation, adjusting for HIV status, sociodemographics, pain severity, long-term prescription opioid receipt, prior diagnoses of PTSD and major depression, and self-reported other substance use. Among the 3,430 eligible participants, the mean age was 49.7 (SD = 10.6) and 2,136 (62.7%) were African American. Incident NMUPO was seen in 1419 individuals. Over the 10-year study period the incidence of heroin initiation was 2.76 per 100 person-years. In a multivariable model, incident NMUPO was positively and independently associated with heroin initiation (adjusted hazard ratio [AHR] = 4.84, 95%CL: 3.89, 6.04). A multivariable model using inverse probability weighting to account for loss to follow-up produced similar results (AHR = 4.88, 95% CL: 3.95-6.02). NMUPO is a strong risk factor for heroin initiation among veterans receiving medical care. Novel prevention and screening strategies are needed to identify and address NMUPO among veterans in care.

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CHEMICAL EXPOSURES AND ISCHEMIC HEART DISEASE IN THE ALUMINUM INDUSTRY. Daniel Brown*, Andreas Neophytou, Elizabeth Noth, Mark Cullen, Ellen Eisen (University of California, Berkeley)

We observed that occupational exposure to airborne particles with an aerodynamic diameter smaller than 2.5 microns (PM2.5) was associated with risk of incident ischemic heart disease (IHD) in a cohort of 15,924 aluminum workers actively employed in smelting and fabrication operations. It is possible that the observed risk was due to co-exposure by other chemicals in the work environment rather than to particulate exposure. To test this hypothesis, we estimated the risk of IHD due to exposure to each of 13 chemicals regularly monitored by company industrial hygienists:, benzo(a) pyrene, particle-bound polycyclic aromatic hydrocarbons (PAH), fluorides, silica, oil mist, aluminum, chromium, copper dust, iron, lead, manganese, nickel, and welding fumes. PM2.5 exposure was based on extensive air monitoring data combined with job records. Chemicals were included as categorical variables and in addition to PM2.5 exposure, we also adjusted for demographics , job grade, smoking status, BMI, hypertension, diabetes, dyslipidemia, and an insurance derived health risk score. We used longitudinal targeted minimum loss-based estimation (TMLE) to estimate the marginal cumulative incidence of IHD if continuously employed in jobs with exposure to each chemical, while correcting for measured time-varying confounding that characterizes the healthy-worker survivor effect. We compared this estimate to that for IHD incidence if all workers were continuously employed in jobs without exposure. Of the 14 chemicals, only PAH was associated with excess risk of disease, with a cumulative incidence ratio of 1.6 (95% CI: 1.1 – 2.2). We demonstrate the ability to adjust for measured PM2.5 exposure and identify additional sources of occupational risk. Though multiple comparisons should be taken into account, these results provide initial evidence that occupational exposure to PAHs may contribute to the incidence of heart disease.

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THE INTERACTION OF SUGARS INTAKE AND HLA GENOTYPE IN TYPE 1 DIABETES DEVELOPMENT: THE DIABETES AUTOIMMUNITY STUDY IN THE YOUNG. Molly M Lamb*, Brittni Frederiksen, Jennifer Seifert, Miranda Kroehl, Marian Rewers, Jill M. Norris (Colorado School of Public Health)

Objective: Dietary sugars intake may increase insulin production, stress the beta cells and increase the risk for islet autoimmunity (IA) and subsequent type 1 diabetes (T1D). **Methods:** Since 1993, the Diabetes Autoimmunity Study in the Young (DAISY) has followed children at increased genetic risk for T1D for the development of IA (autoantibodies to insulin, GAD65 or IA-2 twice or more in succession), and progression to T1D. Intake of fructose, sucrose, total sugars, sugar-sweetened beverages, beverages with non-nutritive sweetener, and juice were collected prospectively throughout childhood via food frequency questionnaires (FFQ). We examined diet records for 1,893 children (mean age at last follow-up: 10.2 years); 145 developed IA and of these, 45 progressed to T1D. The association of sugars intake with risk of IA was assessed using time-varying dietary covariates. The association of sugars intake with risk of T1D in IA-positive children was assessed using diet measured at first appearance of IA. HLA genotype was dichotomized by high risk (HLA-DR3/4,DQB1*0302) or not. All Cox regression models were adjusted for total calories, FFQ type, T1D family history, HLA genotype and ethnicity. Models of T1D risk in IA positive children were also adjusted for age at IA appearance. **Results:** While development of IA was not associated with any of the sugar intake variables, risk of T1D in children with IA was significantly associated with intake of total sugars (HR: 1.71, 95% CI: 1.09-2.68, for a 1 standard deviation increase in intake). Furthermore, in children with IA, risk of T1D was associated with increased intake of sugar-sweetened beverages in those with the high-risk HLA genotype (HR: 1.94, 95% CI: 1.37-2.74) but not in children without it (interaction p-value=0.008). **Conclusions:** Sugars intake may exacerbate the later stage of T1D development, and sugar-sweetened beverages may be especially detrimental to children with the highest genetic risk of developing T1D.

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ASSOCIATIONS BETWEEN EARLY LIFE SOCIOECONOMIC POSITION, CANDIDATE GENE METHYLATION, AND ADULT CARDIOMETABOLIC PHENOTYPES IN YOUNG ADULT WOMEN IN THE JERUSALEM PERINATAL FAMILY FOLLOW-UP STUDY. Jonathan Y Huang*, Amelia R Gavin, Thomas S Richardson, Ali Rowhani-Rahbar, David S Siscovick, Hagit Hochner, Yechiel Friedlander, Daniel A Enquobahrie (McGill University, Institute for Health and Social Policy)

Background: Early life socioeconomic position (SEP) has been related to adult cardiometabolic health. Empirical evidence for epigenetic mechanisms remains limited. **Methods:** Among 613 adult women (mean age = 32 years) of the Jerusalem Perinatal Study Family Follow-Up, we investigated early life SEP - adult DNA methylation associations at five cardiometabolic and stress genes: ABCA1, INSIGF, LEP, HSD11B2, and NR3C1. Early life SEP was defined using father's occupational class (6 levels) and parental education years at offspring birth. Sequenom MassARRAY was used to quantify gene-specific, percent DNA methylation in adult peripheral blood. We used multivariable linear regression and marginal structural models (MSM) to estimate early life SEP – adult methylation associations under two proposed causal structures. We also examined whether methylation mediated SEP-adult cardiometabolic phenotype relationships using MSM and product-of-coefficients, adjusting for adolescent overweight, education, religiosity, marital status, parity, and cigarette or alcohol use. All models were adjusted for age at blood draw and sampling criteria. **Results:** Average methylation ranged from 5.7% (HSD11B2) to 77.3% (INS-IGF). Increasing maternal and paternal education from ≤ 8 years to 9-12 years were associated with 0.5 %-point (95% Confidence Interval: 0.1, 0.8) higher HSD11B2 and 3.6 %-point (95% CI: 0.8, 6.5) higher NR3C1 Exon 1F methylation, respectively. HSD11B2 methylation was associated with weight, total cholesterol, and LDL-cholesterol levels while and NR3C1 was associated with height and blood pressure. We did not find evidence for mediation. **Conclusions:** We found some evidence of associations between HSD11B2 and NR3C1 and both early life SEP and adult cardiometabolic phenotypes.

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ASSOCIATION BETWEEN DEHYDRATION AND SHORT-TERM RISK OF MYOCARDIAL INFARCTION AND STROKE IN ISCHEMIC HEART DISEASE PATIENTS. Joel N. Swerdel, George G. Rhoads, Nora M. Cosgrove, John B. Kostis (Rutgers School of Public Health)

Background: Previous cross-sectional studies have demonstrated a higher incidence of dehydration in patients admitted for myocardial infarction (MI) or ischemic stroke suggesting possible effects of chemical and/or rheological changes on infarctions. However, the temporality of the association has not been definitively established. The goal of the present study was to examine whether prior hospitalization with dehydration in chronic ischemic heart disease (IHD) patients was associated with 15-day incidence of MI or stroke using a longitudinal dataset. **Methods:** We obtained data for the years 1994-2012 from the Myocardial Infarction Data Acquisition System (MIDAS), a repository of in-patient records from non-federal New Jersey hospitals, for IHD hospitalizations (N=2,701,657). We determined dehydration through comorbid diagnosis of dehydration, volume depletion, and/or hypovolemia. Estimates for the association between IHD hospitalization with and without dehydration and 15-day incidence of or mortality from MI and stroke were determined using log-linear modeling. **Results:** Prior hospitalization with dehydration in IHD patients was associated with a 57% increase in the 15-day risk for MI (RR: 1.57, 95% CI 1.50-1.65) and an 87% increase in the 15-day risk for stroke (RR: 1.87, 95% CI 1.77, 1.99) compared to IHD patients without dehydration after adjusting for sociodemographic factors and comorbid conditions. Dehydration was also associated with a 65% increase in the 15-day mortality risk from MI (RR: 1.65, 95% CI 1.51-1.81) and a 2.7 times increase in the 15-day mortality risk from stroke (RR: 2.73, 95% CI 2.35, 3.16) after adjustment. **Conclusion:** Dehydration may be an important risk factor for MI and stroke especially in patients with ischemic heart disease. The importance of proper hydration may need to be emphasized by medical professionals especially to their patients with chronic ischemic heart disease.

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COUNTY-LEVEL DISPARITIES IN CARDIOVASCULAR DISEASE MORTALITY IN THE UNITED STATES IN 2007-2011: CONTRIBUTING FACTORS. Shivani A. Patel*, Mohammed K. Ali, K.M. Venkat Narayan, Neil K. Mehta (Hubert Department of Global Health, Emory University)

Background: Reducing longstanding geographic disparities in cardiovascular disease (CVD) mortality is a national public health priority. We sought to identify and quantify leading factors responsible for CVD mortality disparities across US counties in 2007-2011.**Methods:** We linked vital statistics, census, survey, and administrative data to characterize 2,152 counties (covering 97% of the national population). Four sets of county features were examined: (1) demographic, (2) social and economic, (3) health care and healthy environments, and (4) modifiable CVD risk factors. County-level CVD mortality, 2007-2011, measured as CVD deaths per 100,000 population among adults ages 45-74 years was modeled using 2-level hierarchical linear regression. We quantified CVD mortality variation (i.e., % inter-county disparity) modeled by each set of features. **Results:** There was a 9-fold difference between the lowest and highest county CVD mortality. 39% of county-level CVD mortality variation was modeled by demographic features (e.g., urbanicity, racial composition, and foreign birth), and another 30% was modeled by economic and social features (e.g., income, education, employment). Health care and healthy environment (e.g., specialist medical doctors, exercise opportunities), and CVD risk factors modeled an additional 2% of CVD mortality variation. In the final fully adjusted model, +1SD in median income was associated with lower CVD mortality (-19.81; 95%CI: -23.16,-16.47) and +1SD in the proportion without a HS degree was associated with higher CVD mortality (23.39; 95% CI: 19.04,27.75). In comparison, +1SD in specialist medical doctors per 100,000 was associated with -3.41 CVD mortality (95% CI: -6.38,-1.10) and an aggregate index of modifiable CVD risk factors was associated with 6.97 CVD mortality (95% CI: 4.21,9.73). **Conclusion:** Improving health care access and traditional CVD risk factors may reduce county CVD mortality levels but is unlikely to reduce county CVD disparities.

785-S/P

GESTATIONAL DIABETES AND OFFSPRING OBESITY IN CHILDHOOD, ADOLESCENCE AND EARLY ADULTHOOD. Shanshan Li1*, Edwina Yeung, Jorge E. Chavarro, Yeyi Zhu1, Alison E. Field, Stacey A. Missmer, James L. Mills1, Frank B. Hu, Cuilin Zhang (Epidemiology Branch, Division of Intramural Population Health Research, Eunice Kennedy Shriver National Institute of Child Health and Human Development, National Institutes of Health, Rockville, MD 20852, US)

Background: Hyperglycemia in utero environment as exemplified by gestational diabetes (GDM) is related to an elevated risk of childhood obesity. However, long-term trans-generational impacts of GDM through adulthood are unknown. Furthermore, gender specific data are lacking. **Methods:** We conducted a prospective cohort study of 19,956 individuals (10,410 female and 9,546 male) followed up from age 9-14 through age 23-28. Obesity was defined using International Obesity Task Force criteria for children under age 18 and World Health Organization definition for age 18 or older. The association between GDM and offspring obesity was examined using generalized linear models and generalized estimating equations adjusted for pre-pregnancy body mass index (BMI), age, and other major maternal factors. **Results:** During 14 years follow-up, 8.8% girls and 9.2% boys became obese. In general, male offspring born to a GDM pregnancy had significantly higher BMI ($p<0.001$) and greater risk of obesity from childhood through early adulthood than those born to non-GDM pregnancies. Adjusted relative risks (RRs) (95% Confidence Intervals (CIs)) for obesity among males were 1.64 (1.14-2.37) for late childhood (9-12 years), 1.58 (95% CI: 1.16-2.16) for adolescence (12 -18 years), and 1.42 (95% CI: 1.04-1.95) for early adulthood (age $\geq$18 years). There was a significant interaction between pre-pregnancy BMI and GDM in relation to obesity risk in the male offspring, with the highest risk being observed among offspring born to obese GDM women (p for interaction=0.03). Among female offspring, however, no significant association was observed between GDM and offspring obesity from childhood through adulthood. **Conclusion:** Hyperglycemia in utero environment may have a gender specific effect on obesity risk in the offspring; it is related to higher risk of obesity from childhood through early adulthood among male offspring, but not among female offspring.

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COMBINED EXPOSURES TO PRENATAL PESTICIDES AND FOLIC ACID INTAKE IN RELATION TO AUTISM SPECTRUM DISORDERS. Rebecca J. Schmidt*, Vladimir Kogan, Janie Shelton, Lora Delwiche, Robin L. Hansen, Sally Ozonoff, Daniel Tancredi, Irva Hertz-Picciotto, Heather E. Volk (Department of Public Health Sciences and the MIND Institute, University of California Davis School of Medicine)

Many pesticides are neurotoxic by design and some have been linked to autism spectrum disorder (ASD). Periconceptional folic acid (FA) is associated with reduced ASD risk. In animal studies, maternal FA provides protection from environmental chemicals with developmental toxicity. We examined combined exposures to maternal FA and selected pesticides, both in-home and agricultural, in relation to ASD risk. California children aged 24-60 months enrolled in the CHARGE case-control study from 2003-2011 were clinically confirmed to have ASD (n=505) or typical development (n= 346). Maternal supplemental FA intake before and during pregnancy and indoor use of products containing pesticides were retrospectively collected by telephone interview. Agricultural pesticide exposure was determined by linking mothers' addresses shortly before, during, and after pregnancy to California's commercial Pesticide Use Reports using 1250 m buffers. For all comparisons, the reference group was women with above-median FA intake (800+ µg) during the first pregnancy month and no pesticide exposure. ORs were adjusted for home ownership. Women with <800 µg FA intake and regular exposure (for 6+ pregnancy months) to indoor pesticides had children with elevated ASD risk (OR=5.1, 95% CI: 2.3-11.4). This was over twice that of those with 800+ µg FA and regular pesticide exposure (OR=2.3, 1.3-4.1). ORs for combined low maternal FA intake and any exposure to agricultural pesticides 3 months before or after conception were: 1.6 (0.6-4.4) for chlorpyrifos, 2.1 (1.0-4.4) for organophosphates, 1.9 (0.9-4.1) for pyrethroids, and 2.1 (0.7-5.9) for carbamates. Except for carbamates, these ORs were larger than those for combinations of pesticide exposure with higher FA intake. All results were consistent with joint multiplicative or additive effects. Supplemental FA could potentially reduce the risk of ASD associated with pesticide exposure. Larger studies and research on potential mechanisms are warranted.

791-S/P

BIRTH OUTCOMES AND UNCONVENTIONAL NATURAL GAS DEVELOPMENT IN PENNSYLVANIA, USA, 2009-2013. Joan A. Casey*, David A. Savitz, Sara G. Rasmussen, Elizabeth L. Ogburn, Jonathan Pollak, Brian S. Schwartz (Department of Environmental Health Sciences, Johns Hopkins Bloomberg School of Public Health, Baltimore, Maryland, USA; Robert Wood Johnson Foundation Health and Society Scholars Program, UC San Francisco and UC Berkeley, California, USA)

Background: Unconventional natural gas development (UNGD) has expanded rapidly in several regions of the USA; in Pennsylvania there were over 3500 producing wells by December 2012. A prior study reported adverse birth outcomes in those living near gas wells. **Methods:** We evaluated associations between prenatal exposure to UNGD and four neonatal outcomes among 9384 mothers linked to 10946 neonates delivered at the Geisinger Health System between 2009-Jan. 2013. We estimated cumulative exposure to UNGD with an inverse-distance squared model that incorporated distance to the mother's home; dates and durations of well pad development, drilling, and hydraulic fracturing; and natural gas production volume during the pregnancy. We used the electronic health record to identify maternal and neonatal characteristics. In addition, we characterized other relevant environmental exposures including water source, residential greenness, distance to nearest major road, and community socioeconomic deprivation. We used multilevel linear and logistic regression to examine associations between UNGD quartile and birth weight, 5 minute Apgar score, preterm birth, and small for gestational age, while controlling for confounding variables. **Results:** In adjusted models, there was an association between UNGD and preterm birth that increased across quartiles (p for trend = 0.02), with a fourth quartile odds ratio of 1.46 (95% CI 1.11-1.91). UNGD was similarly associated with decreased birth weight, but the association disappeared after adjustment for gestational age. We found no associations of exposure with Apgar score or small for gestational age. In a post-hoc analysis, UNGD was associated with high-risk pregnancy identified on the problem list (fourth vs. first quartile, OR = 1.27, 95% CI 1.03-1.56, and p for trend = 0.002) **Conclusions:** Prenatal residential exposure to UNGD was associated with increased odds of preterm birth, adding to evidence that UNGD may impact pregnancy outcomes.

792-S/P

ASSOCIATION OF TRAFFIC-RELATED AIR POLLUTION AND CORONARY ARTERY CALCIUM IN THE FRAMINGHAM HEART STUDY. Kirsten S. Dorans*, Elissa H. Wilker, Wenyuan Li, Mary B. Rice, Joel Schwartz, Brent A. Coull, Julie E. Buring, Ralph B. D'Agostino Sr., Joseph M. Massaro, Udo Hoffmann, Christopher J. O'Donnell, Murray A. Mittleman (Beth Israel Deaconess Medical Center; Harvard T.H. Chan School of Public Health, Boston, MA, United States)

Rationale: Long-term exposure to air pollution is associated with an increased risk of cardiovascular disease, potentially via atherosclerosis promotion. Studies of air pollution and coronary artery calcium (CAC), a correlate of subclinical atherosclerosis, have had inconsistent findings. Objectives: To determine whether living close to a major road and residential exposure to fine particulate matter (PM2.5) are associated with CAC in a population-based cohort in the Northeastern US. **Methods:** CAC Agatston score was measured from 2002-2005 among participants in the Framingham Offspring and Third Generation studies. Participants with clinical CVD were excluded. We assessed the association between residential distance to major road and PM2.5 exposure (annual average for 2003; estimated by a satellite and land use-based spatiotemporal model) and CAC. We used logistic regression to assess the association with any detectable CAC. As CAC scores were right-skewed (43% had detectable CAC), we used quantile regression to assess associations with extent of CAC. We modeled the 60th–90th CAC score percentiles (95% CIs estimated by bootstrapping with 1000 samples). Models were adjusted for age, sex, body mass index, smoking, individual and area-level socioeconomic status indicators, cohort, temporal trends and season. **Results:** Among 2699 eligible participants, mean age was 51.6 (standard deviation 11.3); 50% male. There was no association of distance to major road or PM2.5 with the presence of CAC. The 90th percentile CAC score was 27.2 units higher (95% CI: -6.0, 46.6) among those living <100 m compared to those 400-<1000 m from a major road. No associations were seen for PM2.5 or with the 60th, 70th or 80th percentiles. **Conclusion:** In this cohort, proximity to major road and PM2.5 were not associated with presence of CAC. Results suggested a small association of distance to major road with the 90th percentile of CAC. Confirmation of these findings in other settings is warranted.

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ORGANOCHLORINE INSECTICIDES DDT AND CHLORDANE IN RELATION TO SURVIVAL FOLLOWING BREAST CANCER. Humberto Parada*, Mary S. Wolff, Lawrence S. Engel, Alexandra J. White, Sybil M. Eng, Rebecca J. Cleveland, Nikhil K. Khankari, Susan L. Teitelbaum, Alfred I. Neugut, Marilie D. Gammon (University of North Carolina at Chapel Hill, Department of Epidemiology)

Background: Organochlorine insecticides have been studied extensively in relation to breast cancer incidence and results have largely been null. Whether these compounds influence survival remains to be fully explored. Objectives: We examined associations between organochlorine insecticides (p,p'-DDT, its primary metabolite, p,p'-DDE, and chlordane) and survival among women with breast cancer. **Methods:** A population-based sample of women diagnosed with a first primary invasive or in situ breast cancer in 1996-1997 with organochlorine blood measures (n=633) were followed for vital status through 2011. After follow-up of 5 and 15 years, respectively, we identified 55 and 189 deaths, of which 36 and 74 were breast cancer-related. Using Cox regression models, we estimated hazard ratios (HRs) and 95% confidence intervals (CIs) for lipid-adjusted organochlorine concentrations with all-cause and breast cancer-specific mortality. **Results:** At 5 years after diagnosis, the highest tertile of DDT concentrations was associated with more than two-fold increase in all-cause (HR=2.19; 95%CI: 1.02, 4.67) and breast cancer-specific (HR=2.72; 95%CI: 1.04, 7.13) mortality. At 15 years, middle tertile concentrations of DDT (HR=1.42; CI 0.99, 2.06) and chlordane (HR=1.42; 95%CI: 0.94-2.12) were modestly associated with all-cause and breast cancer-specific mortality hazards. However, third tertile DDE concentrations were inversely associated with 15-year all-cause mortality (HR=0.66; 95%CI: 0.44, 0.99).**Conclusions:** This is the first population-based study in the United States to show that DDT may adversely impact survival following breast cancer. Given the high breast cancer incidence worldwide, further restriction of the use of this and other similar chemicals may be warranted.

794-S/P

RESIDENTIAL EXPOSURE TO PESTICIDE ACTIVE INGREDIENTS AND 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, U.S. Environmental Protection Agency, National Center for Environmental Assessment)

In previous work, we observed elevated ORs for total pesticide exposure and 10 particular birth defects, including 3 congenital heart defects and structural defects affecting the gastrointestinal, genitourinary and musculoskeletal systems. This analysis examines the association of those birth defects with exposure to 7 pesticide active ingredients. Cases were from the North Carolina Birth Defects Monitoring Program and linked to live singleton birth records for 2003-2005 in North Carolina; non-cases served as controls (total n=304,906). Pesticide exposure was assigned using a previously constructed metric estimating pounds of active ingredient applied to crops grown within 500 meters of maternal residence, specific dates of pregnancy and chemical application dates based on the planting/harvesting dates of each crop. Logistic regression was used to estimate ORs (95% CI) for four categories of exposure (<10, 10-<50, 50-<90, >=90 percentiles) compared to unexposed. Models were adjusted for maternal race, age at delivery, education, marital status and smoking status. Associations varied by birth defect and pesticide combinations. For example, hypospadias had positive ORs with exposures to mepiquat (OR 50-90th: 1.10 (0.90, 1.34)), paraquat (OR 50-90th: 1.14 (0.93, 1.39)), and pendimethalin (OR 50-90th: 1.21 (1.01, 1.44)), but not metolachlor (OR 50-90th: 1.00 (0.81, 1.22)). Whereas atrial septal defects had positive ORs with higher levels of exposure to glyphosate, cyhalothrin, metolachlor, mepiquat, and pendimethalin (where ORs range from 1.22 to 1.35 for 50-90th exposures, and 1.72 to 2.09 for >90th exposures), but paraquat associations were null or inconsistent (OR 50-90th: 1.05 (0.87, 1.27). Our results suggest differing patterns of association with residential exposure to 7 of the most frequently applied pesticide active ingredients. The views expressed in this abstract are those of the authors and do not necessarily reflect the views or policies of the U.S. EPA.

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CLIMATE CHANGE AND VERY DANGEROUS HEAT WAVES: PROJECTING THE FREQUENCY OF HIGH-MORTALITY HEAT WAVES IN 82 US COMMUNITIES IN 2061--2080 UNDER DIFFERENT CLIMATE, POPULATION, AND ADAPTATION SCENARIOS. G. Brooke Anderson*, Keith Oleson, Bryan Jones, Roger D. Peng (Colorado State University)

Certain rare heat waves can have devastating effects to a community's public health and well-being. Here, we built models to predict which heat waves are likely to be such "very dangerous" heat waves using present-day data from 82 large US communities, 1987—2005. We built twenty potential classification models and used tools from machine learning (Monte Carlo cross-validations) to evaluate these models, identifying three models capable of predicting very dangerous heat waves. Using these three models, we predicted the frequency of very dangerous heat waves in these 82 communities in 2061—2080 under two scenarios of climate change (RCP4.5, RCP8.5), two scenarios of population change (SSP3, SSP5), and three scenarios of community adaptation to heat (none, lagged, on-pace). We found that the frequency of very dangerous heat waves was most strongly influenced by the pace at which communities are able to adapt to their changing climates. We found that the frequency also depended somewhat on the climate change scenario, while frequency was practically unchanged across different population scenarios. Our results suggest that it is critical to consider adaptation scenarios when projecting the health impacts of heat under climate change scenarios. Further, our findings suggest that community-level adaptation measures are likely to be a critical protection against future very dangerous heat waves.

800-S/P

PRE-CONCEPTION LOW-DOSE ASPIRIN AND SEX RATIO: THE EAGER TRIAL. Rose Radin*, Sunni Mumford, Robert Silver, Laurie Lesher, Noya Galai, David Faraggi, Jean Wactawski-Wende, Janet Townsend, Anne Lynch, Hyagriv Simhan, Lindsey Sjaarda, Neil Perkins, Shvetha Zarek, Torie Plowden, Emily Mitchell, Karen Schliep, Robyn Kalwerisky, Enrique Schisterman (NICHD/NIH)

Overactive endometrial inflammation is observed in women with recurrent miscarriage. Disordered inflammation may be exacerbated by the male embryo, which has more active metabolism and provokes greater oxidative stress and immune activation as shown in animal and human studies. Thus, low-dose aspirin (LDA), an anti-inflammatory drug, may alter the sex ratio among women with a history of pregnancy loss. We assessed the sex ratio at birth and approximate sex ratio at implantation in a preconception randomized trial of LDA vs. placebo. Participants were age 18-40 with 1-2 pregnancy losses. We estimated the intention-to-treat (ITT) RR and 95% CI for a live-born male. The RR for pregnancy with male offspring included karyotypes of losses (n=48). When restricting to ultrasound-confirmed pregnancies and live births, respectively, we adjusted with stabilized inverse-probability-of-treatment weighting. A sensitivity analysis examined bias from the pregnancy losses with unknown offspring sex (n=85). The ITT RR for live-born male, LDA vs. placebo, was 1.31 (1.07-1.60) among 1,078 women who completed follow-up and 1.23 (1.03-1.46) among 595 live births (sex ratio at birth). The RR for pregnancy with male offspring among 728 ultrasound-confirmed pregnancies was 1.22 (1.02-1.45) ; in the sensitivity analysis, RRs were 1.15-1.17 and statistically significant, indicating that missing karyotype data on pregnancy losses produced little bias. Among women with the inflammatory biomarker C-reactive protein>1.65 mg/L at randomization, the ITT RR=1.79 (1.24-2.58) vs. 1.07 (0.84-1.37) among women with values < 1.65 mg/L (P-interaction=0.02). Preconception LDA was associated with an increased sex ratio, particularly among women with higher CRP. LDA may have modulated decidual inflammation that was exacerbated by the male embryo.

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IS THERE AN ASSOCIATION BETWEEN PRESENCE OF THYROID ANTIBODIES AND PREGNANCY LOSS? Torie Comeaux Plowden*, Lindsey Sjaarda, Aijun Ye, Neil J. Perkins, Shvetha Zarek, Karen Schliep, Robyn Kalwerisky, Enrique F. Schisterman, Jean Wactawski-Wende, Janet Townsend, Ann Lynch, Robert Silver, Laurie Lesher, Noya Galai, David Faraggi, Rose Radin, Emily Mitchell, Alan H. DeCherney, Sunni Mumford (Epidemiology Branch, Division of Intramural Population Health Research, Eunice Kennedy Shriver NICHD)

Introduction: Overt thyroid dysfunction been associated with infertility, early pregnancy loss and other adverse obstetrical and fetal outcomes. However, results of studies assessing the relationship between thyroid antibodies and pregnancy loss have varied. Thus, our objective was to examine the association between pre-pregnancy presence or absence of anti-thyroid antibodies and pregnancy loss. **Methods:** This study is a secondary analysis of a large, randomized controlled trial evaluating healthy fertile women (n=1228). Women with 1 or 2 prior pregnancy losses were enrolled and followed for up to 6 menstrual cycles of attempting pregnancy. Prior to conception, TSH, fT4, anti-thyroglubulin antibody (anti-TG) and anti-thyroid peroxidase antibody (anti-TPO) levels were measured. RR and 95% CIs for pregnancy loss were estimated using generalized linear models adjusting for age and body mass index. **Results:** 119 women had anti-TG antibodies and 103 women had anti-TPO antibodies. Neither women with anti-TG antibodies nor those with anti-TPO antibodies were shown to have a higher likelihood of any pregnancy loss (RR 1.01, 95% CI: 0.67, 1.52 and RR 0.92, 95% CI 0.58, 1.45 respectively). A subgroup analysis of women with a clinical pregnancy loss did not find any correlation with presence of thyroid antibodies. In the subset of women who became pregnant during the study, there also was no association between these antibodies and pregnancy loss. **Conclusion:** Among healthy fertile women with a history of 1 or 2 losses, the presence of anti-thyroid antibodies (anti-TG or anti-TPO) was not associated with pregnancy loss.

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THE VIRULENT MALE: PRETERM BIRTH AND GROWTH RESTRICTION FOLLOWING A FIRST-BORN SON. Tim A. Bruckner*, Jonathan A. Mayo, Jeffrey B. Gould, David K. Stevenson, Gary B. Shaw, Suzan L. Carmichael (UC Irvine)

In Scandinavia, delivery of a first-born son elevates the risk of preterm delivery and intrauterine growth restriction of the next-born infant. Explanations for this finding invoke maternal immunological responses against male -specific antigens that are shared across populations. However, the external validity of Scandinavian results to ethnically diverse populations remains unclear. We test the virulent male hypothesis for preterm delivery and growth restriction using the linked California birth cohort file. Given the different baseline risks of adverse outcomes across race/ethnicity, we examined the hypothesis separately by race/ethnicity. We retrieved data on 2,852,976 births to 1,426,488 mothers with at least two live births. Our within-mother tests applied Cox proportional hazards (preterm delivery) and linear regression models (birthweight for gestational age). For non-Hispanic whites, Hispanics, Asians, and American Indian / Alaska Natives, analyses indicate heightened risk of preterm delivery and growth restriction following a first-born male. The race-specific hazard ratios for preterm delivery range from 1.07 to 1.18. Coefficients for birthweight-for-gestational-age percentile range from -0.73 to -1.49. The 95% CIs for the preterm and growth restriction estimates do not contain the null. By contrast, we could not reject the null for non-Hispanic black mothers (Hazard Ratio for preterm = 1.00, 95% CI: 0.96—1.04; coefficient for birthweight for gestational age percentile = -0.30, 95% CI = -0.68—0.09). Propensity score analyses, which control for selection into a second live birth, yielded essentially the same results. Findings also remain robust to unmeasured confounding from shared factors across pregnancies. Whereas findings in California generally support those from Scandinavia, the null results among non-Hispanic black mothers suggest that the virulence of a first-born male does not appear fixed across all racial/ethnic groups.

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RACE DISPARITIES IN PLACENTAL VASCULAR LESIONS. Janet M. Catov*, W. Tony Parks (University of Pittsburgh School of Medicine Dept. of Ob/Gyn/RS)

There are profound and persistent race disparities in adverse pregnancy outcomes, with African American women having rates of preeclamspsia, preterm birth (PTB) and small for gestational age (SGA) deliveries that are up to two times higher than White women. Placental evidence of malperfusion is linked to these outcomes, and we considered this common underlying etiology may reveal clues about race disparities. We evaluated placental pathology records among 18,717 deliveries at Magee-Womens Hospital (Pittsburgh, PA) from 2008 to 2012 (45% of all births; n=14,228 White; n=4,489 African American). Placental lesions were abstracted and categorized as malperfusion, ascending intrauterine infection (AIUI), chronic villitis, fetal thrombosis, and chorangiosis using established criteria. African American women with placental records had higher rates of preeclampsia (14.1 vs 12.0%, p<0.0001) and spontaneous PTB (15.2 vs 13.3%, p=0.004) compared to White women. African American vs. White women had higher risk of vasculopathy, the underlying cause of infarcts and abruption identified via failed vessel remodeling and atherosclerosis-like features. This excess risk was present following term, spontaneous PTB or indicated PTB and persisted after adjustment for age, smoking, gestational age and pre-pregnancy BMI (OR 1.32, 95% CI 1.08, 1.61). African American vs. White women with spontaneous PTB were more likely to have AIUI (47.2 vs. 33.1, p<0.0001), independent of confounders (OR 1.52 [1.03, 2.24]). This race-specific risk for spontaneous PTB was particularly high when placentas were affected by both malperfusion and AIUI (OR 1.77 [1.19, 2.62]). Our results indicated African American women had excess risk of the most prominent malperfusion lesion, and risk of spontaneous PTB was high in African American women affected by both vascular and infectious lesions. Race disparities in adverse pregnancy outcomes may be linked to co-occurrence of vascular and infectious pathways.

804-S/P

COUPLES' USE OF TOBACCO PRODUCTS AND TIME-TO-PREGNANCY IN A PRECONCEPTION COHORT. Katherine J Sapra*, Dana B Barr, Jose M Maisog, Rajeshwari Sundaram, Germaine M Buck Louis (Eunice Kennedy Shriver National Institute for Child Health & Human Development)

Background: Smokeless tobacco has been touted as a harm reduction tool for smokers. However, no prior study has evaluated the risk of smokeless tobacco use on couple fecundity. **Methods:** 501 couples discontinuing contraception to try for pregnancy were followed until positive pregnancy test or 12 months of trying. Partners reported current use of cigarettes, cigars, and chew/snuff (smokeless). Fecundity was measured by prospectively observed time-to-pregnancy (TTP) in cycles. Partners provided blood for quantification of heavy metals and serum cotinine, and data on demographics (race/ethnicity, education, income, age) and lifestyle (alcohol and caffeine use; measured BMI). Fecundability odds ratios (FOR) were estimated for current exclusive use of each tobacco type relative to never users of tobacco, adjusted for demographics/lifestyle. Partners were modeled separately and together. Geometric means of cotinine/ metals were evaluated across tobacco type using non-parametric tests. **Results:** 11% of females smoked. Male exclusive use was 10% for cigarettes, 9% for cigars, 6% for smokeless tobacco. Neither cigar (FOR: 0.74, 95%CI: 0.48-1.14) nor smokeless tobacco use (FOR: 1.15, 95%CI: 0.69-1.92) was associated with TTP. Cigarette use reduced fecundity in males (FOR: 0.43, 95%CI: 0.24-0.75) and females (FOR: 0.55, 95%CI: 0.34-0.87) modeled separately; modeled jointly only female use was significant (FOR: 0.28, 95%CI: 0.10-0.77). Cotinine levels were significantly higher in cigarette and smokeless tobacco users than never users; however, cotinine was not associated with TTP using >3, >10, or >200 ng/mL cutoffs. Cadmium levels were significantly higher in smokers than smokeless tobacco and never users; adjusting for cadmium attenuated the association between cigarette use and TTP. **Conclusions:** While we cannot conclude smokeless tobacco does not alter fecundity, we do not observe an effect in our limited sample. We observe longer TTP in smokers that may be due to high cadmium levels.

810-S/P

THE ASSOCIATION BETWEEN CHILDHOOD PSYCHOLOGICAL FUNCTIONING AND ADULTHOOD HEALTHY LIFESTYLE. Ashley Winning*, Marie McCormick, M. Maria Glymour, Laura Kubzansky (Harvard T.H. Chan School of Public Health)

Background: Maintaining a healthy lifestyle in adulthood has been shown to significantly reduce risk of chronic disease and premature mortality; yet, little work has examined childhood psychological predictors of adult healthy lifestyle. **Methods:** Using prospective data from the National Child Development Study, we assessed whether psychological functioning in childhood (captured by internalizing and externalizing symptoms at ages 7, 11, and 16 years) was associated with healthy lifestyle at ages 33 years (N=10,748) and 42 years (N=9,581). We created a healthy lifestyle index that consisted of five components: regular physical activity, healthy diet, absence of smoking, moderate alcohol consumption, and ideal body weight. We used linear regression models to estimate the relationship between psychological functioning and healthy lifestyle, running separate models for the age 33 and age 42 outcomes. We used logistic regression models to explore each health behavior separately in relation to childhood distress. To minimize potential bias due to participant attrition, we applied inverse probability weights to all analyses. **Results:** Few participants (3.8% at age 33 years and 2.8% at age 42 years) endorsed all five components of a healthy lifestyle. Adjusting for potential child- and family-level confounders, poor psychological functioning in childhood was negatively associated with healthy lifestyle at age 33 years (β=-0.11, SE=0.01, $p<0.0001$) and age 42 years (β=-0.13, SE=0.01, $p<0.0001$). Other than physical activity, greater distress in childhood was associated with significantly lower odds of endorsing each of the healthy lifestyle components, at both ages. **Conclusions:** Psychological distress in childhood may signal increased risk for engaging in an array of unhealthy lifestyle practices later in life and, thus, may be an important target for public health interventions aimed at preventing chronic disease.

811-S/P

PRENATAL AND PERINATAL RISK FACTORS FOR SELF-INJURIOUS BEHAVIORS IN AUTISM SPECTRUM DISORDERS. Gnakub Norbert Soke*, Tasha Fingerlin, Cordelia Rosenberg, Steve Rosenberg, Richard Hamman, Li-Ching Lee, Ellen Giarelli, Laura Carpenter, Lisa Wiggins, Carolyn DiGuiseppi (Colorado School of Public Health)

Background: Self-injurious behaviors (SIB) are common in autism spectrum disorders (ASD) and have serious consequences. Pre- and perinatal factors may be associated with SIB via direct neurologic insult or indirect markers of adverse pregnancy circumstances. **Objectives:** Explore associations between prenatal/perinatal risk factors and SIB in a population-based sample of children with ASD. **Methods:** The study included 4,343 8-year-old children with ASD from 14 sites of the Autism and Developmental Disabilities Monitoring (ADDM) Network. Sites that did not provide birth certificate data were excluded. The outcome, SIB, and potential risk factors (sociodemographics; maternal smoking status; maternal medical conditions; pregnancy complications; and perinatal factors) were abstracted from medical, educational and birth records. We used within-site multiple imputation to account for missing data and between-site variability. We employed a non-linear mixed model with site as a random effect in each imputed dataset and combined estimates using Rubin's formula. Models were adjusted for previously described medical and developmental risk factors (e.g., epilepsy). Effect modification by sex, IQ, and maternal education was examined. Results: SIB was associated with maternal smoking (adjusted OR=1.48; 95%CI: 1.10, 2.00) and lack of college degree (aOR=1.31; 1.06, 1.62). Marital status, pregnancy complications and interventions, maternal weight gain, plurality, and lower birth weight, Apgar score and gestational age also increased the association but not significantly. No significant effect modification was found. **Conclusions:** Few prenatal and no perinatal factors were associated with SIB. Maternal smoking may be causal or a marker for unmeasured risk factors (e.g. illicit drugs). Lower maternal education may be associated with other unhealthy behaviors or a proxy for limited access to services. These results need confirmation in other samples and may be informative for future studies

812-S/P

TOWARDS UNDERSTANDING EDUCATIONAL INEQUALITIES IN LATER-LIFE PHYSICAL ACTIVITY IN ENGLAND. Lindsay C Kobayashi*, Jane Wardle, Christian von Wagner (University College London)

Background: Educational inequalities in leisure-time physical activity (LTPA) appear consistent across time and place, but are not well understood among older populations. Drawing from Link and Phelan's "fundamental causes" theory, we aimed to describe later-life educational inequalities in LTPA and to investigate health literacy as a flexible resource utilised by well-educated older adults to engage in LTPA. **Methods:** Data were from 8738 adults aged ≥50 years interviewed in the population-based English Longitudinal Study of Ageing from 2010-11 (96% of eligible). Education was coded according to England's 7-level National Qualification Framework. Health literacy was assessed as reading comprehension of a medicine label. LTPA was defined as self-reported engagement in moderate or vigorous activities or sports >once/week. Log binomial regression was used to estimate prevalence rate ratios (PRR) for LTPA across education groups. Mediation of educational inequality in LTPA by health literacy was performed according to Kenny's binary outcome method with bias-corrected 95% CIs estimated via bootstrapping. **Results:** LTPA was linearly graded by educational attainment, from 74% of adults with higher degree education to 46% of those with no qualification (PRR=1.61; 95% CI: 1.52-1.69; Ptrend<0.0001). The standardised total effect of education on LTPA was 0.25 (0.23 to 0.28); the indirect effect of health literacy was 0.018 (0.012-0.027). Other mediators were net non-pension wealth (0.032; 0.023-0.043), self-rated health (0.056; 0.047-0.064), instrumental activities of daily living (0.035; 0.027-0.044), and cognitive ability (0.014; 0.001-0.025). Together with age and sex, these mediators explained 80% of the total effect of education on LTPA. **Conclusions:** Educational inequalities in LTPA are apparent among older adults in England. Health literacy, along with cognitive function and health itself, may be viewed as a flexible resource that partly mediates this inequality.

813-S/P

GESTATIONAL WEIGHT GAIN, PREPREGNANCY BODY MASS INDEX, AND OFFSPRING INTELLIGENCE AND EXECUTIVE FUNCTION AT AGE 10 . Sarah Pugh* The University of Pittsburgh)

Our objective was to estimate the independent and joint association between gestational weight gain (GWG) and prepregnancy BMI on offspring intelligence (IQ) and executive function at age 10. Mother-infant dyads (n=763) enrolled in a birth cohort study were followed from early pregnancy to 10 years. IQ was assessed by trained examiners using the Stanford Binet Intelligence Scale-4th edition, and executive function was assessed by the number of perseverative errors on the Wisconsin Card Sorting Test and time to complete Part B on the Trail Making Test. Self-reported total GWG was converted to gestational-age-standardized GWG z-scores. Multivariable linear regression and negative binomial regression were used to estimate independent and joint effects of GWG and BMI on outcomes while adjusting for maternal race, parity, income, maternal intelligence, home stimulation, and prenatal substance use. The mean(SD) GWG z-score was -0.5(1.8) and 27% of women had a pregravid BMI≥25. The median(IQR) number of perseverative errors was 23(17-29), the mean(SD) time on part B was 103 (42.6) seconds, and 44% of children had a low IQ(≤89). Maternal obesity was associated with 3.2 lower IQ points (95% CI: -5.6, -0.8) and a slower time to complete the executive function scale Part B (adj β:12.7, 95% CI: 2.8, 22.7) compared with offspring of normal weight mothers. Offspring of mothers whose GWG was >+1SD, compared with -1 to +1SD, performed 15.3 seconds slower on the executive function task (95% CI: 2.5, 28.1), but there was no association between GWG z-score and offspring composite IQ (adj β: -0.32, 95% CI: -0.72, 0.10). Prepregnancy BMI did not modify these associations. While GWG may be important for executive function ability, maternal BMI had a stronger relationship with offspring cognitive outcomes.

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INTERPRETATION OF COMPARATIVE CANCER INCIDENCE RATES REQUIRES BOTH RACE/ETHNICITY AND SOCIOECONOMIC ADJUSTMENT. Elizabeth Lewis-Michl*, Kamalnain Siagm June Moore, Karen Wilson (New York State Department of Health)

Background: Cancer incidence rates were estimated for an urban area of New York City (population 52,753 in 2010) to respond to concerns about cancer and environmental exposures. The study area included a ½ mile buffer around a Creek, a former industrial hub. **Methods:** Indirect standardization was used to evaluate cumulative cancer incidence for 1990-2008 in the study area, defined by Census blocks, using 2 boroughs containing the study area (population 4,735,421) as standard. Population in the study versus comparison area was 64%/41% white, 7%/27% black, 8%/16% Asian, 16%/11% other; and 35%/23% Hispanic. Race/ethnicity was grouped as Hispanic; non-Hispanic white, black, and Asian+other. The study area had household median income 21% lower and poverty rate 33% higher than the comparison area. **Results**: When adjusting only for age for females, cervical cancer was elevated (SIR 1.39, CI: 1.11-1.71), and total and breast cancer showed deficits. Applying race/ethnicity increased the cervical cancer elevation slightly (SIR 1.44, CI: 1.15-1.77), and added kidney, leukemia and thyroid cancer to the deficits. For males, age-adjusted only analyses showed lung (SIR 1.17, CI: 1.04-1.30) and liver (SIR 1.33, CI: 1.03-1.70) excesses, and total, prostate, and bladder deficits. Adding race/ethnicity voided the deficit of total, slightly increased the liver and lung elevations, and reduced the prostate elevation to non-significance. **Conclusions:** Interpretation of the study's findings, elevations of cancer types associated with lower socioeconomic status, is limited due to socioeconomic differences between the study and comparison areas. The study was able to adjust for race and ethnicity using Cancer Registry and Census data. However, measures of socioeconomic status are not generally available at the individual level for routine surveillance studies.

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THE IMPACT OF SOCIAL ISOLATION ON OVARIAN CANCER RISK AND SURVIVAL. Elizabeth M. Poole*, Laura D. Kubzansky, Olivia I. Okereke, Shelley S. Tworoger (Brigham and Women's Hospital and Harvard Medical Center)

Introduction: In ovarian cancer mouse models and in ovarian cancer patients, social isolation has been associated with tumor aggressiveness. However, social isolation has not been investigated in relation to ovarian cancer risk or survival in humans; we addressed these questions in the Nurses' Health Study (NHS), a longitudinal cohort of 121,701 US-based nurses. **Methods:** The Berkman-Syme social network index (BSSNI), a validated measure of social isolation, was assessed every four years in the NHS, starting in 1992. Women were categorized into four groups: socially isolated, moderately isolated, moderately integrated, and socially integrated. We assessed risk of ovarian cancer associated with the BSSNI and its components using Cox proportional hazards models. In addition, we evaluated whether pre-diagnosis social isolation affected ovarian cancer survival. **Results:** Socially isolated women had no increased ovarian cancer risk compared to socially integrated women (RR: 0.90; 95% CI: 0.63-1.28). When we assessed the components of the BSSNI, widowed women were at increased ovarian cancer risk (RR: 1.34; 95% CI: 1.08-1.67) compared to married women. Neither the BSSNI nor its components were statistically significantly associated with ovarian cancer-specific survival; however, several of the associations were suggestive. For example, being widowed was associated with a 58% increased risk of ovarian cancer death (95% CI: 0.96-2.64). **Conclusion:** These data add to a growing body of evidence that psychosocial stress is important for ovarian cancer risk and progression. Future studies should confirm these results and evaluate additional sources of psychosocial stress.

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DIETARY IRON & PHYTATE & RISK OF FEMALE BREAST CANCER IN NEW MEXICO. Frank Groves*, Richard Baumgartner, Kathy Baumgartner (University of Louisville)

Background: Epidemiologic studies have identified dietary iron intake as a breast cancer risk factor. Dietary phytic acid, or "phytate", binds iron in the gut, rendering it more difficult to absorb, and phytate-rich dietary constituents have been touted as a means of mitigating the increased risk of cancer otherwise conferred by dietary iron. We used data from the Four-Corners Breast Cancer Study to test the hypothesis that the risk of breast cancer increases with increasing dietary intake of iron, and decreases with increasing dietary intake of phytic acid. **Methods:** The Four Corners Breast Cancer Study began as a retrospective study of 1004 women with breast cancer and 944 controls. Cases were ascertained by the New Mexico Cancer Registry; all women between 20 and 79 years of age diagnosed with histologically-confirmed breast cancer between October, 1999 and May, 2004 were eligible. Controls were frequency-matched to cases on ethnicity and five-year age group. All subjects were interviewed as to their physical activity, medical history, reproductive history, and dietary history. The dietary history was assessed by a computer-assisted interview Nutrient intake was calculated from the reported foods consumed using the Nutrition Data System for Research. Odds ratios & confidence intervals were calculated by unconditional logistic regression using SAS 9.4. **Results:** Neither iron intake nor phytate intake was separately associated with the risk of breast cancer, which was doubled, however, for women in the lowest octile of the phytate/iron ratio (<=31.639 day) versus women in the highest octile (>68.450); OR=2.05; 95% CI: 1.42-2.94).

823

MALE PATTERN BALDNESS, CHEST HAIR, AND RISK OF PROSTATE CANCER IN THE PROTEUS STUDY IN MONTREAL, CANADA. Marie-Elise Parent*, Andrea R. Spence, Deborah Weiss (INRS-Institut Armand-Frappier, Laval, QC,)

Introduction: Male pattern baldness (MPB) and chest hair are thought to relate to androgen levels, and may be indicators of prostate cancer (PCa) risk. These associations were assessed in our population-based case-control study. **Methods:** Cases were 1937 men aged < 76 years with histologically confirmed incident PCa, diagnosed in hospitals serving the French-speaking population of Montreal. Population-based controls (n=1995), Montreal residents, were recruited using provincial French electoral lists, and frequency matched to cases by age (± 5 years). Face to face interviews collected information on baldness at 10 year increments starting at age 20, using a modified Hamilton-Norwood scale. An additional question elicited the amount of hair on the chest. Logistic regression, adjusting for age, family history of PCa and ancestry, was used to assess the relationship between type and age of onset of baldness, chest hair, and PCa risk. Associations with PCa aggressiveness were also sought. **Results:** Ever baldness was observed in 57% and 56% of cases and controls, respectively. Onset of vertex balding at age 30 was associated with an increased risk of PCa (OR=1.27, 95% CI: 1.00-1.62), while onset of frontal balding at age 50 was associated with an increased risk of aggressive PCa (OR=2.10, 95% CI: 1.06-4.15). About half of subjects indicated having little or no chest hair. This was associated with both an increased risk of overall (OR=1.27, 95% CI: 1.09-1.48) and aggressive PCa (OR=1.56, 95% CI: 1.25-1.95). Age at baldness onset and chest hair amount showed low correlation (Spearman's r=0.09) and ORs for PCa mutually adjusted for these were largely unchanged. **Discussion:** These results support an independent association between MPB, chest hair and PCa, especially among men experiencing balding at a younger age, and among those with little or no chest hair. The finding about chest hair is novel and requires replication.

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SMOKING AND BREAST CANCER RISK IN AFRICAN AMERICAN WOMEN: THE AMBER CONSORTIUM. Song-Yi Park*, Christine B. Ambrosone, Elisa V. Bandera, Emma Viscidi, Traci N. Bethea, Laurence N. Kolonel, Andrew F. Olshan, Julie R. Palmer(University of Hawaii Cancer Center)

Recent population studies offer some support for the role of smoking in the etiology of breast cancer, but few of them have been conducted among African American women. In a collaborative project of four large ongoing studies (Carolina Breast Cancer Study, Women's Circle of Health Study, Black Women's Health Study, and Multiethnic Cohort Study), we examined the associations between smoking measures and breast cancer risk overall and by menopausal status and hormone receptor status (ER+, ER-, and ER-PR-HER2-) among 5,802 African American cases and 17,409 African American controls. Odds ratios (ORs) and 95% confidence intervals (CIs) were calculated in unconditional polytomous logistic regression analysis with adjustment for study and risk factors. The proportions of never, former, and current smokers were 56.5%, 26.0%, and 17.5% in cases and 55.4%, 26.1%, and 18.6% in controls, respectively. Overall, smoking was not associated with breast cancer risk except for former smokers who quit within 3 years of diagnosis (OR=1.40, 95% CI=1.14-1.71). Among premenopausal women, current smokers had a lower risk of breast cancer (OR=0.80, 95% CI=0.68-0.94), compared to never smokers. Among postmenopausal women, ORs were 1.16 (95% CI=1.05-1.28) for smoking duration of ≥20 years and 1.17 (95% CI=1.02-1.34) for pack-years of ≥20. A weekly increased risk with smoking duration of ≥20 years was observed for ER+ but not ER- or triple-negative tumors. The findings do not support an association between smoking and breast cancer overall, but suggest that the association might vary by menopausal status and hormone receptor status. As it becomes clearer that there are differing etiologic pathways for ER+ and ER- breast cancer, particularly with regard to reproductive characteristics, future studies assessing risk factors for breast cancer, including studies of cigarette smoking, should take hormone receptor status into account.

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PREMENOPAUSAL CIRCULATING ANDROGENS AND RISK OF ENDOMETRIAL CANCER. Tess Clendenen*, Kathryn Hertzmark, Karen Koenig, Sabina Rinaldi, Theron Johnson, Eva Lundin, Annika Idahl, Annekatrin Lukanova, Goran Hallmans, Vittorio Krogh, Anne Zeleniuch-Jacquotte (Department of Population Health, Division of Epidemiology and Biostatistics, New York University School of Medicine, New York, US)

Circulating postmenopausal androgen concentrations are associated with increased risk of endometrial cancer. Less is known about the effect of premenopausal androgen concentrations. We conducted a case-control study nested within three prospective cohorts to assess the relationship between premenopausal androgens and risk of endometrial cancer. In total, 161 cases of incident endometrial cancer and 303 controls matched to cases on age and date of blood donation were included. Testosterone (T), dehydroepiandrosterone (DHEAS), androstenedione (A4), and sex hormone binding globulin (SHBG) were measured in prediagnostic serum or plasma samples. Free T was calculated. We observed a trend of increasing risk of endometrial cancer with increasing concentrations of T (OR for a doubling in T: 1.48, 95%CI: 1.04, 2.12, p=0.03) and free T (OR: 1.44, 95%CI: 1.10, 1.90, p=0.009). Associations were not significant after adjustment for body mass index (BMI, OR for a doubling in T: 1.34, 95%CI: 0.93, 1.94, p=0.12; free T: 1.24, 95%CI: 0.92, 1.67, p=0.16). There were no associations for DHEAS, A4, or SHBG with risk. We observed a significant interaction for all androgens by age at diagnosis (≥55 vs. <55 years). Significant positive associations for T and free T were observed, in models adjusted for BMI, among women ≥55 years at diagnosis, who were predominantly postmenopausal (OR for a doubling in T: 2.10, 95%CI: 1.27, 3.48, p=0.004; free T: 1.56, 95%CI: 1.05, 2.32, p=0.03), but not among women <55 years at diagnosis (OR for a doubling in T: 0.82, 95%CI: 0.47, 1.45, p=0.50, p-interaction=0.01; free T: 0.92, 95%CI: 0.57, 1.48, p=0.70, p-interaction=0.04). Our observation that androgens are associated with risk among women 55 years and over is consistent with the results of prospective studies of postmenopausal androgens and risk. Androgens were not associated with risk of endometrial cancer in premenopausal women in our study or a previous prospective study.

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INVESTIGATION OF SPATIAL CLUSTERING OF BILIARY TRACT CANCER INCIDENCE IN OSAKA, JAPAN: NEIGHBOURHOOD EFFECT OF A PRINTING FACTORY. Yuri Ito*, Tomoki Nakaya, Akiko Ioka, Tomio Nakayama, Shinichiro Uehara, Kyoko Kogawa Sato, Ginji Endo, Tomoshige Hayashi (Center for Cancer Control and Statistics, Osaka Medical Center for Cancer and Cardiovascular Diseases, Osaka, Japan)

Background In 2013, unusually high incidences of biliary tract cancer (BTC) among current or former workers at the offset colour proof-printing department of a printing factory in Osaka, Japan, were reported. We aimed to examine whether distance from the printing factory was associated with incidence of BTC and whether clustering of BTC incidence occurred around the printing factory in Osaka using population-based cancer registry data.**Methods** Incidence data on BTC, from 2004-2007, by patient address (small area level) were provided by the Osaka Cancer Registry. Population data by sex, 5-year age group and small area were obtained from the National Census of 2005. To estimate age-standardised incidence rate ratio (SIR), the standard incidence rate by age group was calculated using whole data in Osaka prefecture from 2004-2007. Three cases who were workers at the factory were excluded from the analysis to estimate the risk of neighbouring exposure by distinguishing from the occupational exposure. We estimated the SIR according to the distance from the factory. We also searched clusters of BTC incidence using spatial scan statistics.**Results** The distance from the factory was not associated with the incidence of BTC. The SIRs of those who lived within <1 km, ≥1 km, <2 km, ≥2 km, <5 km, ≥5 km were 0.81 (95% CI 0.42-1.55), 0.98 (0.94-1.02), 0.96 (0.69-1.34), 0.98 (0.94-1.02), 1.00 (0.90-1.11), and 0.97 (0.93-1.02), respectively. The scan statistics did not show any statistically significant clustering of BTC incidence anywhere in Osaka prefecture in 2004-2007 (p-value of the most likely cluster was 0.217).**Conclusions** There was no statistically significant clustering of BTC incidence around the printing factory or in any other areas in Osaka, Japan in between 2004 and 2007. Data analysed to date show that even if some substances had been diffused outside this factory, they did not influence the incidence of BTC in neighbouring residents.

827-S/P

POLYCYCLIC AROMATIC HYDROCARBON (PAH)-DNA ADDUCTS AND BREAST CANCER: MODIFICATION BY GENE PROMOTER METHYLATION IN A POPULATION-BASED STUDY. Alexandra J. White*, Jia Chen, Lauren E. McCullough, Xinran Xu, Yoon Hee Cho, Susan L. Teitelbaum, Alfred I. Neugut, Mary Beth Terry, Hanina Hibshoosh, Regina M. Santella, Marilie D. Gammon (Department of Epidemiology, University of North Carolina, Chapel Hill, NC, USA)

Background. Polycyclic aromatic hydrocarbons (PAH)-DNA adducts have been previously associated with breast cancer in several epidemiologic studies. Aberrant changes in DNA methylation may be an early event in carcinogenesis. However, possible relations between PAH-DNA adducts, methylation and breast cancer are unknown. Objectives. The objectives of this study were to (1) assess associations between PAH-DNA adducts and DNA methylation markers; and, (2) to examine interactions between adducts and DNA methylation in association with breast cancer and tumor subtype. **Methods.** In a population-based case-control study, promoter methylation of 13 breast cancer-related genes was measured in tumor tissue (n=765-851 cases). Blood DNA from breast cancer cases (n=873) and controls (n=941) was used to assess PAH-DNA adducts and global methylation. Logistic regression was used to estimate adjusted odds ratios (ORs) and 95% confidence intervals (CI); and the ratio of the OR (ROR) was used as a measure of heterogeneity. **Results.** Detectable PAH-DNA adducts were inversely associated with HIN1 methylation (ROR =0.66, 95%CI 0.42, 1.05) in cases, and positively associated with LINE-1 (OR=1.25, 95%CI 0.94, 1.65) in controls. In cases, women with detectable PAH-DNA adducts and methylated RARβ (p for interaction=0.03), or perhaps APC (p for interaction=0.09), were more likely to have hormone receptor-positive cancer (RARβ, OR=2.17, 95%CI 1.04, 4.52; APC, OR=1.61, 95%CI 0.99, 2.61) than other tumor subtypes. **Conclusions.** In the first study to date to evaluate these issues, gene-specific methylation of RARβ may interact with PAH-DNA adducts to increase risk of hormone receptor-positive breast cancer, the most common subtype diagnosed among American women.

828-S/P

ARSENIC IN GROUNDWATER AND PROSTATE CANCER IN ILLINOIS COUNTIES. Catherine Bulka*, Rachael Jones, Mary Turyk, Leslie Stayner, Maria Argos (University of Illinois at Chicago)

Background: Although arsenic is ubiquitously distributed in nature, it is categorized as having sufficient evidence of carcinogenicity by the International Agency for Research on Cancer. For humans, one of the major sources of exposure is through naturally contaminated drinking water. To date, few studies have researched the association between low-dose arsenic exposure and prostate cancer, the second leading cause of cancer death in males in the United States. **Methods**: Illinois Environmental Protection Agency arsenic groundwater data from public water supplies throughout the state was linked with Illinois State Water Survey data on private well use from 2000 to 2006. We then aggregated prostate cancer incidence data from 2007 to 2011 from the Illinois State Cancer Registry at the county level. Using U.S. Census data and National Cancer Institute Surveillance, Epidemiology, and End Results Program data, we calculated indirectly standardized incidence ratios (SIRs) by age for each county. A negative binomial regression model was used to model the association between county-level SIRs and mean arsenic tertile (0.33 to 0.72, 0.73 to 1.61, and 1.61 to 16.23 ppb), adjusting for self-reported private well use rates, racial demographics, and percent living below the poverty line. **Results:** For counties with mean arsenic levels between 0.73 and 1.61 ppb, the SIR was 1.04 (95% CI: 0.97-1.12). For counties with mean arsenic levels between 1.61 and 16.23 ppb, the SIR was 1.07 (95% CI: 1.00-1.15). There was a significant dose-response relationship observed between mean arsenic levels and prostate cancer SIRs (P for trend = 0.046). **Conclusions:** Prostate cancer incidence was significantly higher in counties with higher mean arsenic levels in the groundwater. Individual-level studies of prostate cancer and arsenic exposure are needed.

829-S/P

BONE MORPHOGENETIC PROTEIN USE IN LUMBAR SPINAL FUSION PROCEDURES AND CANCER RISK. Daniel C. Beachler*, Brook I. Martin, Elizabeth L. Yanik, Ruth M. Pfeiffer, Sohail K. Mirza, Richard A. Deyo, Eric A. Engels (Division of Cancer Epidemiology, and Genetics, National Cancer Institute, NIH, Bethesda, MD)

Background: Recombinant bone morphogenetic proteins (BMPs) are growth factors often utilized in lumbar spinal fusion procedures. Secondary analyses of randomized control trials suggest that BMP may increase cancer risk, but studies were limited in size. **Methods:** We conducted a case-cohort study of individuals, aged 66 and older, who underwent a lumbar fusion surgery in 2002-2009. Utilizing linked Surveillance, Epidemiology, and End Results (SEER)-Medicare data, we included 3,326 individuals from a 5% random subcohort of Medicare enrollees in SEER areas and 3,038 individuals outside the subcohort who developed cancer. We evaluated cancer risk in those with and without BMP claims at the time of their lumbar fusion surgery. Weighted Cox models were used to estimate hazard ratios. **Results:** In the SEER-Medicare subcohort, 27.6% of individuals who underwent a spinal fusion received BMP. Patient and hospital-level characteristics were similar between BMP users and non-users, although BMP usage did increase over time. BMP was modestly associated with subsequent cancer risk in univariate analyses (HR=1.15, 95%CI=1.06-1.26) and after adjustment for co-morbidities, demographics, and hospital size (aHR=1.16, 95% CI=1.06-1.26). Risk of individual cancer types were not significantly elevated in BMP-users, except for prostate cancer (aHR=1.38, 95%CI=1.11-1.71). BMP-use was associated with diagnoses of local or regional staged cancers (aHR=1.23, 95%CI=1.14-1.31), but inversely associated with distant staged cancers (aHR=0.75, 95%CI=0.64-0.89). In addition, the association between BMP and cancer was not evident among those with 4+ vertebrae fused (aHR=0.96, 95%CI=0.74-1.24), who may have received a higher BMP dose. **Conclusion**: Among elderly US adults receiving lumbar spinal fusions, BMP use was modestly associated with local/regional staged cancer risk, and inversely associated with distant staged cancer risk.

830-S/P

CHRONIC SKIN DISORDERS AND RISK OF T ZONE LYMPHOMA: USING DOGS TO UNDERSTAND HUMAN DISEASE. Julia L Bromberek*, Janna Yoshimoto, Jennifer L Peel, Anne C Avery (Colorado State University)

Background: Non-Hodgkin lymphoma is the most common hematopoietic neoplasm in both humans and dogs. Historically, rare human subtypes such as T zone lymphoma (TZL) have been difficult to study due to low case counts; very few, if any, risk factors have been identified. Our goal is to use canine TZL, a more common disease than human TZL, to better understand the etiology and pathogenesis of human TZL. **Objective:** Our objective was to examine the association of chronic skin disorders and TZL among Golden Retrievers aged 9 years or older. **Methods:** Canine TZL cases from throughout the United States were recruited through Colorado State University's Clinical Immunology Laboratory, which diagnoses lymphoproliferative disorders using immunophenotyping. Controls were recruited through a database of Golden Retriever owners. Controls with evidence of TZL were excluded from the analysis. Data on health history, signalment, and lifestyle were obtained from owner-completed questionnaires. Our primary exposure of interest was history of one or more chronic skin disorders, including hot spots, mange, and pyoderma. ORs and 95% CIs were estimated using multivariable logistic regression. **Results:** Preliminary results were available for 70 cases and 89 controls. Thirty-nine percent of cases and 25% of controls had chronic skin disorders. Controlling for sex and age at enrollment, dogs with TZL were twice as likely to have a history of chronic skin disorders as controls (OR: 2.08; 95% CI: 1.03–4.21). **Conclusion:** Dogs with a history of chronic skin disorder may be predisposed to developing TZL. We hope to corroborate this finding in future studies of human TZL.

831-S/P

PERIOD AND COHORT PATTERNS FOR LETHAL VERSUS NON-LETHAL PROSTATE CANCERS AMONG BLACK AND WHITE MEN IN THE UNITED STATES. Scott P. Kelly*, Ruth Etzioni, Gabriella Andreotti, Naji Younes, Sean D. Cleary, Philip S. Rosenberg, Michael B. Cook (Division of Cancer Epidemiology and Genetics, National Cancer Institute, National Institutes of Health, Maryland)

Following the advent of PSA testing, U.S. prostate cancer (PCa) incidence rose rapidly, peaked and then stabilized, while PCa mortality declined. However, little is known of trends in lethal versus non-lethal PCa. We aimed to elucidate the period effect of PSA, and explore cohort effects and racial disparities in lethal and non-lethal PCa using age-period-cohort (APC) analysis. We defined PCa as lethal disease for whom PCa was the underlying cause of death within 10 years of diagnosis. We extracted PCa cases and U.S. population estimates from SEER-9 (1975–2001). We calculated age-standardized rates (ASR), estimated annual percentage changes (EAPCs) and fitted APC models. Rates were standardized to the 2000 U.S. population. During 1975–2001, there were 50,415 (17%) incident lethal PCa cases and 240,973 (83%) non-lethal PCa cases. The ASR for lethal PCa was 58/100,000 person-years, while the rate was significantly higher in blacks (106/100,000) compared with whites (56/100,000). The ASR of lethal PCa among blacks was 1.89 (1.85, 1.94) times that among whites, while the non-lethal ASR rate ratio was 1.39 (1.38, 1.41). Lethal PCa ASRs declined significantly over the entire study period (EAPC = −1.5%/yr) and did not vary by race. When restricted to the PSA era (1989–2001), lethal rates declined at −6.1% per year. APC results of lethal PCa indicated a significant period effect for all racial groups when PSA testing began. Age-specific incidence rates for lethal PCa were 2–4 fold greater in blacks than whites, with higher rate ratios at younger ages. This study demonstrated vastly different period effects for lethal and non-lethal PCa, while results indicated period and cohort patterns of each which were remarkably similar in black and white men. Our results suggest a greater racial disparity in lethal PCa compared with non-lethal PCa, with black men having substantially higher risk of lethal disease in every period and cohort examined.

832-S/P

HAS MAMMOGRAPHY USE AND PHYSICIAN RECOMMENDATION CHANGED AMONG YOUNGER AND OLDER WOMEN IN RESPONSE TO 2009 US PREVENTIVE SERVICES TASK FORCE BREAST CANCER SCREENING RECOMMENDATIONS?
Stacey Fedewa*, Elizabeth Ward, Janet de Moor, Carol DeSantis, Ann Goding Sauer, Robert Smith, Ahmedin Jemal (American Cancer Society Intramural Research, Emory University Department of Epidemiology)

Background: In 2009, the US Preventive Services Task Force (USPSTF) no longer recommended routine mammography for women 40-49 and ≥75 years. Whether mammography usage and physician recommendation for mammography among younger and older women has changed in response to these recommendations is unclear. **Methods:** Cross-sectional data from women ≥40 years in the 2008 and 2013 National Health Interview Surveys were used (n=4,942 40-49 years and 3,047 ≥ 75 years). Changes between 2008 and 2013 in self-reports from women about having undergone mammography in the past 2 years and in physician recommendation for mammography were estimated using predicted marginal models and expressed as prevalence difference (PD) and 95% CI adjusted for demographics and socioeconomic status(SES). **Results:** Adjusted prevalence of mammography among women 40-49 years was similar in 2008 and 2013 (61.9% in 2008 to 58.6% in 2013 PD=-3.3%, 95%CI -7.0, 0.4). Significant decreases were observed in high income, college educated, non-Hispanic whites, and privately insured women 40-49 years, with PD of -6.0% (95%CI -11.3, -0.7), -5.7% (95%CI -11.3,-0.1), -5.0% (95%CI -9.5,-0.5) and -5.5% (95%CI -9.6, -1.4), respectively. For women ≥75 years, there was no change in mammography prevalence overall (2008:59.1% and 2013:58.1%) or by SES. Physician recommendation for mammography declined in younger (40-49 years: PD= -4.9, 95%CI -8.6,-1.2) and older (≥75 years: PD= -5.8, 95%CI -10.7,-0.9) women.**Conclusion:** Four years after the publication of updated USPSTF mammography recommendations, mammography prevalence for women 40-49 and ≥75 years did not significantly decrease except for women 40-49 years with higher SES, which may reflect differences in awareness of updated recommendations by age and SES. The significant decrease in physician recommendation of mammography in younger and older women may reflect a change in practice patterns by some physicians in response to USPSTF recommendations.

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SHORT-TERM WEIGHT GAIN AND BREAST CANCER RISK BY HORMONE RECEPTOR CLASSIFICATION AMONG PRE– AND POSTMENOPAUSAL WOMEN.
Bernard Rosner*, A. Heather Eliassen, Adetunji T. Toriola, Susan E. Hankinson, Walter C. Willett, Loki Natarajan, Graham A. Colditz, (Channing Division of Network Medicine, Brigham and Women's Hospital and Harvard Medical School, 181 Longwood Avenue, Boston, MA, 02115, USA)

Obesity is well established as a cause of postmenopausal breast cancer incidence and mortality. In contrast, adiposity in early life reduces breast cancer incidence. However, whether short-term weight change influences breast cancer risk is not well known. We followed a cohort of 77,232 women from 1980 to 2006 (1,445,578 person-years), with routinely updated risk factor information, documenting 4196 incident cases of invasive breast cancer. ER and PR status were obtained from pathology reports and medical records yielding a total of 2033 ER+/PR+ tumors, 595 ER−/PR− tumors, 512 ER+/PR− tumors. The log incidence breast cancer model was used to assess the association of short-term weight gain (over past 4 years) while controlling for average BMI before and after menopause. Short-term weight change was significantly associated with breast cancer risk (RR 1.20; 95 % CI 1.09 –1.33) for a 4-year weight gain of ≥15 lbs versus no change (≤5 lbs) (P_trend < 0.001). The association was stronger for premenopausal women (RR 1.38; 95 % CI 1.13–1.69) (P_trend = 0.004) than for postmenopausal women (RR 1.10; 95 % CI 0.97–1.25) (P_trend = 0.063). Short-term weight gain during premenopause had a stronger association for ER+/PR− (RR per 25 lb weight gain = 2.19; 95 % CI 1.33–3.61, P = 0.002) and ER−/PR− breast cancer (RR per 25 lb weight gain = 1.61; 95 % CI 1.09–2.38, P = 0.016) than for ER+/PR+ breast cancer (RR per 25 lb weight gain = 1.13; 95 % CI 0.89–1.43, P = 0.32). There are deleterious effects of short-term weight gain, particularly during pre-menopause, even after controlling for average BMI before and after menopause. The association was stronger for ER+/PR− and ER−/PR− than for ER+/PR+ breast cancer.

833-S/P

INCIDENCE OF MALIGNANT PRIMARY CARDIAC TUMORS IN THE UNITED STATES: A SEER ANALYSIS. Zhiying Zhang* Qian Grace Gan, Karin Rosenblatt (Department of Kinesiology and Community Health, University of Illinois at Urbana-Champaign, Champaign, IL US

Primary tumors of the heart are so rare that the precise incidence in the general population is unknown. The present study was undertaken to evaluate the incidence rate of primary cardiac malignancies and its time trends over a 37-year period between 1975 and 2011 in the U.S. population. Patients with primary malignant cardiac tumors, diagnosed between 1975 and 2011, were identified in the Surveillance, Epidemiology, and End Results (SEER) database. Univariate analyses were conducted by using the SEER*Stat software to report the frequency and age-adjusted incidence rates of primary malignant cardiac tumors by race, gender, age, tumor grade, SEER stage, histologic subtype, and SEER registry. Multivariate Poisson regression models were also used for trend analysis and to determine rate ratios associated with age, gender and race. A total of 215 cases were identified in SEER 9 registries and the majority were sarcomas (88%), with hemangiosarcoma (38%) being the most common histology types. The overall age-adjusted incidence rate was approximately 0.25 per million person-years, with a slight male predominance (RR=1.38; P=0.023). Nonwhites had higher rates than whites (RR=1.42; P = 0.06). From 1975 to 2011, the overall age-adjusted incidence rates increased by an annual percent change (APC) of 1.70% (P= 0.01). A significant increase in the incidence appeared to be evident after 1992 (APC=2.54%; P=0.0496). In conclusion, primary cardiac malignant tumors are rare, but the incidence has been increasing in the general population in the United States. This rising incidence is likely attributable to the introduction and development of non-invasive cardiac imaging or may reflect a real increase. Further studies are needed to better understand the reasons for this trend, particularly on the racial disparity and the greater increase in detecting tumors of more aggressive or later stage.

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ANXIETY/DEPRESSIVE SYMPTOMS ARE ASSOCIATED WITH HIGHER CAROTID INTIMA-MEDIA THICKNESS. THE BRAZILIAN LONGITUDINAL STUDY OF ADULT HEALTH (ELSA-BRASIL) BASELINE. Isabela M. Bensenor*, Itamar S. Santos, Alessandra C. Goulart, André R. Brunoni, Andrew H. Kemp, Paulo A. Lotufo (University of São Paulo)

Background: Studies focusing the association between anxiety/depressive symptoms and accelerated subclinical atherosclerosis yield mixed results. The aim of this study is to verify if anxiety/depressive symptoms, common mental disorder (CMD), major depression disorder (MDD) or generalized anxiety disorder (GAD) diagnoses are associated with carotid intima-media thickness (CIMT) values. **Methods:** ELSA-Brasil is a cohort of 15,105 civil servants from six Brazilian cities. Baseline assessment included CIMT measurements and the Clinical Interview Schedule – Revised (CIS-R), a validated questionnaire for anxiety/depressive symptoms/diagnosis. We included participants with high quality CIMT images and no past coronary disease or stroke. We built linear and multinomial models to determine if CIS-R score (per standard deviation increase), CMD, MDD or GAD were associated with higher CIMT. **Results:** Study sample comprised 9,744 participants. We found that individuals with higher CIS-R score (OR:1.12; 95%CI:1.06-1.19), CMD (OR:1.22; 95%CI:1.07-1.38) and GAD (OR:1.19; 95%CI:1.01-1.41) had significantly higher odds to be classified in the highest age, sex and race-specific CIMT quartile. In linear models, after adjustment for major cardiovascular risk factors and the use of antidepressants, higher CIS-R scores (β:4.57; 95%CI:0.94 to 8.19) and GAD (β:11.16; 95%CI:0.84 to 21.48) were independently associated with CIMT values (in μm). **Conclusion:** Individuals with higher CIS-R scores, CMD or GAD diagnoses had higher CIMT values compared to peers of same age, sex and race. CIS-R scores and GAD were positively and independently associated with higher CIMT values. Our results show an association between anxiety/depressive symptoms (and, most notably, GAD diagnosis) and accelerated subclinical atherosclerosis.

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PATHWAYS FOR VITAMIN D AND CARDIOVASCULAR DISEASE RISK FACTORS IN AFRICAN AMERICANS: THE JACKSON HEART STUDY. Rumana J Khan*, Mario Sims, Samson Gebreab, Pia Riestra, Ruihua Xu, Sharon K Davis (National Human Genome Research Institute, National Institute of Health)

While it is recognized that vitamin D deficiency is related to several cardiovascular (CVD) risk factors and is more common in African Americans, the pathological mechanisms that underlies these relationships are not fully understood. We investigated if factor like C reactive protein (CRP), adipokines and aldosterone intervene as mediators in the associations between vitamin D and CVD risk factors, such as waist circumference (WC), mean arterial pressure (MAP), fasting blood glucose (FBG), low density lipoprotein and high density lipoprotein- cholesterol (HDL-C) in African Americans using the Jackson Heart Study cohort. Data of 4010 (36.2% male and 63.8% female, mean age 54.05 years) individuals were analyzed. We used the path analysis to quantify the share of the associations between vitamin D and CVD risk factors that was statistically explained by each of the mediators by decomposing the associations into direct and indirect effects. Mediation analyses were tested using bootstrapping methods with bias corrected confidence estimates. After adjusting for potential confounding factors, vitamin D was independently and positively associated with HDL-C and independently and inversely associated with FBG, WC, and MAP. Mediators that had appreciable shares of the associations between vitamin D and HDL-C were adiponectin and leptin (24% of the association, indirect effect, $\beta = 0.028$, $p < 0.05$), between vitamin D and FBG were CRP and adiponectin (18% of the association, $\beta = -0.043$, $p < 0.05$), between vitamin D and WC were CRP, adiponectin and leptin (33% of the association, $\beta = -0.041$, $p < 0.05$), and between vitamin D and MAP was aldosterone (16% of the association, $\beta = 0.01$, $p < 0.05$). Our findings suggest that vitamin D exerts its beneficial influence on CVD risk factors mainly through CRP and adipokines. More evidence however, is required from large longitudinal and randomized controlled studies to establish definitive causality.

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CORRESPONDENCE BETWEEN SELF-REPORTED HYPERTENSION AND MEASURED BLOOD PRESSURE IN THE GULF LONG-TERM FOLLOW-UP (GULF) STUDY. William B. Jackson*, Kathryn M. Rose, John M. McGrath, Matthew D. Curry, Lawrence S. Engel, Aubrey K. Miller, Richard R. Kwok, Dale P. Sandler (Social & Scientific Systems, Inc.)

Self-reported hypertension is often used in epidemiological studies in lieu of blood pressure (BP) measurements. Yet, few studies have examined the correspondence between measured blood pressure (BP) and self-reported hypertension (HTN), particularly in medically underserved populations at high risk for HTN. We examined agreement between self-reported HTN and measured BP in the GuLF STUDY, which examines health effects of the clean-up effort surrounding the 2010 Deepwater Horizon Oil Spill. The analysis includes a sub-group 10,964 participants from the Gulf region who completed a telephone enrollment interview and home exam. Self-reported HTN was ascertained during the enrollment interview. Measured BP and use of anti-hypertensive medications were ascertained during the home exam an average of three months later. HTN was defined, averaging the 2nd and 3rd of three consecutive measures, as a systolic BP ≥ 140 mmHg, diastolic BP ≥ 90 mmHg, or use of anti-hypertensive medications. Overall, 3,592 (33%) reported HTN at enrollment and 3,889 (35%) were classified with HTN by measured BP or use of medications. Concordance of self-report with measured BP was 79% [κ =0.53, 95%CI=0.51-0.54]. Among 7,372 without self-reported HTN, 1,301 (18%) were classified with HTN by measured BP. In a logistic model, predictors of undiagnosed HTN included increased age (per year) (OR=1.06, 95%CI=1.05-1.07), higher BMI (per unit) (OR=1.06, 95%CI=1.05-1.07), black race (OR =1.29, 95%CI=1.10-1.50), male gender (OR =1.85, 95%CI=1.55-2.22), and less than a high school education (OR=1.49, 95%=1.17-1.91). Family income, insurance status, and having a usual medical provider were not significant, perhaps in part due to their correlation with race and other measures of disparity in this cohort. Estimates of the magnitude of misclassification of self-reported HTN can inform sensitivity analyses and potential correction strategies that could increase the validity of self-reported measures.

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CORONARY ARTERY CALCIUM PREDICTS MYOCARDIAL INFARCTION AND ALL-CAUSE MORTALITY IN HEAVY SMOKERS. Lindsey Duca*, Gregory Kinney, Matthew Budoff, Sharon Lutz, Janet Snell-Bergeon, John Hokanson Colorado School of Public Health, University of Colorado, Aurora, Colorado)

Smoking is a major risk factor for atherosclerosis and mortality. Coronary artery calcium (CAC) is a marker for subclinical atherosclerosis. The relationship between CAC, incident myocardial infarction (MI) and mortality was examined in heavy smokers enrolled in the COPDGene study. A prospective cohort study design was utilized. CAC was quantified from chest CT scans in 8,912 adults mean±SD age of 60±9 years at baseline. CAC Agatston score categories were created based on severity of baseline calcium: 0, 1-10, 11-100, 101-400, and >400. Survival curves were generated by Kaplan-Meier technique and the log-rank test was used for significance. Two separate Cox proportional hazards regression models were used to evaluate the relationship between CAC and non-fatal MI or all-cause mortality to eliminate the competing risk of death on MI events, adjusting for age, sex, race, diabetes status, hypercholesterolemia, statin use, BMI, pack-years, smoking status, and gold stage. 6,231 follow-up surveys were completed in 6,625 subjects followed for a total of 27,586 person-years. 175 (2.6%) subjects experienced an MI and 275 (4.2%) died. The 6-year probability of survival was significantly different across CAC categories ($p<.0001$). In fully adjusted model, with increasing CAC severity there was an increased risk for a nonfatal MI (CAC 1-10 HR: 1.3 (95%CI 0.6-2.6, p=0.5); CAC 11-100 HR: 1.7 (95%CI 1.1-2.7, p=0.02); CAC 101-400 HR: 1.8 (95%CI 1.1-2.9, p=0.02); CAC >400 HR: 2.9 (95%CI 1.7-4.9), $p<.0001$) compared to the no CAC category. Only individuals with the most extensive CAC were at risk for all-cause mortality (CAC >400 HR: 1.5 (95%CI 1.1-2.2), p=0.02) compared to the no CAC category. In conclusion, heavy smokers with the most extensive CAC have an increased risk of all-cause mortality and there was a dose-response relationship with severity of CAC and incident non-fatal MI.

844-S/P

CHANGES IN DEPRESSIVE SYMPTOMS AND HYPERTENSION RISK. Paola Gilsanz*, Jessica Marden, Eric Tchetgen Tchetgen, Laura Kubzansky, Ichiro Kawachi, Maria Glymour(Harvard T.H. Chan School of Public Health)

Studies show that depressive symptoms predict hypertension incidence yet the timing of these effects and the mechanisms involved remain unclear. In the Health and Retirement Study, we examined how change or stability in depressive symptoms over 2 successive biennial interviews predicts incident hypertension during the following 2 years. Participants (n=8,499) without baseline hypertension diagnoses were interviewed every 2 years up to 12 years. At each interview, scores of 3+ on the 8-item Centers for the Epidemiologic Study of Depression were considered elevated depressive symptoms. Depressive symptoms were classified into 4 categories: persistently high, stable low, new onset, and remitted. Persistently high was defined as 2 consecutive waves of elevated symptoms, stable low was 2 consecutive waves of non-elevated symptoms. Remitted was defined as elevated symptoms in the first wave but not in the next, and new onset was elevated symptoms at only the second wave. Using inverse-probability weighted estimation of a discrete time Cox proportional hazards marginal structural model, we compared individuals with changes in depressive symptoms or persistently high symptoms to those with stable low symptoms for risk of incident hypertension diagnoses (3,496 events) during the subsequent 2 year interval. Covariates included baseline depressive symptoms, demographics, and time -updated age, marital status, wealth, and health behaviors and conditions. Individuals with persistently high depressive symptoms had increased risk of incident hypertension (HR=1.22; 95% CI: 1.02-1.47); as did those with remitted depressive symptoms (HR=1.21; 95% CI: 1.03-1.42). People with new onset of depressive symptoms were not at elevated hypertension risk (HR=1.07; 95% CI: 0.94-1.23), though the confidence intervals was wide. Our findings suggest elevated depressive symptoms influence hypertension through slower acting mechanisms given that effects persist two years or more after symptoms remit.

845-S/P

ABNORMALITIES IN TRIGLYCERIDE OR HDL-CHOLESTEROL AND THE RISK OF ISCHEMIC STROKE AND CORONARY HEART DISEASE: THE STRONG HEART STUDY. Po-Yin Chang*, Ying Zhang, Barbara V. Howard, Jorge Kizer, Lyle Best, Richard Fabsitz, Jennifer S. Lee (Stanford University School of Medicine)

Background: Atherogenic dyslipidemia refers to high fasting triglyceride (TG) and low HDL- cholesterol (HDL-C) levels. We characterized the relationship of atherogenic dyslipidemia and its components to the risks of future ischemic stroke and coronary heart disease (CHD). **Method:** 4150 American Indian participants (40% men), ages 45-74 years and stroke/CHD-free at baseline, were followed for 17 years (median). Cox models estimated HRs and 95% CIs for incident ischemic stroke and CHD in relation to TG and HDL-C combination groups, using clinical cutpoints. The groups were (1) high TG-low HDL; (2) normal TG-low HDL; (3) high TG-normal HDL; and (4) the referent, normal TG-normal HDL. Models included age, smoking, body mass index, LDL-C levels, hypertension, glomerular filtration rate, and urine albumin-to-creatinine ratio. **Results:** 1006 (479 men, 645 diabetic) and 206 (87 men, 130 diabetic) participants developed CHD or stroke, respectively. Low HDL-C, regardless of TG category, was associated with an increased CHD risk in men (HR=1.80, CI: 1.32-2.45 for "high TG-low HDL"; HR=1.94, CI: 1.45-2.58 for "normal TG-low HDL"); "high TG-low HDL" was the only group associated with borderline increased risk in women (HR=1.20, CI: 0.90-1.60) compared to "normal TG-normal HDL" (P for interaction with sex=0.07). In diabetic participants, "high TG-low HDL" was the only group associated with an increased CHD hazard (HR=1.42, CI: 1.10-1.83); this association disappeared in non-diabetic participants (P for interaction with diabetes status=0.02). Stroke risk was suggestively increased only in diabetic participants with low HDL-C (HR=1.75, CI: 0.98-3.14 for "high TG-low HDL"; HR=2.08, CI: 1.19-3.61 for "normal TG-low HDL"), but no association with stroke was observed in non-diabetic participants (P for interaction with diabetes status=0.05). **Conclusion:** Fasting TG and HDL-C may have varying roles in the risk of future CHD and ischemic stroke, depending on sex and diabetes status.

846-S/P

ETHNIC DIFFERENCES IN THE ASSOCIATION BETWEEN INSULIN RESISTANCE AND BLOOD PRESSURE: A COMPARISON OF THE BUYI AND HAN CHINESE. Zaixing Shi*, Joseph H. Lee (Columbia University Mailman School of Public Health)

BACKGROUND: Insulin resistance and the subsequent hyperinsulinemia participate in the development of hypertension. However, findings of the relationship between insulin resistance and blood pressure are inconsistent. This study aimed to investigate the possibility of ethnic differences in this relationship. **METHOD:** This population-based cross-sectional study included 243 Buyi and 467 Han Chinese who were normotensive and free of diabetes from Guizhou province, China in 2009. The two groups were comparable in sex (46% and 47% were male, respectively), mean age (49 and 48 years, respectively), blood pressure (114.8/73.9 and 114.8/74.5 mmHg, respectively), and body mass index (22.0 and 22.4 kg/m2, respectively). Insulin resistance was measured by the homeostasis model assessment (HOMA-IR), and hyperinsulinemia was measured by the fasting plasma insulin concentration. The associations between insulin resistance, hyperinsulinemia, and blood pressure were analyzed using multivariable linear regression. **RESULTS:** The Buyi and Han Chinese had similar mean HOMA-IR (5.25 and 5.10, respectively) and fasting plasma insulin concentration (19.90 and 18.67 mU/L, respectively). After adjusting for age, sex, and body mass index, every 1-unit increase in HOMA-IR was associated with greater increase in systolic blood pressure among Buyi (0.38 mmHg, 95% CI: 0.08 – 0.68 mmHg) than Han Chinese (0.01 mmHg, 95% CI: -0.07 – 0.09 mmHg), and every 5-mIU/L increase in fasting plasma insulin was associated with greater increase in both systolic and diastolic blood pressures among Buyi (systolic: 0.62 mmHg, 95% CI: 0.13 – 1.11 mmHg; diastolic: 0.12 mmHg, 95% CI: -0.19 – 0.43 mmHg) than Han Chinese (systolic: -0.01 mmHg, 95% CI: -0.14 – 0.13mmHg; diastolic: 0.08 mmHg, 95% CI: -0.02 – 0.18 mmHg). **CONCLUSION:** The relationships between insulin resistance, hyperinsulinemia, and blood pressure differ by ethnic groups, and may be mediated by mechanisms active in Buyi but not Han Chinese.

847-S/P

CORONARY ARTERY CALCIFICATION AND CARDIOVASCULAR RISK FACTORS IN SOUTH ASIANS. Serena Wang* (South Asian Heart Center, El Camino Hospital)

Compared to other ethnic groups, South Asians are at higher risk for cardiovascular disease and diabetes mellitus. Traditional risk factor assessment, developed mainly in a white European-descent populations, may underestimate the incidence of cardiovascular disease in South Asians. Our study examined the relationship between coronary calcification, a strong predictor of cardiovascular events, and other traditional cardiovascular risk factors in South Asians. We analyzed the association of coronary calcification with both traditional and emerging factors commonly used to predict cardiovascular risk. These factors include the lipid panel (total cholesterol, LDL-C, HDL-C, and triglycerides), fasting blood glucose, high-sensitivity CRP, family history of coronary artery disease and diabetes, and the ACC/AHA-recommended atherosclerotic cardiovascular disease (ASCVD) risk score. We found that fasting blood glucose, glycated hemoglobin, insulin, BMI, and personal history of hypertension, hypercholesterolemia, and diabetes mellitus were all significantly associated with a non-zero calcium score. High-sensitivity CRP, the conventional lipid panel, the ASCVD risk score, and family history of coronary artery disease and diabetes were not. Because the lipid panel was not predictive while the glucose dysmetabolism risk factors were, the evaluation of South Asians should include and focus on pre-diabetic risk factors, such as fasting blood glucose, insulin, and hemoglobin A1c, and measurements of obesity.

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AMBIENT PM2.5 EXPOSURE DURING THE FIRST YEAR OF LIFE AND ASTHMA INCIDENCE IN A BIRTH COHORT. Audrey L. Flak*, Howard H. Chang, David Lavoue, Mitch Klein, Craig Hansen, Heather A. Holmes, Armistead G. Russell, Matthew J. Strickland, Lyndsey A. Darrow (Emory University, Rollins School of Public Health)

Background: Critical respiratory and immune system development occurs during the first year of life. Exposure to vehicular traffic, specifically to fine particulate matter (PM2.5), during this developmental window may impact asthma occurrence. **Methods:** We examined the association between ambient PM2.5 exposure during the first year of life and childhood asthma in the Kaiser Air Pollution and Pediatric Asthma (KAPPA) Study, a birth cohort of 23,155 children born between 2000 and 2010 enrolled in Kaiser Permanente Georgia. Electronic medical records were used for classification of incident asthma, defined as 1 asthma diagnosis and 1 asthma-related medication dispensing after the first year of life. Exposure was assigned using child residential history and PM2.5 estimates, at 250 meter grid resolution, created from a Bayesian space-time downscaler model incorporating modeled PM2.5 concentrations (CMAQ), fine-scale on-road mobile source emissions, and meteorology. The model is calibrated using measurements from air pollution monitors and then used to predict concentrations in each grid. Binomial linear regression with generalized estimating equations, to account for correlation between siblings in our cohort, were used to estimate risk differences (RD) for incident asthma at ages 2 through 8. **Results:** By age 5, 28.7% of children in our cohort were classified as asthmatic. In preliminary analyses, PM2.5 was associated with cumulative asthma incidence by ages 5 and 6, but not at other follow-up ages. An IQR increase in PM2.5 (5.146 µg/m3) was associated with a 2 percent increase in asthma risk at age 5 (RD (95% CI) 0.019 (0.002, 0.036)) and age 6 (0.023 (0.003, 0.043)) in models controlling for sex, race, ethnicity, maternal asthma, maternal age, maternal education, and month and year of birth. **Conclusion:** Although results are preliminary, we observed some evidence for an association between first year of life PM2.5 exposure and childhood asthma incidence.

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ASSOCIATION OF PREPUBERTAL SERUM DIOXIN-LIKE TOXIC EQUIVALENTS WITH SEXUAL MATURITY IN RUSSIAN BOYS. Jane S. Burns*, Paige L. Williams, Mary M. Lee, Oleg Sergeyev, Susan A. Korrick, Russ Hauser (Harvard T. H. Chan School of Public Health)

Background: We examined the association of prepubertal serum toxic equivalents (TEQs) of dioxin-like compounds (DLCs: dioxins, furans, coplanar polychlorinated biphenyls) with age at sexual maturity in a prospective cohort of Russian boys. **Methods:** From 2003-2005, 499 boys were enrolled at ages 8-9 years, and blood was collected for DLC measurement by the Centers for Disease Control and Prevention. Annual physical exams with Tanner Staging (genitalia (G) and pubarche (P)) and testicular volume (TV) measurement by orchidometer were performed, and detailed medical, demographic, socioeconomic (SES), and dietary data were collected by questionnaires. Multivariable interval-censored models were used to assess the associations of quartiles of lipid-adjusted total TEQs with indicators of sexual maturity, G5 and P5 and TV ≥20mL, adjusted for birthweight, maternal age, prenatal tobacco, SES and nutrition. **Results:** At entry, the median (25th-75th%-iles) serum total TEQ was 21.1 (14.4-33.3) pg/g lipid. At ages 17-18 years, 312 of the 315 boys remaining in the study (99%) had achieved sexual maturity. Based on prospective annual assessments with a median follow-up of 9 years, boys in the highest TEQ quartile vs the lowest had significantly later sexual maturity (months) for TV≥20mL (7.7: 95% CI 3.6, 11.8; $p<0.001$) and G5 (4.9: 95% CI 0.4, 9.5; $p=0.04$), but not for P5, in adjusted models. After further adjustment for baseline body mass index and height z-scores, the highest vs lowest TEQ quartile remained associated with later sexual maturity by TV≥20mL (5.2: 95% CI 3.6, 11.8, $p=0.01$), but not by G5 (1.8: 95% CI -2.6, 6.2, $p=0.42$). **Conclusions:** Higher prepubertal serum TEQ levels were associated with later male sexual maturity. Funded by EPA Grant R82943701 & NIEHS Grants ES014370 & ES000002.

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BIOMONITORING PROJECT RESPONDS TO CONCERNS ABOUT DEPLETED URANIUM EXPOSURE FROM FORMER WEAPONS MANUFACTURE IN COLONIE, NEW YORK. June Moore* Elizabeth Lewis-Michl, Patrick Parsons, John Arnason, Amy Steuerwald, Samira Skochko (New York State Department of Health)

Background: New York State Department of Health (NYSDOH) collaborated with the community group, Community Concerned about National Lead (NL) Industries, to address concerns of former employees and nearby residents about historical exposures to depleted uranium (DU). Concerns include occupational and residential exposures to airborne emissions of fine -grained depleted uranium from incineration of waste materials from 1958 to 1984, and from contact with residential soil, removed from nearby properties from 1984 to 1988 after the plant closed in 1984. The biomonitoring results may be useful for addressing health concerns and communicating with health care providers. **Methods:** Recruitment used existing lists of 370 former workers and 200 residents as well as local media. Participation included completing questionnaires, urine and optional blood collection. To date, NYSDOH's Wadsworth Center Labs measured total uranium and DU levels in urine. **Results:** A total of 131 participants (32 workers and 99 residents) enrolled. Participant ages ranged from 21 to 85. Average age for workers was 66, for resident males 60 (N=36), and for resident females 63 (N=63). The geometric mean for total uranium for workers was .012 µg/g creatinine (95% CI: .007-.021), elevated but not significant compared to 2009-10 NHANES values (.007 µg/g, 95%CI: .006-.008). Residents' mean was .002 µg/g (95% CI: .002-.003), lower than the workers and NHANES values. The measurement of uranium isotopes ratios in urine showed that approximately 10% of residents were still excreting detectable amounts of DU. Approximately 90% of workers had had DU and/or enriched uranium in urine. Evidence of enriched uranium was detected in 9% of workers. Given the 30 years since the facility closed, the existence of DU in urine of residents as well as the difference in the values between workers and residents is of interest.

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ACUTE ASSOCIATIONS BETWEEN HEAT WAVES AND PRETERM BIRTH IN ATLANTA, 1994-2006. Lyndsey A Darrow*, Matthew J Strickland, Howard H Chang (Emory University)

Background: Climate change is projected to increase the frequency and severity of heat waves. Recent studies suggest that heat waves trigger preterm birth. We assessed this relationship using methods that control for potential bias due to seasonal patterns of conception. **Methods:** We investigated the association between heat waves and daily rates of preterm birth during the warm season in metropolitan Atlanta. Heat waves were defined as ≥2 consecutive days with mean daily temperatures above the 98th percentile (84 degrees Fahrenheit). Births in the study area were identified using birth records, and preterm birth was defined as birth before 37 completed weeks of gestation. Using a time-series approach accounting for the gestational age distribution of the risk set of pregnancies on each day we modeled the count of preterm birth during May-September for the years 1994-2006 using Poisson regression. Counts were modeled within strata of maternal education, maternal race, and gestational week. Models additionally included control for weekday/weekend and seasonality (cubic spline with 8 degrees of freedom on day of season). We also assessed effect modification between heat waves and maternal race and education. **Results:** Over 13 years, there were 77 days that met the specified definition of a heat wave. In preliminary analyses, overall rates of preterm birth were not elevated on heat wave days relative to non-heat wave days (RR=0.98, 95%CI=0.92-1.05). However, we observed evidence of interaction between heat waves and maternal education ($p=0.03$) suggesting higher rates of preterm birth on heat wave days compared to non-heat wave days among women with less than 12 completed years of education (RR=1.11, 95% CI=0.98-1.26). There was no evidence of interaction between maternal race and heat waves. **Conclusion:** Our preliminary results provide modest evidence that certain population subgroups are susceptible to adverse effects of heat waves on pregnancy duration.

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RELIABILITY ANALYSIS OF SELF-REPORT INDOOR PRODUCT USE DURING THE PERINATAL PERIOD. Rebecca J. Schmidt*, Jacqueline Barkoski, Pei-Chen Chen, Daniel J. Tancredi, Cheryl K. Walker, Irva Hertz-Picciotto, Deborah H. Bennett(Department of Public Health Sciences, School of Medicine, University of California, Davis)

Background: Questionnaires can help advance research when biomarker sample collection and analyses are too expensive or invasive, but only for exposures that can be reliably reported. Objective: Compare the reliability of maternal report of product use in and around her home on the ELEAT(Early Life Exposure Assessment Tool) retrospective assessment with her responses regarding the same products during pregnancy. **Methods:** Participants(n=130)from the MARBLES(Markers of Autism Risk in Babies -Learning Early Signs)prospective study underwent structured interviews during pregnancy and then again with the ELEAT, a shorter instrument derived from the one utilized longitudinally, 2 or more years postpartum. The ELEAT environment module has questions about interior paint, pet flea treatments, pesticides, and personal care products. Reliability was assessed with Cohen's Kappa statistic(K), sensitivity, specificity and Youden's inde (YI=Sensitivity+Specificity – 1).**Results:** We found substantial agreement(K= 0.61, YI=0.59)for mothers reporting professional outdoor pesticide use during the index time(3 months before pregnancy through the child's 1st year). Questions about freshly painted walls, pet flea pouch products, antibacterial soap, and indoor pesticide foggers had moderate agreement(K=0.41-0.60,YI=0.42-0.61). Other pesticide questions, professional indoor applications and, indoor and outdoor sprays, had fair agreement (K=0.21-0.40, YI=0.19-0.38). Report of pet flea treatments; such as, soap, collars, and skin products showed fair agreement. Differences in wording of the questions may have contributed to these findings of only fair agreement. Responses to specific time points over the index period did not perform as well and generally had fair agreement. **Conclusion:** In this study population, responses on environmental questions at 2 years postpartum or later had moderate to fair agreement when compared to answers given prospectively during the perinatal period.

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THE EFFECTS OF HEAT WAVES ON HOSPITALIZATIONS IN CALIFORNIA, 1999-2009. Toki Sherbakov* Brian J. Malig, Alexander Gershunov, Kristen Guirguis, Rupa Basu (School of Public Health, University of California, Berkeley)

Exposure to higher ambient temperature has been associated with increased mortality and morbidity for a number of health conditions. Previous studies have looked specifically at heat waves or more generally at incremental changes in temperature, but few have examined both simultaneously. In this study, we utilized distributed lag non-linear (DLNM) models to investigate the presence of heat wave-specific effects beyond standard temperature -morbidity relationships for different types of hospitalizations in California from 1999-2009. For each of 16 California climate zones, we calculated a population-weighted daily mean temperature and totaled counts of hospitalizations for specific diagnoses. We identified dates that were a minimum second consecutive day above the zone- and month-specific 95th percentile as heat wave days. Climate zone-specific DLNM models were run using two strata (lag0 & lag1-3) crossbasis terms for both temperature and heat wave, a binary season indicator and interaction term with temperature to focus on warm season (May - September) relationships, relative humidity, a smooth for time, and a day of week indicator. Random-effects meta-analysis was used to derive pooled estimates. We observed higher risk of hospitalization for ischemic stroke (excess risk = 4.1% [0.3, 8.0]) and acute myocardial infarction (MI) (5.2% [1.1, 9.5]) during heat wave days, though acute MI was negatively associated with daily temperature. Conditions traditionally associated with high heat exposure (primary or secondary heat illness diagnosis, dehydration, acute renal failure) also increased during heat waves. Risk of respiratory and intestinal infectious disease admissions increased with higher temperatures but showed significantly lower risks on heat wave days. Ultimately, heat waves appear to impact hospitalizations for ischemic stroke, acute MI, and traditional heat-influenced conditions beyond typical temperature-morbidity relationships.

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MATERNAL AMBIENT AIR POLLUTION EXPOSURE IN PRECONCEPTION AND EARLY GESTATION AND OFFSPRING CONGENITAL OROFACIAL DEFECTS. Yeyi Zhu*, Cuilin Zhang, Maeve Wallace, Katherine L. Grantz, Danping Liu. Pauline Mendola (Epidemiology Branch, Division of Intramural Population Health Research, Eunice Kennedy Shriver National Institute of Child Health and Human Development)

Background: Maternal air pollution exposure has been associated with birth defects but the literature is equivocal. Potential preconception effects have not been studied. **Objective:** We investigated the association of ambient air pollutant exposure during 3 months before pregnancy and during weeks 3-8 of gestation with offspring oral cleft risk. **Methods:** Among 188,012 live and stillborn infants ≥23 weeks' gestation from the Consortium on Safe Labor (2002–2008), 63 with isolated cleft palate and 159 with isolated cleft lip with/without cleft palate were identified by ICD-9 codes. Air pollution exposures were estimated using a modified version of the Community Multiscale Air Quality models. Logistic regressions were used to calculate adjusted odds ratios (aOR) of oral clefts after adjustment for study site, clinical and lifestyle factors, and diabetes status. **Results:** During the 3 month preconception window, positive associations were observed between carbon monoxide (CO) and cleft palate [aOR (95% CI): 2.93 (1.50, 5.71)], sulfur dioxide and cleft lip [aOR=2.32 (1.24, 4.36)], with an inverse association observed between ozone and cleft palate [aOR=0.40 (0.17, 0.91)] per inter-quartile range (IQR) increase in air pollutant. During weeks 3-8 of pregnancy, CO was related to increased odds of cleft palate and cleft clip [aOR (95% CI): 3.34 (1.82, 6.14) and 1.59 (1.08, 2.35) per IQR increase, respectively]. Similarly, nitrogen oxides were related to increased odds of cleft palate and cleft clip [aOR (95% CI): 4.78 (2.18, 10.5) and 1.76 (1.06, 2.92) per IQR increase, respectively]. An IQR increase in particulate matter ≤2.5 μm in aerodynamic diameter was positively associated with cleft palate [aOR (95% CI): 1.77 (1.12, 2.81)]. **Conclusions:** Positive associations between air pollutants and oral clefts were observed. Both pre- and early conception time windows are relevant with stronger effects appearing for exposures during organogenesis at weeks 3-8.

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AMBIENT AIR POLLUTION AND THE RISK OF PRETERM BIRTH. Anne P Starling*, Jennifer L Peel, Steven J Dutton, Michael P Hannigan, Shelly L Miller, Jana B Milford, Sverre Vedal(Department of Epidemiology, Colorado School of Public Health, Aurora, CO, USA)

Growing evidence supports the association of ambient air pollution and preterm birth. However, few studies have examined the role of fine particulate matter (PM2.5) constituents. We examined the association of low-level exposure to ambient air pollution, including PM2.5 mass and constituents (organic carbon [OC], elemental carbon [EC], sulfate, nitrate) and preterm birth using birth certificate data from the Denver metropolitan area, 2003-2007 (n=144,925 live births after exclusions). PM2.5 mass and constituents were measured daily at a residential monitoring site, and daily concentrations were averaged over three exposure periods of interest. We used logistic regression models adjusted for maternal characteristics, infant sex, season, temperature and relative humidity, to estimate odds ratios for preterm birth (n=11,551, 8%) associated with an interquartile range (IQR) increase in concentration. In preliminary results, the risk of preterm birth was positively associated with last week of pregnancy concentrations of PM2.5 EC (OR per 0.33 ug/m3: 1.11, 95% CI: 1.06, 1.16) and carbon monoxide (OR per 0.80 ppm: 1.06, 95% CI: 1.02, 1.11) but inversely associated with PM2.5 OC (OR per 1.67 ug/m3: 0.96, 95% CI: 0.92, 1.00). Last-month concentrations of PM2.5 EC (OR per 0.33 ug/m3: 1.21, 95% CI: 1.14, 1.28), carbon monoxide (OR per 0.80 ppm: 1.11, 95% CI: 1.04, 1.18) and nitrogen dioxide (OR per 0.02 ppm: 1.11, 95% CI: 1.04, 1.18) were positively associated with preterm birth. First-month nitrogen dioxide concentration was inversely associated with preterm birth (OR per 0.02 ppm: 0.96, 95% CI: 0.92, 1.00). We will continue to investigate the possible impact of residual confounding by seasonal trends. Sources of PM2.5 will also be examined in association with preterm birth in this population. The views expressed in this abstract are those of the authors and do not necessarily represent the views or policies of the U.S. EPA.

858-S/P

ARE CERTAIN TYPES OF PARKS ASSOCIATED WITH OUT-OF-SCHOOL PHYSICAL ACTIVITY AMONG YOUTH AT RISK OF OBESITY?. Madeleine Bird*, Geetanjali D. Datta, Tracie A. Barnett (University of Montreal, Centre de recherche du CHU Sainte-Justine, Centre de recherche du CHUM)

Childhood obesity is associated with chronic health risks that last into adulthood. Almost one third of Canadian youth are overweight and obese, presenting a major public health challenge. Parks may play an important role for physical activity (PA) among youth, however it remains unclear what types of parks are associated with out-of-school PA among youth at risk for obesity. Objectives were addressed utilizing data from the QUALITY cohort study, a longitudinal study on the natural history of obesity among youth (8-11 years) considered at high risk due to their parental history. Audits were conducted on up to 3 of the closest parks (n=564) within a 1km buffer zone of participating families' residences (n=368) in the Montreal Metropolitan Area between April-December, 2008-2010. A park typology was developed using cluster analysis yielding 9 overlapping yet conceptually distinct park types (small, few installations; small, unfavorable to walking; small, incivilities; mid-size, team sports; mid-size, unfavorable to team sports, safe; mid-size, infrequent installations, incivilities; mid-size, pool; mid-size, esthetically pleasing; large, cycling features). Daily PA events based on activity (e.g. tag) occurring outside of school for a minimum of 15 min/day were self-reported. Linear regression was used to predict number of PA events per week by park type controlling for family socioeconomic status, age and sex. Mid-sized, esthetically pleasing parks were associated with 5.23 more PA events than small parks with few installations (95% CI=0.54-9.91). No other park type was associated with PA events. Boys had an average of 2.61 more PA events per week than girls (95%CI=1.30–3.82) in the model. Understanding which park types may be associated with weekly PA events among youth at risk for obesity may help inform population-level policies for intervention. Future research should focus on assessing other PA outcomes and methods to identify other facets of park type.

859-S/P

MEASURING EXPOSURE TO FLOODING AND ITS IMPACT ON MENTAL HEALTH IN NORTHERN COLORADO., Molly Gutilla*, Brooke Anderson, Sheryl Magzamen (University of Colorado)

Background: Exposure to natural disasters impacts mental and emotional wellbeing. In September, 2013 a rare weather event created intense rainfall in Northern Colorado resulting in major flooding in mountainous canyons and on the eastern plains. The purpose of this analysis was to determine if exposure to the flooding impacted mental and emotional health. **Methods:** Flooding occurred immediately prior to the fielding of a survey capturing personal health information and perceived exposure to the flood event. Across two Colorado counties, 15,732 randomly selected households were recruited to participate. Neighborhood-level assessment of exposure was estimated using geocoded responses and Federal Emergency Management Agency (FEMA) data. Self-reported flood exposure was captured using a 6-item scale. Mental health was indicated by reported number of poor mental health days in the past month and stress level. **Results:** The final sample included 4,877 respondents (response rate = 31%). The majority of the sample (87%) reported at least an indirect exposure to the flood event while fewer (13%) respondents reported a direct exposure to the flooding. Self-reported exposure corresponded with an increase in the mean number of poor mental health days (4.29 vs. 2.91, $p<0.01$) and mean level of self-reported stress following the flood event (3.8 vs. 2.06, $p<0.01$). Thirty percent of census blocks within the study area received FEMA assistance. Neighborhood-level analysis using FEMA data an exposure indicator of the flooding detected a significant impact on stress level (3.16 vs. 2.20, $p<0.01$), but not on mean number of days of poor mental health ($p=0.98$). There were no significant effects of flood exposure on self-reported physical or overall health. **Conclusions:** We detected worsened mental health for those directly exposed to the flood event. This finding supports that disaster exposure impacts community mental health.

860-S/P

CROSS-SECTIONAL AND LONGITUDINAL ASSOCIATIONS BETWEEN PERFLUOROOCTANOIC ACID SERUM LEVELS AND TWO OUTCOMES: A STUDY OF REVERSE CAUSATION. Radhika Dhingra*, Lyndsey Darrow, Andrea Winquist. Mitchel Klein, Kyle Steenland (Emory University, Department of Environmental Health)

Both chronic kidney disease (CKD) and early menopause have been positively associated with perfluorooctanoic acid (PFOA) in prior cross-sectional studies, but have not been analyzed using longitudinal data. Previous cross-sectional analyses showing positive associations between measured PFOA and these outcomes may have resulted from reverse causation, whereby the outcome results in increased measured serum PFOA levels. **Methods:** We analyzed women, age≥40, (N = 11,720) for age at menopause, and adults, age≥20 (N = 32,254) for CKD, in a Mid-Ohio Valley community cohort, exposed to high levels of PFOA. PFOA (ng/mL) was measured cross-sectionally in the blood (2004-05) and retrospective yearly serum PFOA levels (1951-2011) were estimated via coupled environmental, exposure and pharmacokinetic models. Data on estimated glomerular filtration rate (eGFR) was also available from 2004-05. Cross-sectional associations of eGFR and PFOA, both measured and modeled, in 2004-05 were analyzed in linear models. Cox models were also used to analyze validated CKD incidence. Age at menopause and years since menopause in 2004-05 were analyzed cross-sectionally through linear models in relation to measured and modeled PFOA. Cox models were used to analyze age at menopause in relation to modeled cumulative exposure **Results:** Cross-sectionally, those with higher measured, but not modeled, levels had earlier age at menopause. The number of years past menopause was positively associated with increased serum levels ($\beta=0.04$, $p<0.0001$), suggesting reverse causation. Similarly, eGFR was negatively associated with measured serum PFOA($\beta=-0.26$, $p=0.0005$) but not with modeled serum PFOA ($\beta=-0.07$, $p=0.24$). In Cox models using modeled PFOA, neither age at menopause nor CKD were associated with modeled cumulative exposure. **Conclusion:** Our data suggest that earlier age at menopause and impaired kidney function are the cause rather than the result of increased measured serum PFOA.

861-S/P

ARSENIC METABOLISM PHENOTYPES IDENTIFIED USING PRINCIPLE COMPONENT ANALYSIS, HAVE DISTINCT ASSOCIATIONS WITH SEX, BMI, SES, 10Q24.32 SNPS, AND ARSENIC EXPOSURE. Rick J. Jansen*, Maria Argos, Lin Tong, Jiabei Li, Muhammad Rakibuz-Zaman, Vesna Slavkovich, Tariqul Islam, Alauddin Ahmed, Faruque Parvez, Yu Chen, Mary V. Gamble, Joseph H. Graziano, Brandon L. Pierce, Habibul Ahsan (University of Chicago)

Exposure to inorganic arsenic (iAs) affects several hundred million people worldwide. The highest exposure levels occur in South America and Asia often through drinking water. In the body, iAs is metabolized to monomethylarsonous acid (MMAIII) as a 1st methylation step and dimethylarsinous acid (DMAIII) as a 2nd methylation step, and all three arsenic species can be measured in the urine. The abundance of each of these species, relative to total arsenic, varies among individuals reflecting underlying differences in metabolism capacity. Here we use principle components analysis (PCA) of these three species (iAs%, MMA%, and DMA%) to identify two independent arsenic metabolism phenotypes: principle component 1 (PC1), which represents one's ability to fully metabolize iAs to DMA (2nd step), and principle component 2 (PC2), which distinguishes those with high levels of MMA compared to iAs (1st step). Here, we analyzed data on 4,814 individuals participating in the Health Effects of Arsenic Longitudinal Study (Araihazar, Bangladesh) with urinary arsenic species, water arsenic, susceptible genotype and other relevant data. Characteristics positively associated (p-value <0.05) with PC1 include age, female sex, and BMI, while those negatively associated are current smoking, education, land-ownership, and primary well water arsenic level. For PC2, positive associations are seen for age and education while negative associations are seen with female sex, and BMI. PC2 shows a significant positive association with having skin lesions while PC1 shows a non-significant negative association with skin lesions. Looking at SNP association plots in the 10q24.32 region, distinct peaks for each PC suggests an unique set of polymorphisms are driving variation of each methylation step. Our results indicate that PCA can identify two unique arsenic metabolism phenotypes displaying different patterns of associations with sex, BMI, SES and 10q24.32 polymorphisms.

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GENE-ENVIRONMENT INTERACTION IN PARKINSON'S DISEASE: COFFEE, ADORA2A, AND CYP1A2. Yu-Hsuan Chuang,* Pei Chen Lee, Johnni Hansen, Christina Funch Lassen, Jorgen Olsen, Christina Lill, Beate Ritz (UCLA School of Public Health Department of Epidemiology)

Majority of PD cases are likely caused by the combination of genetic and environmental factors, including coffee consumption which is inversely associated with PD. The proteins encoded by genes adenosine A2A receptor (ADORA2A) and cytochrome P450 1A2 enzyme (CYP1A2) are related to the function of caffeine at the neuronal receptors or caffeine metabolism, respectively. The objective of the study is to examine whether the coffee-PD association differs by ADORA2A (rs5760423) and CYP1A2 (rs762551 and rs2472304) genotypes. We use population-based case control data from PASIDA study in Denmark (1,333 cases and 1,423 controls). PD patients were diagnosed with idiopathic PD according to the Danish National Hospital Register between 1996-2009. Controls were selected from the Danish Central Population Registry consentaneously matched on birth year and sex. Information about lifestyle factors were collected in phone interviews. Coffee consumption was defined as heavy vs light drinkers and number of cups per day. DNA was extracted from saliva and genotyped using Taqman allelic discrimination assays. Unconditional logistic regression was used to estimate the individual effect of coffee on PD risk, after adjusting for matching factors and potential confounders. In order to determine the gene-environment interaction, multiplicative term of caffeine*SNP were added to the models. We observed that effects of caffeine on PD risk did not significantly differ across ADORA2A or CYP1A2 genotypes. But there appears to be a decreasing trend of coffee-PD association across ADORA2A rs5760423 genotypes. The aOR for PD among heavy coffee drinker, relative to light drinker, was 0.84 for wildtype carriers compared with 0.75 for heterozygotes and 0.57 for homozygotes (Pinteraction =0.34). Our study confirmed the interactions between ADORA2A polymorphisms and caffeinated coffee consumption, but we were not able to replicate the interactions of CYP1A2 polymorphisms and coffee consumption on PD risk.

871-S/P

MATERNAL AND OFFSPRING GENETIC VARIANTS IN VITAMIN A, CHOLINE AND FOLATE PATHWAYS AND RISK OF NEUROBLASTOMA. Angela Liu*, Stephanie M. Engel, Anna, Maria Siega -Riz, Clarice R. Weinberg, Fei Zou, Andrew Olshan(UNC-Chapel Hill)

Neuroblastoma, a cancer of undifferentiated sympathetic neurons, is the most common malignancy in infants under 1 year of age. Vitamin A, or retinoid, is essential for neural development and differentiation. Folate and choline are necessary for proper one-carbon metabolism and the synthesis and maintenance of DNA. Current epidemiologic evidence suggests an inverse association between maternal vitamin intake during pregnancy and neuroblastoma, implying a possible role for genes governing vitamin-related pathways. We genotyped 603 families (505 trios and 98 dyads) in the Neuroblastoma Epidemiology of North America (NENA) study, to assess the association between maternal and offspring germline variants (1,352 SNPs) within vitamin A, choline and folate pathways and neuroblastoma. NENA is the first study to assess maternal variants in relation to neuroblastoma. Cases and parents were recruited through the Children's Oncology Group's Children Cancer Research Network. We used a log-linear model with log-additive genotype coding (and the expectation maximization algorithm for missing genotypes) to estimate the per-allele offspring and maternal risk ratios. There were no significant maternal or offspring genotype associations after accounting for multiple corrections by calculating a false discovery rate (FDR) by pathway. The most significant SNP, rs12442054 (risk ratio: 0.61; 95% confidence interval: 0.47 - 0.79; P-value < 0.001; FDR < 0.08), was an inter-genic variant close to the vitamin A-related gene STRA6. We do not find strong evidence for an association between the one-carbon metabolism SNPs and neuroblastoma.

872-S/P

CONGENITAL HEART DISEASE AND INDICES OF FETAL GROWTH IN A NATIONWIDE COHORT OF CHILDREN WITH DOWN SYNDROME. Niels B. Matthiesen*, Peter Agergaard, Tine B. Henriksen, James W. Gaynor, Cathrine C. Bach, Vibeke Hjortdal, John R Ostergaard (Department of Pediatrics, Aarhus University Hospital, Aarhus University, Denmark)

Background: Neurodevelopmental disorders are common in children with congenital heart disease (CHD). These disorders are highly correlated to measures of fetal cerebral growth e.g. head circumference at birth. It remains unknown whether this is due to cerebral hypoxia caused by CHD per se, environmental or genetic causes. Down syndrome is a known cause of CHD, neurodevelopmental disorders and impaired cerebral growth. We aimed to assess the association between CHD and proxy measures of fetal growth in a large cohort of children with Down syndrome, possibly eliminating unknown genetic confounding. **Methods:** All Danish Down syndrome livebirths 1997-2012 were included. Karyotypes (trisomy, translocation, mosaicism), CHD, pregnancy outcomes and potential confounders were identified in national registries. In 30% of infants with CHD diagnostic validity was assessed in detail. The association between CHD and proxy measures of fetal growth was analyzed by multiple linear regression adjusted for potential confounders (including karyotype) with and without adjustment for gestational age. **Results:** 710 livebirths were included (362 with CHD). We found no association between CHD and head circumference or birth weight in children with Down syndrome, adjusted differences: 0.0cm (95%CI -0.2; 0.3) and 33g (95%CI -42; 108). We found no differences by severity of CHD. According to sensitivity analyses the results were unlikely to be explained by conditioning on live birth or gestational age. **Conclusions:** We found no association between impaired fetal growth and CHD in a large cohort of infants with Down syndrome. We suggest that the most common types of CHD in Down syndrome do not impair fetal cerebral growth. Previously demonstrated associations in populations with unknown causes of CHD may have been confounded by unknown genetic causes.

873-S/P

GENETIC PREDICTORS OF COGNITIVE DECLINE IN PARKINSON'S DISEASE. Kimberly C Paul*, Michelle Creek, Janet S Sinsheimer, Helen R Rausch, Jeff M Bronstein, Yvette Bordelon, Beate Ritz (UCLA)

Background: While Parkinson's disease (PD), a disorder characterized by progressive depletion of dopaminergic neurons in the substantia nigra region of the brain, is typically described in terms of motor dysfunction, recent years have seen non-motor features of PD come more into the focus with cognitive decline being a major concern for patients and caregivers. 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 the course and severity of symptom progression is highly variable. Three dementia related genes, apolipoprotein E (APOE), catechol-O-methyl transferase (COMT), and microtubule-associated protein tau (MAPT), are speculated to be involved in cognitive decline in PD. **Methods:** In a longitudinal cohort, consisting of 242 incident PD patients, we repeatedly assessed progression of motor and non-motor symptoms, including cognition via mini-mental state exam (MMSE) score, the primary outcome of interest, and a full neuropsychological battery. Using linear mixed-effects models, we tested for association between APOE carrier status, COMT Val158Met, and the MAPT H1 haplotype and change in cognitive function over time. **Results:** APOE 4 carriers (ε4+) and COMT Met/Met carrier status were associated with significantly faster annual decline in MMSE (ε4+: p=0.03; Met/Met: p=0.05), relative to all other genotypes. Specifically, APOE ε4+ are expected to show on average a loss of 4.5 points more over lifetime and Met/Met carriers nearly 4 points; this decline is of a similar magnitude as the decline due to aging in PD patients. APOE ε4+ carriers also show faster decline in almost all of the neuropsychological test items. No such differences in neuropsychological outcomes were seen for the COMT genotypes. **Conclusion:** This study supports APOE ε4+ and COMT Met/Met genotypes as predictors of faster cognitive decline in PD.

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THE ROLE OF STRESS IN UNDERSTANDING DIFFERENCES IN SEDENTARY BEHAVIOR IN HISPANIC/LATINO ADULTS: RESULTS FROM THE HISPANIC COMMUNITY HEALTH STUDY/ STUDY OF LATINOS (HCHS/SOL) SOCIO-CULTURAL ANCILLARY STUDY. Elizabeth Vasquez*, Garrett Strizich. Linda C. Gallo, Frank J. Penedo, Rosenda Murillo, Benjamin A. Shaw, Christian R. Salazar, Simon J. Marshall, Carmen Isasi(University at Albany (SUNY)

Sedentary behavior refers to activities that require minimal engagement in body movement, resulting in low levels of energy expenditure (<1.5 METs). Chronic stress and/or lifetime traumatic stress can create a self-reinforcing cycle of unhealthy behaviors that can lead to further increases in stress. There is a scarcity of studies examining the association of chronic stress and/or lifetime traumatic stress with sedentary behavior in particular among Hispanic/Latinos. This study examined the relationship between stress and self-reported (Global Physical Activity Questionnaire) and objective measures (using accelerometer) of sedentary behavior in a representative sample of Hispanic/Latino adults (N=4,244) from the probabilistic community based HCHS/SOL Sociocultural Ancillary Study in 4 US urban areas (FL, IL, NY, CA; 2010-2012). Stress was measured as the number of ongoing difficulties lasting 6-months or more (Chronic Stress Burden scale), and lifetime exposure to traumatic events (Traumatic Stress Schedule). Multivariable regression models examined associations of 1) moderate/severe chronic stressors and 2) lifetime traumatic stressors with time spent in objective and self-reported sedentary behaviors adjusting by potential confounders. Those who reported more than one chronic stressor spent on average 8 to 10 additional minutes per day in objectively measured sedentary activities (P-value 0.05), while those with more than one lifetime traumatic stressors spent 10 to 14 additional minutes in sedentary activities (P value 0.01), compared to those who did not report any stressors after adjusting for confounders. Statistical interactions between the two stress measures and age or sex were not significant. Our findings indicate that stress is a risk factor for sedentary behavior among Hispanic/Latino adults regardless of sex and age. Interventions aimed at reducing sedentary behaviors might consider incorporating stress reduction into their approaches.

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IMPACT OF MATERNAL CHARACTERISTICS AND FETAL GROWTH ON EARLY CHILD GROWTH TRAJECTORIES. Hyojun Park*, Maureen Durkin (University of Wisconsin-Madison)

Objectives: This study aimed to identify maternal characteristics and fetal growth status associated with growth trajectories during early childhood and to evaluate developmental milestones including adiposity rebound and rapid catch-up growth during early childhood. **Methods:** Data were from the Early Childhood Longitudinal Study, Birth Cohort (n=6,650). Polynomial growth curve modeling and spline modeling were used to capture the impacts of pre-, peri-, and post-natal risk factors on the body mass index (BMI) or BMI percentile trajectories after adjusting for other covariates. Generalized estimating equations and alternative modeling strategies were fitted to validate the robustness of the results. **Results:** Fetal growth (birth weight for gestational age, b=1.90, s.e=0.21, p<0.001) and duration of gestation (b=1.47, s.e=0.17, p<0.001) were independently and positively associated with BMI percentile trajectories during early childhood. Adiposity rebound occurred around 24 months (BMI between 0 and 24 months: b=-0.04, s.e.=0.00, p<0.001 vs. BMI between 24 and 48 months: b=0.01, s.e.=0.00, p<0.001). We also found a positive gradients between maternal BMI before pregnancy as well as maternal weight gain during pregnancy and child BMI percentile trajectories. No associations were found between household SES or poverty status and BMI percentile trajectories. **Discussion:** Maternal BMI before pregnancy and weight gain during pregnancy were positively and strongly associated with child growth, and fetal growth and duration of gestation were also associated with differential child growth during early childhood. In sum, this study provided insights about how risk factors differently affect growth trajectories during early childhood using nationally representative longitudinal data.

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THE INTERACTION BETWEEN GENETIC ANCESTRY AND BREAST CANCER. Lisa M. Hines*, Rebecca L. Sedjo, Tim Byers, Esther M. John, Laura Fejerman, Mariana C. Stern, Kathy B. Baumgartner, Anna R. Giuliano, Gabriela Torres-Mejia, Roger K. Wolff, Kylie K. Harrall, Martha L. Slattery (Department of Biology, University of Colorado at Colorado Springs)

Introduction: Hispanic women have lower breast cancer incidence rates than non-Hispanic white (NHW) women. To what extent genetic versus non-genetic factors, independently and interactively, account for this difference is unknown. **Methods:** Using logistic regression, we evaluated the interactive influences of established breast cancer risk factors and ethnicity (self-identified and identified by ancestral informative markers) on breast cancer risk among 2326 Hispanic and 1854 NHW postmenopausal women from the US and Mexico in the Breast Cancer Health Disparities Study. **Results:** The inverse association between extent of Native American (NA) ancestry and breast cancer risk was only slightly attenuated after adjusting for known risk factors (lowest versus highest quartile: odds ratio (OR) = 1.39; 95% confidence interval (CI) = 1.00 to 1.92 among US Hispanic women; OR = 1.92; 95% CI = 1.29 to 2.86 among Mexican women). There were notable differences in the prevalence of risk factors, and suggestive differences in the magnitude and direction of their associations with breast cancer risk, across regional, ethnic, and genetic admixture subgroups. When comparing total number of risk factors, the average number of risk factors among breast cancer cases was inversely related to extent of NA ancestry (NHW = 4.24; US Hispanic, low NA ancestry = 3.88, high NA ancestry = 3.64; Mexico, low NA ancestry = 3.07, high NA ancestry = 2.66). **Conclusion:** Collectively, these data suggest that breast cancer development among Hispanic women is not solely attributed to acquiring more known risk factors, and further research is needed to identify additional genetic and/or non-genetic risk factors.

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PHYSICAL ACTIVITY AMONG ADULTS WITH MOBILITY DISABILITY, BEHAVIORAL RISK FACTOR SURVEILLANCE SYSTEM, 2013. Michelle L. Sloan*, Elizabeth A. Courtney-Long , Alissa C. Stevens, Dianna D. Carroll (Centers for Disease Control and Prevention, Atlanta, GA)

Background: Current physical activity (PA) guidelines recommend that adults get ≥150 minutes/week of moderate-intensity equivalent aerobic PA for substantial health benefits. Previous studies show that adults with mobility disability (MD) are less likely than adults without disability to engage in PA, and many do not meet the recommended guideline. This study uses recent data to examine PA among US adults with MD by age group. **Methods:** We used 2013 Behavioral Risk Factor Surveillance System data (n=477,013) to calculate age-adjusted prevalence of meeting the aerobic PA guideline, reporting any PA, and types of PA among adults aged ≥18 years with MD (serious difficulty walking or climbing stairs) compared to adults without disability. Estimates were stratified by age group [Younger-age (YA): 18-44, Middle-age (MA): 45-64, and Older-age (OA): ≥65]. **Results:** Overall, 13.1% of adults reported having MD (YA: 5.5%; MA: 18.3%; OA: 27.5%). Compared to adults without disability, adults with MD had a lower prevalence of meeting the aerobic PA guideline (31.2% vs 54.1%). Among adults with MD the lowest prevalence was among those 45-64 (YA: 32.6%; MA: 28.2%; OA: 32.4%). Adults with MD also had a lower prevalence of reporting any activity (52.6% vs 78.4%), and the prevalence among those with MD decreased with age (YA: 56.0%; MA: 50.2%; OA: 46.4%). Among adults with MD who reported any activity, walking (65.3%) was the most common activity followed by gardening (5.8%) and other (4.6%). Among adults with no disability, the most common activities were walking (46.5%), running (12.8%) and weight-lifting (5.1%). Walking was the most common activity for all age groups of adults with MD (YA: 64.1%; MA: 70.7%; OA: 59.7%).**Conclusion:** About 7 in 10 adults with MD do not meet the aerobic guideline; about half report no aerobic activity. As the most commonly reported activity, walking may be an activity for public health programs and health care providers to encourage among adults with MD.

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QUANTIFICATION AND VISUALIZATION OF DISPARITIES BETWEEN THE DEMAND AND SUPPLY OF TERTIARY EMERGENCY CARE IN QUAKE-STRICKEN REGION USING GEOGRAPHIC INFORMATION SYSTEMS. Michi Sakai*, Sachiko Ohta, Kazuo Okuchi, Junichiro Yokota, Jiro Shimada (Center for Health Service, Outcomes Research and Development – Japan (CHORD-J), Tokyo, Japan)

Objective: Due to the huge earthquake in Tohoku region of Japan in 2011, supply shortage in emergency medical care is growing. We quantified and visualized the disparities between the demand and supply of emergency medical facilities (EMF) providing tertiary care in Tohoku using geographic information systems (GIS). **Methods:** We used secondary data to estimate the annual incidence of patients who required urgent tertiary care (demand) based on the records of patients transported to EMFs in 2013 and census population. We chose a mesh block (area of 1 km squared) as the geographic unit of analysis. We quantified disparities between the demand and supply with the 2 indicators: 1) the proportion of patients in mesh blocks within 45 minutes from ambulance call to receiving care (CA) to the total demand, and 2) the ratio between 1 and the number of patients in the CA (supply-demand balance index), which indicates the supply quantity distributed from each facility to each patient in the CA. If patients were in the CA of multiple facilities, indices were aggregated. The latter was visualized on a map. We compared the proportions of patients in the CA by the chi-square test and supply-demand balance indices by the Kruskal-Wallis test across 7 prefectures in Tohoku. **Results:** The annual incidence of patients requiring tertiary care was 8.2 per 100,000. The overall proportion of patients within the CA in Tohoku was 59.2%(10,352/17,473). Across the 7 prefectures, the proportion was from 24.1% (439/1,820) to 76.5% (2,338/3,057) ($p<0.0001$). The median (interquartile range) of the supply-demand balance index in Tohoku was 0.003 (0.002–0.003). Variation across the prefectures was from 0.002 (0.002–0.002) to 0.004 (0.001–0.004) ($p<0.0001$). **Conclusion:** Regional disparities in tertiary emergency care exist in Tohoku even after 4 years of the earthquake. GIS was useful in identifying the region that may appropriate to assign priority for resource allocation.

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HEALTH CHARACTERISTICS OF 1999-2012 NATIONAL HEALTH INTERVIEW SURVEY (NHIS) ADULTS RECEIVING HOUSING ASSISTANCE FROM THE DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT (HUD). Patricia Lloyd*, Jennifer Parker, Jim Brittain, Cordell Golden, Dean Judson, Eileen Call, Jon Sperling, Barry Steffen , Elizabeth Rudd, Lynn Rodgers(National Center for Health Statistics/Centers for Disease Control and Prevention)

To investigate relationships between housing and health, we linked data from respondents of the 1999-2012 National Health Interview Survey (NHIS) to the Department of Housing and Urban Development (HUD) administrative data on housing assistance programs. We examine the association of ever receiving HUD housing assistance and selected health conditions. The NHIS contains data on health characteristics of the U.S civilian non-institutionalized population; the HUD administrative records contain household, housing, and individual characteristics for members of HUD-assisted households. "Ever HUD" adults are defined as individuals 18 years of age and older in the NHIS who linked to a HUD administrative record dated from 1999 through 2012. Association of ever HUD assistance with respondent-reported chronic conditions (diabetes, hypertension, elevated cholesterol, asthma) were examined using multivariate logistic regression adjusted for age, race/ethnicity, federal poverty level (FPL), and region. Our analytic sample consisted of 465,454 1999-2012 NHIS adults who provided consent and necessary data for linkage; 4.3% (n=21,199) were ever HUD adults. Ever HUD adults were more likely to be diagnosed with diabetes (OR=1.30, 95%CI: 1.23, 1.37), hypertension (OR: 1.19, 95%CI: 1.14, 1.25), elevated cholesterol (OR: 1.26, 95%CI: 1.07, 1.48), and asthma (OR: 1.31, 95%CI: 1.25, 1.38) than adults who never received HUD housing assistance. Estimates were similar when limited to respondents with incomes below 200% FPL. We report significant associations in health conditions by receipt of HUD housing assistance. Our analysis demonstrates the potential usefulness of the NHIS-HUD linked data to examine health outcomes on recipients of HUD housing assistance in the U.S civilian non-institutionalized population.

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THE MORTALITY OF NBA BASKETBALL PLAYERS 1949-2011: ARE THERE RACIAL DISPARITIES? Robert J Reynolds*, Steven M Day (Mortality Research & Consulting, Inc.)

The disparity in mortality rates among Blacks and Whites in the US is well-known and has been the subject of frequent commentary. A number of possible factors may contribute to these disparities including socio-economic status (SES), rate of access to and utilization of healthcare, levels of quality of health care, genetics, and lifestyle choices. In a cohort of physically fit and well-paid Black and White professional athletes the impact of many of these factors may be eliminated or minimized. Analysis of mortality in such a cohort may allow for the estimation of the effect, if any, of factors that remain (e.g., genetics). We analyzed 70,294.7 person-years of data from all Black and White professional basketball players who began their careers in the NBA from 1949 to the end of 2011, and looked for differences in mortality rates over time. To do so we also fit three Poisson regression models to the data: one each for death from all causes, natural causes, and external causes. There were a total of 249 deaths in the study period, 94 among Blacks and 155 among Whites. After adjusting for age, career length, extreme height, and decade, all-cause mortality rates between Blacks and Whites were not statistically significantly different (MRR = 1.62, 95% CI = 0.65-4.03). Modeling the natural-causes mortality rate demonstrated no differences based on race after adjustment for age (MRR = 1.14, 95% CI = 0.49-2.65). Modeling the mortality rate of external causes revealed no differences by race (MRR=1.16, 95% CI = 0.58-2.30), but showed that the 1980s composed a decade of increased risk (MRR=2.28, 95% CI = 1.11-4.69).This study does not support the hypothesis that there is a significant racial disparity in mortality rates between Black and White basketball players in the NBA between 1949 and 2011. This suggests that when Blacks and Whites share approximately the same SES and access to healthcare, and are in the same (top) physical condition, disparities in mortality may vanish.

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IS POPULATION STRUCTURE RESPONSIBLE FOR AREA-LEVEL INEQUALITIES IN INFLUENZA RATES? AN EXAMINATION USING AGENT-BASED MODELS. Kaitlin Piper*, Supriya Kumar, David D. Galloway, James L. Hadler, John J. Grefenstette (University of Pittsburgh)

We examined whether population structure is sufficient to generate the observed poverty-related influenza hospitalization rate inequalities in New Haven County, CT (NHC). Using agent-based modeling and a census-informed, realistic representation of household size, age-structure, and population density in NHC census tracts, we quantified the proportion of observed positive correlation between census tract poverty level and influenza hospitalization rates that could be accounted for by population structure. Simulated attack rates (AR_SIM) among adults increased with census tract poverty level ($F=32.2$; $P < 0.001$) in an epidemic caused by a virus similar to A(H1N1)pdm09. The ratio of adult AR_SIM in the highest- to lowest-poverty tracts, however, was only 34% of the ratio observed in surveillance data. Furthermore, AR_SIM increased earlier in the epidemic in high- than in low-poverty tracts. We conclude that epidemic simulation models that included demographic factors as well as neighborhood, school, and workplace mixing did not fully account for the observed positive correlation between census tract poverty and influenza hospitalization rates. Incorporating additional biological (stress and inflammation) and behavioral factors (vaccine uptake, social distancing, and timely healthcare access) will allow us to weigh their relative explanatory power in closing the gap and enable us to prioritize interventions to reduce inequalities.

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MULTIMORBIDITY, RACE, AND EDUCATION AMONG WORKING-AGED ADULTS IN THE NATIONAL HEALTH INTERVIEW SURVEY. Vicki Johnson-Lawrence*, Anna Zajacova(University of Michigan-Flint)

Approximately 25% of the adults age 18+ have multiple chronic conditions, or multimorbidity, but is understudied among non-elderly populations. This study examines the associations between educational attainment and race/ethnicity with mutimorbidity among adults aged 30-64 using a large, nationally-representative sample from the 2002-2013 National Health Interview Surveys. We used measures of 13 self-reported health conditions or problems that were collected continuously and identically since 2002. Multimorbidity was defined as having 2+ versus having 0-1 conditions. Educational attainment responses were categorized as completing less than high school (HS; 0-12th grade), completed HS or some college, and having a bachelor degree or higher. Compared to having a bachelor degree or higher, having less than a HS credential (OR=2.15, 95% CI = 2.07-2.23) or having a HS credential/some college (OR=1.60, 95% CI = 1.56-1.65) were associated with increased odds of reporting multimorbidity, controlling for age and gender. Non-Hispanic blacks had greater odds of multimorbidity (OR=1.32, 95% CI = 1.28-1.38), while Hispanics (OR=0.76, 95% CI = 0.73 -0.79) and respondents of other race/ethnicities (OR=0.66, 95% CI = 0.62-0.71) had lower odds of multimorbidity compared to non-Hispanic whites. Epidemiologic and demographic research on the burden of multimorbidity among non-elderly adults is limited, but warrants renewed attention given the potential for long-term significant loss in quality of life, financial productivity, and well-being for non-elderly adults. Reducing multimorbidity through health promotion efforts across the socioeconomic spectrum and earlier in the life course will be a requirement to age successfully and support overall well-being as the US population continues to age.

889-S/P

EFFECTS OF MATERNAL HEALTH ON CHILD UTILIZATION OF DENTAL CARE AMONG MEDICAID AND CHIP PARTICIPANTS - A CROSS-SECTIONAL STUDY UTILIZING DATA FROM NSCH 2011-12. Devang Patel*, Mohammad Sadath, Briar Deen, Alexis Rendon, Mark Lueke, Sharon Homan, Hasita Patel(University of North Texas Health Science Center)

Background: 80% of dental diseases are found in 20-25% of US children. Previous studies have linked dental healthcare utilization to dental healthcare coverage. Since majority of children are covered by Medicaid and CHIP program, it is important to analyze healthcare utilization among these children. Previous studies have not examined the relationship between overall maternal health and impact on child's dental care utilization, specifically preventive dental care. The aim of this study was to examine the association between maternal health status and utilization of dental care among children enrolled in Medicaid and CHIP programs. **Methods:** The data for analysis in this study were obtained from the 2011-2012 National Survey of Children's Health (NSCH). A sample of 88,460 children who were either covered by Medicaid or CHIP were selected. The authors examined the odds of having at least one dental visit in the past 12 months within the levels of self-reported maternal health status. Multivariable logistic regression was used to control for children's age, sex, maternal education, family structure, and satisfaction with healthcare provider. **Results:** Children who had mothers with excellent and very good health had 148% (OR 2.48; CI 1.41-4.38) more likelihood of having at least one dental visit in the last year in comparison to children who had mothers with poor general health. Children with mothers having good and fair general health also had 2.03 times higher odds (CI 1.14- 3.61) of dental visits in the last 12 months, as compared to children with mothers having poor health. One limitation to consider is that the maternal health statuses were self-reported. **Conclusion:** The findings suggest that overall maternal health status appears to play a role in their children's dental care utilization among population studied. Thus, maternal health may be utilized to identify a subgroup of children who do not have access to dental health care.

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CANCER SURVIVAL IN FIRST NATIONS AND MÉTIS ADULTS IN CANADA: A LINKED COHORT STUDY. Diana R Withrow*, Michael Tjepkema, E. Diane Nishri, Jason Pole, Loraine D. Marrett (Dalla Lana School of Public Health, University of Toronto)

BACKGROUND: Owing largely to a lack of ethnic identifiers in Canadian cancer registries, little is known about cancer among Aboriginal people in Canada. There are three Aboriginal groups in Canada: the Inuit, the First Nations and the Métis. The Métis are the descendants of unions of First Nations women and European fur traders. A linkage of the 1991 Canadian long-form census to the Canadian Mortality Database and the Canadian Cancer Registry (CCR) provides an opportunity to measure cancer survival in First Nations (FN) and Métis adults. Our objectives are to a) describe how a linked cohort study was used to generate the first national cancer statistics for FN and Métis b) describe the site-specific relative survival from cancer among FN and Métis and c) compare survival in FN and Métis to that in the general Canadian population. **METHODS:** The cohort consists of 2.7 million respondents to the 1991 Canadian census aged 25 and older, of whom approximately 62,000 are FN and 11,000 are Métis. Cohort members have been followed up for incident cancers (1992-2009) and deaths (1992-2009). RESULTS:Preliminary results have been generated for lung, breast, prostate, and colorectal cancer among FN and non-Aboriginals diagnosed from 1992 to 2003. The results show significantly poorer one-year relative survival from lung cancer among FN compared to their non-Aboriginal peers (32.4% [95%CI:27.2-37.6] vs. 39.7% [95%CI:39.1-40.3]). At five years post-diagnosis, relative survival is poorer among FN for all four cancer sites and significantly so for prostate cancer (75.3% [95% CI:66.3-82.1] vs. 88.2% [95%CI: 87.6-88.8]). Full results will be ready in June. **IMPLICATIONS:** The study is methodologically innovative in Canada as it uses a probabilistic linkage with the Canadian census to identify FN and Métis persons in the CCR. Further, we have used the same cohort and ethnic identifiers to derive the ethnic-specific life tables as to gather the incident cancers, despite small numbers.

891-S/P

EVALUATION OF ALLOSTATIC LOAD AS A MARKER OF CUMULATIVE STRESS IN A CALIFORNIA BIRTH COHORT. Katrina L Kezios*, Bruce G. Link, Shakira F. Suglia, Dana March, Barbara Cohn, Piera Cirillo, Ezra S. Susser, Pam Factor-Litvak(Mailman School of Public Health, Columbia University, New York, NY)

Allostatic load (AL) is conceptualized as chronic mis-activation of the body's stress response. In previous studies, high AL is a risk factor for poor health and associated with race and socioeconomic status. Few studies have examined the relationship between AL and self-rated health (SRH). We followed 605 adult offspring from the Child Health and Development Studies, a birth cohort recruited between 1959 and 1967 in California. Of these, 400 subjects had complete serology data available for analyses. Our AL index included 12 variables: BMI, waist circumference, percent body fat, systolic and diastolic blood pressure, heart rate, C-reactive protein, Interleukin-6, total and HDL cholesterol, hemoglobin A1C, and dehydroepiandrosterone sulfate. Each component was dichotomized based on the worst 25th percentile, scored as 1 (vs 0 otherwise). Scores were summed; the top 25th percentile of subjects was considered the high AL group and the rest, the low AL group. Performance of the index was tested with cross-sectional descriptive analyses of its relationship to race (black vs white), educational attainment (less than college vs college degree), and SRH (fair/poor vs good/very good/excellent). Scores on the index ranged from 0 to 10; high AL comprised scores of 5 or more. A higher proportion of Black vs. White participants were in the worst 25th percentile for most AL components and a higher proportion of Black participants (56% vs 44%) made up the high AL group. A similar pattern was seen for educational attainment. Subjects with good or higher SRH scored lower on the index (mean: 2.6 ± 2.3) compared to those with self-rated fair or poor health (mean: 4.7 ± 2.5). Adjusted odds ratios (95% CI) for high vs. low AL for race, education, and SRH were 2.6 (1.6, 4.4), 2.6 (1.5, 4.4), and 4.1 (2.3, 7.3), respectively. In these analyses, AL is associated with race, educational attainment and SRH. These associations may be compatible with a hypothesis of health disparities.

892-S/P

CONGRUENCE OF PARENTAL GENOMIC VARIATION BY COUNTRY AND SELF-REPORTED RACE AND ETHNICITY IN ONGOING MATERNAL CHILD GENOMIC STUDIES. Sahel Hazrati* (Inova Health System)

Background: Concerns with minority representation in pediatric research, especially in genomic research is a challenge to adequately represent the population and provide the appropriate "reference" gene set for analysis. **Objective:** To compare genetic, ancestral (country of birth), and self-report data to electronic medical record (EMR) race and ethnic data to determine the reliability and validity of available race and ethnic health care data that is used to create policy and pediatric health care outcome measurements. **Design/Methods:** Two maternal child genomic studies at Inova Children's Hospital (Inova Translational Medicine Institute) have enrolled over 3,000 families. We collect biological specimens along with social/demographic factors and clinical data including infant birth report, mother's medical condition, and family history of health. Data was collected over 3 years at Inova Fairfax Hospital, located in Northern Virginia, a highly diverse community. Racial and ethnic analysis was conducted and analyzed by principal component analysis (PCA) to determine the participants' ancestral background along with investigating the congruence of the self-report race, ethnicity, and country of birth to hospital EMR. **Results:** EMR data on race and ethnicity are difficult to validate and are not a reliable source of documentation. Ancestral reference genetics does not correlate well to self-reported race or ethnicity. Ancestral country of birth provides improved reference genetics that may identify population variations. **Conclusions:** Race is a social construct that does not accurately identify ancestral genetic characterization. Race and ethnicity is an important component of pediatric health care outcomes research; yet is often poorly constructed and documented. Future research may explore the use of ancestral reference genes to establish pediatric treatment protocols, health outcome measures, and develop pediatrics personalized medicine.

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CIGARETTE SMOKING TRAJECTORIES AMONG LESBIAN, BISEXUAL AND HETEROSEXUAL WOMEN IN THE NURSES' HEALTH STUDY II FROM AGES 14 TO 64 YEARS. Hee-Jin Jun*, S. Bryn Austin, Nicole VanKim, Heather L. Corliss (San Diego State University Graduate School of Public Health)

The extant literature provides clear evidence that lesbians and bisexual women have disproportionately higher prevalence of smoking compared to heterosexual women. Little is known, however, about sexual-orientation disparities in longitudinal patterns of smoking, and studies that prospectively examine sexual-orientation differences in smoking trajectories occurring throughout a major portion of the lifespan are absent. General growth mixture modeling (GGMM) has emerged as an important method for distinguishing subgroups of people experiencing different trajectories of smoking. This approach identifies subgroups of individuals based on their ages of initiating and quitting smoking and their degree of smoking at different time points. The aim of this study is to increase understanding of the burden of excess smoking among lesbian and bisexual women across the duration of their lifespan. GGMM is used to estimate smoking trajectories from early adolescence through later adulthood (ages 14-64 years) and to examine how these smoking trajectories are related to sexual orientation. We used repeated measured data collected from more than 100,000 women participating in the Nurses' Health Study II (NHSII). Smoking data were collected from participants at baseline in 1989 (adolescent and current use) and in 11 additional follow-up assessments (current use) occurring every 2 years. Approximately 1.5% of the cohort identified as lesbian or bisexual over the study follow up period. Findings will contribute to an understanding of the excess burden of smoking across the lifespan in sexual minority women and inform interventions to prevent and reduce smoking in this population.

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HEPATITIS C VIRUS (HCV), HCV/HEPATITIS B VIRUS (HBV) AND HCV/HIV CO-INFECTION AMONG REPORTED FEMALE CASES IN SOUTH CAROLINA. Afiba Manza-A. Agovi*, Wayne Duffus, Melinda Forthofer, Jihong Liu, Jaija Zhang, Wilfriend Karmaus (Arnold School of Public Health, University of South Carolina, Columbia, South Carolina)

Few data exist on the magnitude of Hepatitis C virus (HCV) mono-infection, and its co-infection with hepatitis B virus (HCV/HBV) and human immunodeficiency virus (HCV/HIV) within the US female population. We used a linked surveillance dataset that was reported for viral hepatitis and HIV infected women in South Carolina (SC) to describe individual characteristics, order of HCV/HIV virus diagnosis and the burden of these infections within the state. We identified a total of 10208 HCV-positive reports from 2004 to 2011. Ninety-five percent were mono-infected with HCV, followed by 4% who were co-infected with HCV/HIV and 1% with HCV/HBV infection. HCV mono-infected cases were predominantly middle-aged White women. However, after stratifying our results by age for those with available race information, we observed an increase over the study period in the number of HCV infections reported for White adolescents and young adults aged 15-25 years old. HCV/HIV co-infected cases tended to be Black middle-aged women from urban areas who reported either intravenous drug use (IDU) or heterosexual contact as their main risk factor for HIV transmission. HIV was diagnosed first in 79% of HCV/HIV co-infected cases and 62% of HCV/HBV co-infected cases had both infections reported within the same year. Our findings suggest a need for resources to be directed at improving screening and prevention efforts among middle-aged White women, Black women and young persons between the ages of 15 and 25 years.

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SEXUAL HEALTH IN A CREE COMMUNITY. Dionne Gesink*, Lana Whiskeyjack, Terri Suntjens, Alanna Mihic, Sherri Chisan, Priscilla McGilvery (University of Toronto)

Our purpose was to gather community member observations and perspectives about why sexually transmitted infection (STI) rates are high for the Saddle Lake Cree community in Northern Alberta, Canada. In-depth interviews were conducted using an indigenous method of interviewing grounded in the Cree values of relationship, sharing, personal agency and relational accountability. A purposive snowball sample of community members were asked why they thought STI rates were high for the community. The remainder of the interview was unstructured, led by the participant and supported by the interviewer through probes and sharing in a conversational style. A modified grounded theory analysis was used to develop a theoretical model of STIs in the community. Twenty-two in-depth interviews were conducted with 25 community members between March 1, 2011 and May 15, 2011. Participants were a balance of men and women, ranging in age from 18 to 65 years, living on- or off- reserve, and employed, unemployed or retired. High STI rates can be explained by the core category: abuse of power in relationships. We theorize that historic and current abuse of power in relationships is leading to loss of relationship and disconnection with self, others, family, community, organizations, leadership, the land, knowledge and Spirit. The breakdown and loss of relationships is the key psychosocial process that underlies high STI rates, and underlies all themes that emerged from the data, including: 1) drugs, alcohol and addiction; 2) "don't care"; 3) addiction, environment, and child neglect; 4) child neglect and sexual abuse; 5) silence; 6) loss of what is sacred and spiritual wounds; 7) disruption to the medicine wheel; and 8) camp jobs. Abuse of power in relationships is theorized to be the root of a complex cycle of mental, emotional, and spiritual trauma, substance ab/use, addiction, sexual ill-health and STIs.

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RACIAL/ETHNIC DIFFERENCES IN SURVIVAL RATES AMONG PEOPLE DIAGNOSED WITH HIV INFECTION, FLORIDA, 2000–2009. Mary Jo Trepka*, Kristopher P. Fennie, Diana M. Sheehan,, Thoephile Niyonsenga, Lorene M. Maddox, Spencer Lieb(Florida International University)

Background: The human immunodeficiency virus (HIV) mortality rate is substantially higher among non-Hispanic blacks (NHB) compared with non-Hispanic whites (NHW). The study objective was to analyze survival rates by race/ethnicity, according to factors not previously investigated. **Methods:** Florida HIV/AIDS surveillance data for people diagnosed with HIV during 2000–2009 were linked with Florida Vital Records, the Social Security Administration's Death Master File, and the National Death Index to ascertain deaths through December 2011. Data were linked with zip code-level poverty data from the American Community Survey. Rural status was classified based on the zip code's rural-urban commuting area coding. To estimate the role of late diagnosis and access and adherence to care and treatment, racial/ethnic disparities in survival were analyzed separately for those who were diagnosed with concurrent acquired immunodeficiency syndrome (AIDS) (diagnosed with AIDS within 1 month of HIV diagnosis) and those diagnosed with HIV infection alone. Multilevel weighted crude and adjusted Cox regression models were performed and hazard ratios (HR) computed. **Results:** Of the 61,265 people diagnosed with HIV infection, 11,902 (19.4%) died by December 2011. Among those with a concurrent AIDS diagnosis, the crude HR was higher among NHB (HR 1.44 [95% CI 1.32-1.56]) compared with NHW. After adjusting for sex, age at diagnosis, diagnosis year, US birth, HIV transmission mode, poverty, and rural/urban status, the HR for NHB decreased but remained significant (HR1.27; 95% CI 1.16-1.38). Among those with HIV infection only, the crude HR for NHB was also higher (1.36; 95% CI 1.21-1.52) relative to NHW and decreased to 1.22 (95% CI 1.09-1.36) after adjustment for the same factors. **Conclusions:** Among people diagnosed with only HIV and those with HIV and AIDS concurrently, NHB had shorter survival indicating that disparities likely exist in linkage to and retention in HIV care and treatment.

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ANTIRETROVIRAL THERAPY RECEIPT DEMARCATES IMPROVED RETENTION IN HIV CARE. Peter F. Rebeiro*, Asghar Kheshti, Megan Turner, Sally S. Bebawy, James B. Logan, Catherine C. McGowan, Stephen P. Raffanti, Timothy R. Sterling, Bryan Lau(Vanderbilt University School of Medicine, Nashville, TN)

Background: Antiretroviral therapy (ART) receipt and retention in HIV care are critical to delayed HIV progression and reduced transmission. We hypothesized that retention may improve after ART receipt due to increased personal investment in and understanding of HIV disease management. **Methods:** Adults with ≥1 visit who received first ART from 2000-2012 at the Vanderbilt Comprehensive Care Clinic contributed from enrollment until last visit before death or study end. Those with ≥2 years prior to ART (pre-ART), and ≥2 years after (post-ART), were included. ART was prescription of ≥1 active antiretroviral agent. Retention, by the US Institute of Medicine indicator, was ≥2 HIV primary care visits in a calendar year, >90 days apart. A piecewise generalized linear mixed model with random effects for intercepts and slopes by pre- and post-ART period was used to determine ORs and 95% CIs for the relationship between ART use and retention, adjusting for baseline age, sex, race/ethnicity, HIV risk factor, and CD4 count as potential confounders. **Results**: Among 257 adults included, median baseline age was 35 years (IQR: 29,41), 27% were female, 44% were Black, 9% had injection drug use as HIV risk factor, and median baseline CD4 was 468 (IQR: 360,630) cells/μL. In the pre-ART period, 60% of individuals were retained, and 80% were retained post-ART. In the adjusted model, the pre- and post-ART slopes for retention were flat (OR=1.10, 95% CI: 0.99,1.22 and OR=0.94, 95% CI: 0.82,1.08, respectively). The post-ART intercept was higher than the pre-ART intercept (OR=3.83, 95% CI: 1.17,12.50), though there was no difference between pre- and post-ART slopes (OR=1.03, 95% CI: 0.87,1.22). **Conclusion:** In this clinical population, ART receipt was associated with an increase in overall retention, though the sample may have been too small to detect more subtle changes in retention pre- and post-ART. Further study is necessary to isolate the possible positive effects of ART use on retention.

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FEASIBILITY OF MOBILE TEXT MESSAGING FOR HIV TESTING AMONG LATINO ADULTS. Renee Gindi*, Kathleen Page (CDC/ National Center for Health Statistics)

Introduction: Latinos in the United States are at higher risk of HIV infection than whites but not more likely to be tested for HIV. Poverty, insurance, language, and other factors create barriers to receipt of HIV testing messages. Some of these barriers may be circumvented by using mobile phone-based messaging, as Latinos are more likely than other groups to have mobile phone access. Describing the characteristics associated with not having an HIV test in this group could help target HIV testing messages. **Methods:** We use the data from the 2012 National Health Interview Survey to examine mobile phone access and HIV testing among Latino adults aged 18-44 (n=3,523). Adults living in households where most or all calls made were on mobile phones were considered to have mobile phone access. We considered demographic (age, sex, education, language of interview, nativity, years in the U.S.), economic (income, employment), healthcare (insurance status, access to care) and residential (urban residence, region, and residence in an emergent or established Latino community) characteristics when comparing those who did and did not have an HIV test. **Results:** The majority (72%) of Latino adults aged 18-44 had mobile phone access. Of adults with mobile phone access, 58% had never been tested for HIV. Demographic, economic, and healthcare factors were associated with HIV testing; Latinos aged 18-44 with mobile phone access who had never been tested for HIV were more likely to be younger, male, born outside of the U.S., and interviewed in Spanish than those who had been tested for HIV. Being unemployed, less educated, and uninsured were also associated with not having been tested for HIV in this group. **Conclusions:** Mobile messaging could reach 15 million Latino adults aged 18-44 in the United States, more than half of whom have not been tested for HIV. Those with mobile access and the greatest need of HIV testing may still have important barriers to obtaining health care.

905-S/P

INDIVIDUAL AND NEIGHBORHOOD DETERMINANTS OF LATE HIV DIAGNOSIS AMONG LATINOS WITH A HISTORY OF INJECTION DRUG USE, FLORIDA, 2000-2011. Diana M. Sheehan*, Mary Jo Trepka, Kristopher P. Fennie, Guillermo Prado, Purnima Madhivanan, Frank R. Dillon, Lorene Maddox (Department of Epidemiology, Florida International University, Miami, FL)

Purpose: To identify individual and neighborhood determinants of late HIV diagnosis (AIDS within 3 months of HIV diagnosis) among Latinos with injection drug use (IDU) history. **Methods:** Latinos aged ≥13 who met the CDC HIV case definition during the years 2000-2011 and reported to the Florida Department of Health were analyzed. Five individual-level variables were extracted: diagnosis year, age, sex, birthplace, and HIV transmission mode. Four neighborhood variables were extracted from the American Community Survey: poverty, unemployment, educational attainment, and Latino ethnic density (the proportion of the population who identify as Latino). Rural-Urban Commuting Area codes were used to classify zip codes into rural or urban. Neighborhood variables were matched to each case using the residential zip code at time of diagnosis. Multilevel logistic regressions were used to address correlation within cases in the same zip code and to calculate adjusted odds ratios for late diagnosis. **Results:** Of 14,137 Latinos, 1,281 (9.1%) reported IDU history. Latinos with IDU history who were diagnosed during earlier years (2000-2002 compared with 2006-2008 aOR 1.71, 95% CI 1.13-2.57); males (aOR 1.69, 95% CI 1.23-2.33); ages 40-59 (aOR 4.90, 95% CI 1.05-22.84) or ≥60 (aOR 5.49, 95 CI 1.03-29.30) compared with 13-19; and born in Central America (aOR 2.1, 95% CI 1.11-3.97) or Mexico (aOR 3.12-1.72-5.60) compared with the US had higher odds of late diagnosis. Neighborhood variables were not associated with late diagnosis for Latinos with IDU history. In contrast, low Latino ethnic density and rural residence were additionally associated with late diagnosis for Latinos without IDU history. **Conclusion:** Results suggest that enhanced secondary HIV prevention strategies for Latinos with IDU history should target males, older individuals, and those born in Central America and Mexico. Neighborhood variables appear to affect Latinos differentially by IDU history.

906-S/P

WHEN TO MONITOR CD4 CELL COUNT AND HIV-RNA TO REDUCE MORTALITY, AIDS-DEFINING ILLNESS, AND VIROLOGIC FAILURE IN HIV-INFECTED PERSONS IN DEVELOPED COUNTRIES. Ellen C. Caniglia*, Miguel A. Hernán on behalf of the HIV-CAUSAL Collaboration (Harvard School of Public Health)

Background: CD4 cell count and HIV-RNA are monitored in HIV-infected individuals on antiretroviral therapy (ART), but clinical guidelines vary with regards to the optimal monitoring frequency. **Methods:** The HIV-CAUSAL Collaboration includes prospective cohort studies from 6 European countries and the US. Antiretroviral-therapy naive individuals who initiated ART in 2000 or later and became virologically suppressed (two consecutive HIV-RNA≤200 copies/ml) within 12 months were followed from the date of virologic suppression. We compared four CD4 cell count and HIV-RNA monitoring strategies: (i) every 3±1 months, (ii) every 6±1 months, (iii) every 9±1 months, and (iv) every 12±1 months. At baseline, we made four replicates of each individual (1 per strategy) and censored replicates if and when their data were no longer consistent with their corresponding strategy. We used inverse probability weighted models to estimate hazard ratios of death and AIDS-defining illness or death, and risk ratios of virologic failure (HIV-RNA>50 copies/ml) at 18 months. **Results:** 35,195 individuals were included in our analysis. At 14 months of follow-up, there were 10,523, 3,289, 2,050 and 1,945 replicates remaining in the 3, 6, 9, and 12 months strategies, respectively. There were 541 deaths and 1,147 cases of AIDS-defining illness or death during follow-up and 3,676 cases of virologic failure at 18 months. The hazard ratios of both clinical outcomes were similar for all strategies. Compared with monitoring every 3 months, the risk ratio of virologic failure (95% CI) at 18 months was 1.21 (1.13, 1.30) for 6 months, 1.23 (1.11, 1.37) for 9 months, and 1.26 (1.14, 1.40) for 12 months. **Conclusions:** We found little evidence for an effect of monitoring frequency on death and AIDS-defining illness or death among individuals who achieve virologic suppression within 12 months of ART initiation. However, monitoring every 3 months results in the lowest incidence of virologic failure at 18 months.

907-S/P

RACIAL/ETHNIC DISPARITIES IN CHLAMYDIA RATES FOR US ADOLESCENTS: LOWER WHEN ADJUSTED FOR SEXUAL BEHAVIOR. Jeffrey S. Becasen*, Patricia Dittus, Elizabeth Torrone, Kyle Bernstein, Sevgi Aral (Centers for Disease Control & Prevention)

Rates of reported cases of chlamydia, a sexually transmitted infection, are high among adolescent women in the United States, in particular non-Hispanic black teens. Fewer than half of female teens have ever had sex and are not at risk. We adjusted national chlamydia case rates for sexual behavior and examined differences in adjusted rates by race. We used chlamydia case data reported to CDC, census population counts, and data from the 2002, 2006-2010, and 2011-2013 National Survey of Family Growth to calculate the adjusted rates for those who have had sex (sexually experienced) and rates for those who had sex in the past year (sexually active) across race groups for female teenagers. Overall, the rates of Chlamydia are higher when adjusted for sexual behavior. The disparity in female rates for blacks relative to whites is reduced when adjusted for sexual behavior. For example, in 2006-2008, the black to white chlamydia rate ratio decreased from 6.7 to 3.0 after adjusting for sexual experience. From 2002-2013, decreases in female black/white disparities were more pronounced after adjusting for behavior: 6.4 to 5.3 (crude) vs. 5.1 to 3.5 (adjusted for sexual experience) and 5.9 to 3.5 (adjusted for sexual activity). From 2002-2013, the female Hispanic to white rate ratio also decreased, but was less affected by adjustment for sexual activity: 2.1 to 1.4 (crude) vs. 2.5 to 1.5 (adjusted for sexual experience) vs. 2.7 to 1.7 (adjusted for sexual activity). The impact of adjustments can be attributed to: decrease in proportion of sexually experienced/active blacks; increase in proportion of sexually experienced/active Hispanics; and stable proportion in whites. Adjustments for sexual behavior attenuate the chlamydia rate disparity between blacks and whites, and not adjusting for behavior underestimates the reduction in disparities over time. Black teens remain disproportionately burdened by chlamydia infections.

908-S/P

USE OF STATINS IN THE WOMEN'S INTERAGENCY HIV STUDY. Jonathan V. Todd*, Stephen R. Cole, Jennifer Cocohoba, Daniel J. Merenstein, Greer Burkholder, Mardge H. Cohen, Stephen J. Gange, Jason M. Lazar, Tene T. Lewis, Joel Milam, Anjali Sharma, Adaora A. Adimora (University of North Carolina, Gillings School of Global Public Health, Chapel Hill, NC)

We describe the use of statins in the Women's Interagency HIV Study, a cohort of HIV+ women and matched HIV- controls, from 2000-2013, as well as estimate the effect of HIV serostatus on the use of statins within one year after a first indication, per Adult Treatment Panel (ATP) III guidelines, for their use. We hypothesized that HIV+ women may be less likely to receive a statin than HIV- women. 461 women had a first indication for statins without any prior use according to ATP III guidelines, of whom 318 (69%) were HIV+. LDL and HDL cholesterol were similar between groups (i.e. HIV+ and HIV- women), and HIV+ women were more likely to be white. Atorvastatin was the most commonly used statin in both groups, but HIV+ women were much more likely to take pravastatin than HIV- women. Among the 318 HIV+ women, 44 initiated a statin within a year of having an indication, while among the 143 HIV- women, 14 initiated a statin. The risk ratio for initiation of a statin within one year for HIV+ women was 0.97 (95% CI: 0.58, 1.62), adjusted for baseline age, smoking, hypertension, total cholesterol, LDL cholesterol, HDL cholesterol, Framingham 10-year risk score, and insurance status using inverse probability weights. In summary, HIV serostatus had no effect on the uptake of statins within one year of a first indication, which suggests that disparities in cardiovascular care by HIV serostatus may be limited in this population. We also describe the effects that changing guidelines have on the indication for statin use, as the 2013 American College of Cardiology/American Heart Association (ACC/AHA) guidelines recommend more aggressive use of statin therapy compared to the 2001 ATP III guidelines. Applying the ACC/AHA guidelines for statin initiation rather than the ATP III guidelines increased the number of women with an indication from 461 to 1241, more than doubling the number of women with an indication for a statin.

909-S/P

INITIAL DATA HARMONIZATION IN THE STTR HIV CONSORTIUM: EVALUATING THE RELATIONSHIP BETWEEN ANTIRETROVIRAL ADHERENCE AND SUBSTANCE USE. Lauren Strand*, Robin Nance, Redonna Chandler, William Cunningham, Elise Riley, Shruti Mehta, Frederick Altice, Wendee Wechsberg, Chinazo Cunningham, Chuck Cleland, Sandra Springer (University of Washington)

Introduction: Related studies are often combined to improve statistical power when investigating associations in rare exposures and subpopulations. Data harmonization is an important component of such efforts. The Seek, Test, Treat, Retain (STTR) HIV Consortium is comprised of 22 observational and interventional studies in the United States (US) and abroad and focuses on substance users and persons involved in the criminal justice system. We used data from the Consortium to examine associations between substance use and antiretroviral medication adherence. **Methods:** Studies with cross-sectional data on associations of interest were included in estimates from age-, sex-, and study-adjusted linear regression models. Substance use categories were defined as: alcohol, marijuana, cocaine, opioids, amphetamines, and other. Likert scale frequency of use measures were converted/scaled to estimated days of use in the past 30 days. Adherence was assessed with the visual analogue scale (VAS). **Results:** Data was included on up to 1024 HIV-infected participants in 7 studies (6 US, 1 international), with collection ongoing. Binge drinking was associated with less adherence (ΔVAS: -6%; 95%CI: -12%,-1%) as was amphetamine use (-10%; 95%CI: -15%,-4%) and opioid use (-5%; 95%CI:-9%,-1%), relative to non-use. Use of multiple substances was associated with less adherence vs. single substance use (-6%; 95%CI: -10%,-2%), while non-use was associated with more adherence vs. single substance use (5%; 95%CI: 0%,9%). Greater frequency of use in the past 30 days was associated with less adherence for amphetamines (-0.4%/day; 95%CI: -0.1%,-0.6%) and cocaine (-0.8%/day; 95%CI: -0.5%,-1.2%). Results were similar with only marijuana use as reference. **Conclusion:** Associations between multiple and specific substance use and less antiretroviral adherence may have important implications for patient care. Harmonization allowed for substance-specific estimates, despite the challenges due to heterogeneity.

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ASSOCIATION BETWEEN HERPESVIRUSES AND AFFECTIVE DISORDERS IN YOUNG TO MIDDLE-AGED U.S. ADULTS. Amanda M. Simanek*, Jennifer B. Dowd, Robert H. Yolken (University of Wisconsin-Milwaukee, Joseph J. Zilber School of Public Health)

Objective: Herpesviruses such as herpes simplex virus-1 (HSV-1) and cytomegalovirus (CMV) have recently been associated with affective disorders including depression and bipolar disorder I, however studies have been limited primarily to older clinical populations. Thus, whether these associations exist among younger to middle-aged adults in the general U.S. population remains unknown. We sought to examine whether seropositivity for HSV-1 and CMV were associated with major depression and bipolar disorder I using data from individuals 15-39 years of age in the National Health and Nutrition Examination Survey (NHANES) III. **Methods:** A total of 8435 individuals were assessed for lifetime major depression and 8445 for bipolar disorder I via the Diagnostic Interview Schedule, a structured psychiatric interview that employs DSM-III criteria. Of these individuals, 6564 were tested for HSV-1 and 7498 for CMV seropositivity. In addition, CMV immunoglobulin G (IgG) optical density (OD) values were available for 3920 women. We used logistic regression to estimate the odds ratio (OR) and 95% confidence interval (CI) for the associations between pathogen seropositivity as well as elevated CMV IgG antibody level (i.e., upper 50th percentile) among seropositive women (>1.05 OD units, n=2695) and each outcome, adjusting for age, gender, race/ethnicity and poverty income ratio. **Results:** Neither seropositivity for HSV-1 or CMV was statistically significantly associated with major depression or bipolar disorder I. However, among CMV seropositive women with OD results, the odds of bipolar disorder I was 2.76 (95% CI 1.16, 6.56) times greater for those with elevated CMV IgG antibody level compare to those with lower IgG antibody level in fully adjusted models. **Conclusions:** Future studies are needed to elucidate the role that elevated immune response targeted against CMV may play in the etiology of bipolar disorder I among the general U.S. population.

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RISK FACTORS ASSOCIATED WITH HOSPITALIZATION AFTER PERTUSSIS INFECTION, INDIANA, 2008-2014. Mugdha Golwalkar* (Indiana State Department of Health)

Background: During the last several years, incidence of pertussis has increased within the United States. Pertussis (whooping cough) complications are most severe in young children and infants under one year of age and often result in hospitalization. In 2013, the Advisory Committee on Immunization Practices (ACIP) began recommending a single pertussis vaccine dose for women during each pregnancy to address this issue. **Methods:** Pertussis surveillance data for cases between ages 0-18 years that included hospitalization information was gathered from the Indiana National Electronic Disease Surveillance System (INEDSS) from January 1, 2008 to December 31, 2014. Investigations for pertussis included demographic information, vaccination history, and other morbidity and mortality data. Associations were modeled using multivariate logistic regression. **Results:** During 2008-2014, 96.6% (n=2917) of confirmed pertussis cases under age 18 years had complete data for hospitalization, demographic, and outcome information. Of this group, 54.0% (n=1575) were appropriately vaccinated. The highest percentage of pertussis hospitalizations was in infants age 0-6 months (8.9%). Children with complete vaccinations and high number of doses were significantly less likely to be hospitalized (adjusted odds ratio [aOR], 0.6; 95% confidence interval [CI],0.4-0.9 and aOR, 0.6; 95% CI,0.5-0.7 respectively). Children age 0-6 months, 6-12 months, and 1-3 years were significantly more likely to be hospitalized (aOR, 53.0; 95% CI, 29.9-93.8, aOR, 6.3; 95% CI, 3.1-12.9, and aOR, 3.0; 95% CI, 1.6-5.9 respectively). **Conclusions:** Children under four years of age, who often have fewer vaccine doses than older children, are at greater risk of complications that require hospitalization after pertussis infection. Continued coordination between immunization research and programs, disease surveillance teams, and providers is needed to further investigate appropriate solutions.

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SEASONAL DYNAMICS OF DENGUE IN TAIWAN: THE INTERACTION BETWEEN MOSQUITO POPULATIONS AND CLIMATE FACTORS. Yu-Han Kao*, Rafael Meza, Marisa Eisenberg (University of Michigan School of Public Health)

Dengue fever has become an increasing infectious disease threat to many regions over the past five decades, with more than half of the world's population currently at risk. Without effective vaccines and drugs to counter dengue fever, vector control remains the predominant strategy to mitigate dengue epidemics. Understanding the complex dynamics of dengue transmission is therefore an essential component of disease control. Previous studies have shown that seasonality of dengue transmission is closely associated with climate factors and vector dynamics. Nevertheless, the detailed mechanisms about how climate factors affect vector populations in the wild and perpetuate disease transmission are still unclear. This research is aimed to understand the complex interactions between climate, mosquito populations, and dengue transmission using mathematical modeling, and to further examine strategies for disease surveillance and intervention design. Using dengue epidemics in Taiwan as an example, we develop an ordinary differential equation model of dengue transmission between human and mosquito populations. We include climate data from the Taiwan Central Weather Bureau in order to drive the model dynamics. The model is fitted to dengue incidence data from the Taiwan CDC. Our preliminary results demonstrate that climate factors may contribute to the delay of dengue epidemics; however, more data on vector population dynamics is required to make the model more informative. With additional data sources, our ultimate goal is to develop models that could serve as a tool to predict dengue outbreaks based on weather, vector, and human movement data. We believe that this eventual early-warning system can inform government response in order to launch timely interventions, and further improve the control of dengue fever.

913-S/P

INFECTION RISK FROM HOSPITAL TRANSFER POLICIES: A NETWORK ANALYTICS APPROACH. Eric T. Lofgren* (Network Dynamics and Simulation Science Lab, Virginia Bioinformatics Institute, Virginia Tech)

Patient transfers within a hospital may impact hospital-wide infection rates, as patients with infections are moved or high-risk patients are concentrated in particular sites. Understanding this impact requires studying the risk of healthcare facility associated infections not at the level of the individual patient, but at the hospital level. Using patient records and surveillance data from 7/1/2009 to 12/31/2010, we constructed a directed network of 57 nodes, each one representing a nursing station of a major teaching hospital in the southeastern U.S., with 12,224 patient transfers between them. Using the rates for hospital-acquired infections (HAIs) within those nursing stations, negative binomial regression was used to calculate incidence rate ratios (IRRs) for several network measures, controlling for both the number of incoming patient transfers and the type of nursing station (i.e. ICU vs. Floor). Nursing stations with higher number of outgoing patients had lower incidence of HAIs, with a 1% decrease in infection rate per 10 patients transferred (95% CI: 0.98, 1.00). Nursing stations with a high degree of closeness centrality (i.e. those with few intervening stations between them and any other nursing station) had higher incidence of HAIs (IRR = 2.70, 95% CI: 2.25, 3.27). Other network measures did not have a significant association with infection rates. The protective effect of outgoing patient transfers may be due to the transfer of high-risk patients elsewhere, though this effect remained significant even when controlling for type of patient. The positive association between hospitals with high closeness, who receive transfers from many different sources suggests that they may be a place where patients of various risk groups mix, increasing the overall risk to patients under the care of that station. This analysis is a straightforward use of routinely collected data, and may help build understanding of how hospital policy influences infection risk.

914-S/P

ESTIMATION OF THE MORTALITY BURDEN OF INFLUENZA IN INDIA. Ashleigh A. McGirr*, Cindy L. Gauvreau, Yurie Maher, Mark Jit, Shaun K. Morris, Prabhat Jha (Dalla Lana School of Public Health, University of Toronto, Toronto, ON)

Objectives: Influenza virus is one of the most deadly infectious diseases in high-income countries; however, little is known about the mortality burden from influenza in India. Our primary objective is to estimate influenza mortality in India. Secondary objectives included understanding temporal trends and identifying high-risk age groups for influenza immunization prioritization. **Methods:** Weekly pneumonia deaths were obtained from the Million Deaths Study, a verbal autopsy based study of over 120,000 deaths from a representative sample of India's population. Quasi-Poisson regression was used to estimate the proportion of pneumonia deaths attributable to influenza. The final model included week, temperature, relative humidity, year, percentage of positive influenza tests, and seasonal terms. Influenza-specific mortality fraction was extrapolated to the population to approximate the influenza mortality rate. 95%CIs were estimated using standard error of the fitted model and assuming no additional variability of the multipliers. **Results:** Both the crude and age-specific Poisson regression models were found to be a good fit to the data, although not all included terms in the model were statistically significant. Estimated influenza mortality rates decreased throughout the study period with estimates of 7.55 (95%CI: 3.11-14.81) and 5.05 (95%CI: 2.24-11.17) influenza deaths per 100,000 population in 2001 and 2003 respectively. Using the most recent data, the burden of influenza mortality in 2003 was found to be greatest among children ≤4 years old (49.38/100,000 population) and the adults ≥65 years old (21.47/100,000 population). **Conclusions:** Contrary to high-income countries where influenza burden is high in children but associated with low mortality, young children were found to have the highest influenza mortality burden in India, followed by older adults. As such, these are high-risk groups that should be considered for priority influenza immunization in India.

915-S/P

HBEAG SEROPOSITIVE AS AN EFFECT MODIFIER OF THE ASSOCIATION OF GENDER WITH LIVER DISEASE SEVERITY IN HEPATITIS B INFECTED POPULATION. Jing Sun*, Alison A. Evans (Drexel University School of Public Health)

Introduction: Gender difference in risk of hepatocellular carcinoma (HCC) among hepatitis B chronic infection patients had long been reported. Hepatitis B HBeAg seropositive is associated with more severe liver disease, but its role in the relationship between gender and liver disease in hepatitis B infected population has not been discussed elsewhere. **Methods:** The data in this study is derived from a prospective cohort study established in 1992-93 in Haimen City, China. There were 1863 participants who returned for follow up screening in 2003. Their liver disease severity was categorized into four categories (normal, mild, moderate, and severe/HCC) based on physical examinations, blood tests, and ultrasound. Life-style and environmental exposure were measured through a survey. We used cumulative logit regression models to estimate the gender effect and life-style related effect on liver disease severity. **Results:** We discovered that the hepatitis B antigen is an effect modifier for the gender difference on liver disease severity. Among all men, HBeAg seropositive associated with a 2 fold increase in risk of severe liver disease compared to those who had HBeAg seronegative. The female gender has a protective effect on the risk of severe liver disease (OR: 0.46) compared to males with HBeAg seronegative. Females with HBeAg seropositive were 1.25 times as likely to develop severe liver disease compared to male with HBeAg seronegative. **Discussion:** The gender effect on liver disease severity is different based on HBeAg status. Males with HBeAg seropositive associated with a significantly increased risk of developing severe liver disease. Females with HBeAg seronegative showed a protective effect on developing severe liver disease, but females with HBeAg seropositive associated with a 25% increased risk compared to males with HBeAg seronegative.

916-S/P

MODELING THE EFFECTS OF EBOLA TREATMENT-SEEKING DYNAMICS. Michael A.L. Hayashi*, Marisa C. Eisenberg (University of Michigan, Department of Epidemiology)

Since the first reported cases in Guinea on March 23, the 2014 West African Ebola outbreak has eclipsed all previous occurrences of the disease in both incidence and mortality with a total of 21,724 cases and 8,641 deaths as of January, 2015. In response, public health agencies and aid groups have built Ebola Treatment Units (ETUs) to provide containment and supportive therapy. However, ETU effectiveness may be complicated by the clinical presentation of Ebola virus disease. In the early symptomatic period, it is difficult to differentiate between Ebola and other, more common causes of febrile illness such as malaria or dengue fever without laboratory tests. Thus, infected individuals may not immediately seek treatment due to uncertainty about their disease status and fear of acquiring Ebola in an ETU. We would expect this behavior to be most evident early in the outbreak, shifting toward higher treatment-seeking rates as the prevalence and recognition of Ebola increases. In order to assess the role of treatment-seeking dynamics in the course of an Ebola outbreak, we developed a compartmental model of Ebola transmission that includes multiple disease stages, funeral transmission, hospitalization, and infection by a non-Ebola pathogen. ETU use was modeled as follows: Late stage Ebola cases enter treatment at a constant rate while early stage Ebola cases and those infected with a non-Ebola pathogen elect to enter treatment based on a cost-benefit comparison of the relative risk of death without treatment versus the relative risk of acquiring Ebola in an ETU. Since the risk of Ebola infection varies over time, we use the replicator equation to represent population behavior change in response to the changing risks generated by the transmission model Preliminary results suggest that adaptive treatment-seeking can result in a multiple secondary outbreaks as ETU use declines at the conclusion of the initial outbreak.

917-S/P

EXERCISE OR MINDFULNESS MEDITATION DECREASE RISK OF ACUTE RESPIRATORY INFECTIONS. Rachel Sippy*, Ron Gangnon, Bruce Barrett (University of Wisconsin-Madison)

The Meditation or Exercise for Preventing Acute Respiratory Infection (MEPARI) trial tested the ability of exercise or mindfulness meditation to reduce acute respiratory infections (ARIs). This analysis examines the effect of these interventions on ARI incidence, and sensitivity analysis is used to assess the effect potential differential misclassification of ARIs. Results from the first cohort of MEPARI have been published. Participants were randomized to 8 weeks of training in mindfulness meditation (n=51) or moderate exercise (n=51), or to serve as controls (n=52). Participants self-reported ARIs, and supplied a symptoms measurement and nasal wash. Conditional logistic regression was used to calculate ARI risk for each group. Five periods were analyzed individually to determine the period of greatest effect on ARI incidence for each intervention. Sensitivity and specificity analyses assessed whether differential misclassification of ARIs among controls could explain the effect estimate. Risk of ARI was 0.722 (p=0.2022) for exercisers compared to controls, and 0.652 (p=0.0984) for meditators compared to controls. An interaction was found with area temperature, wherein both intervention groups had decreased risk at higher temperatures: after adjusting for age, smoking status, education, temperature, and a temperature-group interaction, the risk of ARI was 0.618 (p=0.0891) among exercisers compared to controls, and 0.571 (p=0.0498) for meditators compared to controls, at mean temperature (35.23°). Individual analysis of five study periods found the month immediately following intervention to have the greatest effect on ARI risk for mediation (p=0.0772), and two months post-intervention for exercise (p=0.1362). Sensitivity and specificity analysis found effect estimates for exercise or meditation to be unaffected by even severe misclassification of ARI start or end dates. Eight-week periods of exercise or mindfulness meditation training may significantly reduce ARI risk.

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PSYCHOMETRIC PROPERTIES AND FACTOR STRUCTURE OF THE GENERAL HEALTH QUESTIONNAIRE IN A MULTINATIONAL STUDY OF AFRICAN, ASIAN AND SOUTH AMERICAN COLLEGE STUDENTS. Bizu Gelaye* Mahlet G. Tadesse, Vitool Lohsoonthorn, Somrat Lertmeharit, Wipawan C Pensuksan, Sixto E Sanchez, Seblewengel Lemma, Yemane Berhane, Juan Carlos Vélez, Clarita Barbosa, Asterio Anderade, Michelle A. Williams (Department of Epidemiology, Harvard T. H. Chan School of Public Health, Boston, MA)

Background: Common mental disorders (CMDs) such as depression and anxiety are among the leading causes of morbidity and mortality globally. The 12 item General Health Questionnaire (GHQ-12) is a widely used questionnaire for screening and detecting CMDs. The purpose of this study was to examine the reliability, construct validity and factor structure of the GHQ-12 in a large sample of African, Asian and South American young adults. **Methods:** A cross-sectional study was conducted among 9,078 undergraduate students. Students were invited to complete a self-administered questionnaire that collected information about lifestyle, demographics, and CMDs. In each country, the construct validity and factorial structures of the GHQ-12 questionnaire was tested through exploratory and confirmatory factor analyses (EFA and CFA). **Results:** Overall the GHQ-12 items showed good internal consistency across all countries as reflected by the Cronbach's alpha: Chile (0.86), Peru (0.85), Ethiopia (0.83), and Thailand (0.82). Results from EFA showed that the GHQ-12 had a two-factor solution in Chile, Ethiopia and Thailand, although a three-factor solution was found in Peru. These findings were corroborated by EFA. Indicators of goodness of fit, comparative fit index (CFI), reasonable error of approximation, root mean square error value (RMSA), were all in acceptable ranges across study sites. The CFI values for Chile, Ethiopia, Peru and Thailand were 0.84, 0.93, 0.87, and 0.89, respectively. The corresponding RMSEA values were 0.083, 0.051, 0.079, and .065. **Conclusion:** Overall, we documented cross-cultural comparability of the GHQ-12 for assessing CMDs among young adults. Although the GHQ-12 is typically used as single-factor questionnaire, the results of our EFA and CFA revealed the multi-dimensionality of the scale Future studies are needed to further evaluate the specific cut points for assessing CMDs within the multiple factors.

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RESIDENTIAL TRANSIENCE AND SUICIDALITY AMONG ADULTS WITH MENTAL ILLNESS. Cristie Glasheen*, Valerie Forman-Hoffman, Ty Ridenour (RTI International)

Objective: Suicide is the 10th leading cause of death in the U.S. and the 4th leading cause of death among adults aged 18 to 65. Identifying risk factors for suicide is vital for prevention and intervention efforts. This research evaluates how one type of housing instability - residential transience (moving ≥3 times in the past 12 months) is associated with past year suicidality among adults with mental illness (AMI). **Methods:** The association between residential transience and past year suicidality (thoughts, plans, and attempts) was investigated in ~38,300 adults with past year AMI from the 2009 - 2013 National Surveys on Drug Use and Health using logistic regression (weighted for sampling design). **Results:** Among adults with AMI, the prevalence of suicidal thoughts was higher for those with past year transience than for those without (35.7 vs 20.0%, p<.001). Suicide plans and attempts were also more common among transient adults with AMI compared to their non-transient counterparts (Plans: 12.9 vs. 5.6%, p<.001; Attempts: 7.2 vs. 2.4%, p<.001). Even after controlling for mental illness severity, demographics, poverty status, co-occurring substance use disorders, and treatment use, the odds of suicidality were higher for adults with AMI who were transient compared to those who were not (Thoughts: OR=1.34, 95% CI: 1.11 – 1.61, Plans: OR=1.33, 95% CI: 1.09 – 1.62; Attempts: OR=1.47, 95% CI: 1.15 – 1.87). **Conclusions:** Mental healthcare providers should be aware of transience as a potential risk marker for suicide, independent of poverty and mental illness severity. Prior research into housing instability and suicide risk has primarily examined homelessness. However, these findings suggests that residential transience, a conceptually less severe form of hosing instability than homelessness, may also be associated with suicide risk. Future research is needed to evaluate potential causal mechanisms and better explain this association.

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IMPROVED MENTAL HEALTH AMONG LOW INCOME ADULTS IN THE U.S. Greta Kilmer Miller* (RTI International)

Purpose: Health care coverage and access to mental health benefits increased from 2012 to 2013 in the U.S. This research will determine if any measurable improvement occurred in mental health among adults during this time period. **Methods:** The 2012 and 2013 Behavioral Risk Factor Surveillance System questioned adults aged 18 or older via telephone (including cell phones) about how many of the past 30 days they experienced stress, depression, or problems with emotions (mentally unhealthy days). Health insurance, employment, and income were also assessed. Complex sampling design was accounted for in regression models analyzing trends in mentally unhealthy days. Trends in health insurance and employment were also examined. **Results:** Overall, mentally unhealthy days decreased for adults from 2012 to 2013 by an average of 0.19 days (p< 0.0001). A significant interaction was found with income, and revealed that only those with an income over $15,000 and under $25,000 experienced a significant change (decrease of 0.54 days on average; p< 0.0001). Adults with income under $15,000 only showed a decrease in states where Medicaid was expanded, but the change was borderline statistically significant (decrease of 0.45 days, p=0.0619). Additionally, health care coverage, jobless rates, and prevalence of zero mentally unhealthy days were compared by income level to show trends in health care coverage, but no significant trends in joblessness. **Conclusion:** During a time of health care expansion, improved access to mental health care, and stable jobless rates, mental health improved for low income adults in the U.S. Longitudinal studies can be used to confirm if such changes are attributed to improved mental health care, improved health care overall, or changes in financial burden of paying for health care (e.g., Medicaid expansion). Low income adults experience the most mentally unhealthy days in the U.S., but recent health care coverage changes may help to alleviate this disparity.

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REGULAR SODA AND FRUIT DRINK CONSUMPTION AND SERIOUS PSYCHOLOGICAL DISTRESS AMONG ADULTS FROM 5 US STATES. Guixiang Zhao*, Catherine A. Okoro, Liping Pan, Fang Xu, Machell Town (Centers for Disease Control and Prevention)

Purpose: Consumption of sugar-sweetened beverages is linked to major risk factors for diabetes such as obesity, impaired glucose homeostasis, insulin resistance, and metabolic syndrome. This study examined the association between regular soda (i.e., nondiet) and fruit drink consumption and psychological distress among US adults. **Methods:** We analyzed data from 28,833 adults (aged 18 years or older) who participated in the 2012 Behavioral Risk Factor Surveillance System in 5 states. Psychological distress symptoms were assessed using the Kessler-6 questionnaire; a total Kessler-6 score of ≥13 was used to define serious psychological distress (SPD). Prevalence ratios and 95% confidence intervals (CIs) were estimated using log-linear regression analysis while controlling for confounding factors including demographics, lifestyle risk factors, obesity, and diabetes. **Results:** Overall, 23.7% of adults reported consuming regular soda and fruit drinks ≥1times/day, and 3.4% reported having SPD. The prevalence of SPD was 2.5%, 2.6% and 5.9%, respectively, in adults who reported none, <1 time/day, and ≥1 times/day of regular soda and fruit drink consumption. After multivariable-adjustment for potential confounders, the prevalence ratio for SPD was 1.46 (95% CI: 1.01–2.13) among adults who reported consuming ≥1times/day of regular soda and fruit drinks compared with adults who reported none; this association was stronger (adjusted prevalence ratio: 1.82; 95% CI: 1.14-2.89) when analyses were limited to adults with body mass index of ≥25.0 kg/m2. **Conclusion:** Frequent consumption of regular soda and fruit drinks was positively associated with SPD in adults, especially in adults who were overweight and obese.

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PSYCHOTROPIC MEDICATION USE, DEPRESSION, ANXIETY AND FERTILITY. Jaimie L. Gradus*, Yael I. Nillni, Elizabeth E. Hatch, Kenneth J. Rothman, Ellen Margrethe Mikkelsen, Lauren A. Wise (VA Boston Healthcare System and Boston University)

Antidepressant use has been associated with longer time-to-pregnancy (TTP). The extent to which underlying depression or anxiety explains this association is unclear. Retrospective studies have found associations between depression and delayed TTP, while prospective studies have shown little association. We examined the relation of depression, anxiety, and psychotropic medication use to fecundability in Pregnancy Study Online (PRESTO), an internet-based preconception cohort study. At baseline, women completed an online questionnaire about physician-diagnosed depression and anxiety, depressive symptoms (Major Depression Inventory; MDI), and psychotropic medication use for depression or anxiety in the prior 4 weeks. Women completed bimonthly follow-ups for 12 months or until they conceived. The cohort was restricted to 1,089 women attempting pregnancy for ≤3 cycles at study entry. Fecundability ratios (FR) and 95% confidence intervals (CI) were derived from proportional probabilities models, with control for age, education, race/ethnicity, income, marital status, years in a steady relationship, last method of contraception, BMI, smoking, and parity. Psychotropic medication use and depression/anxiety were mutually controlled. FRs for mild, moderate, and severe depressive symptoms relative to no symptoms were 1.08 (CI: 0.79, 1.51), 0.99 (CI: 0.63, 1.55), and 0.77 (CI: 0.38, 1.54). FRs for histories of physician-diagnosed depression, anxiety, or both depression and anxiety were 0.64 (CI: 0.40, 1.03), 0.87 (CI: 0.57, 1.31), and 0.79 (CI: 0.48, 1.29). FRs for current and former use of psychotropic medication, relative to never use of medications, were 1.27 (CI: 0.78, 2.07) and 1.67 (CI: 1.07, 2.61), respectively. Depression and anxiety were associated with delayed conception, independent of psychotropic medication use. Psychotropic medication use did not appear to harm fertility.

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USING MACHINE LEARNING METHODS TO PREDICT SUICIDE ATTEMPTS IN VETERANS HEALTH ADMINISTRATION PATIENTS. Jaimie L. Gradus*, Sarah Leatherman,, Matthew King, Isaac Galatzer-Levy, Ryan E. Ferguson, Matthew Miller(VA Boston Healthcare System/Boston University)

Suicidal behavior among Veterans is a significant public health problem. To date, most analyses of risk factors for suicidal behavior in this population have relied on null hypothesis testing of bivariate associations. Given the multi-causal nature of suicide, we know that this methodology does not mirror the etiology of suicidal behavior or presentation in clinical practice. Machine learning methods (e.g., random forest analyses) allow for the modeling of predictors simultaneously, with the ultimate goal of risk associated with varying probabilities of an outcome. This nested case-control study used machine learning to predict suicide attempts in a Massachusetts Veterans Health Administration (VHA) patients from 2000-2008. Cases were 307 VHA patients who made a suicide attempt in these years. Controls were selected randomly from the population of Massachusetts VHA users who had not made a suicide attempt in this time frame, with 5 controls selected for each case (n = 1,535). Predictors included: depression, substance abuse and dependence, anxiety disorder and posttraumatic stress disorder diagnoses, demographics, period of military service and antidepressant use. The classification tree resulted in 11 combinations of characteristics with varying probability of suicide attempt. The profile most likely to be associated with suicide attempt (172 participants; 67.4% of whom made a suicide attempt) was patients with depression, PTSD and alcohol dependence diagnoses. The profile that was the second most predictive of suicide attempt (57 participants; 56.1% of whom made a suicide attempt) was patients without depression, but with alcohol use/abuse and PTSD diagnoses and were 49 or younger. Additional characteristic profiles and their associated probabilities with suicide attempt will be presented. Applicability of these findings to other samples will also be discussed.

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INTERACTIVE RELATIONS OF MOOD DISORDERS AND SUBSTANCE USE TO FOOD INSECURITY IN BRITISH COLUMBIA. Karen M Davison*, Clifford Holloway (University of British Columbia, School of Nursing)

Many epidemiological studies have shown independent links between psychiatric morbidity and food insecurity, however, the interactive effects of mental health conditions and substance use to food insecurity have not been examined. Using bootstrapped data from the Canadian Community Health Survey Cycle 4.1 (2007-2008) (n=13,450), we investigated interactions between mood disorders (self-reported; 9.5%) and substance use (lifetime cannabis {56.2%}, cocaine or crack {23.8%}, speed {12.4%}, ecstacy {14.1%}, and hallucinogen {21.8%} use) to food insecurity in individuals 12 years and older residing in British Columbia. Food insecurity was measured using The Household Food Security Survey Module and categorized as food secure (92.7%) versus food insecure (7.3%; moderate and severe food insecurity status combined). Covariates included sex (49.3% males; 50.7% females), age (males 47.4 ± 10.0; females 49.4 ± 20.2), relationship status (single {53.3%} versus in a relationship {46.7%}), education (secondary {81.1%} or non-secondary school {18.9%} graduate), income (adequate {91.4%} and low income {8.6%} based on government standards), and the interactive terms of sex, age, and income by each indicated substance. Based on logistic regression analysis where food insecurity was the outcome and models for each substance used were investigated, significant interactions were found for mood disorder with lifetime cannabis, ecstacy, and hallucinogen use (p's ranged from 0.022 to 0.043). In addition, there was interaction of income by lifetime ecstacy use (p = 0.006). These findings provide evidence that interactions between mood disorders and lifetime substance use partially explain food insecurity and have implications for understanding the relationships between food access and mental health issues. Further research is needed to explain the disparity of food insecurity in populations with psychiatric morbidity and lifetime substance use in order to guide corrective actions.

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SYMPTOMS OF PTSD AND DEPRESSION IN SUICIDAL RUMINATION, CONTEMPLATION, AND PLANS IN A SAMPLE US SOLDIERS. Richard K. Herrell*, Charles W. Hoge (Walter Reed Army Institute of Research, Silver Spring, MD)

We examined the DSM-IV symptom criteria for PTSD (measured with the PTSD Checklist) and depression (measured with the Patient Health Questionaire-9) and suicidality in a sample of US Soldiers recruited by the Walter Reed Army Institute of Research. Suicidality was assessed asking about rumination about death, seriously considering suicide, and having planned suicide during the last month, as well as lifetime attempt. Surveys of a brigade combat team were conducted at 3 months (n=2876) and again at 16 months (n=1670) after return from Afghanistan. The team was due to redeploy soon after the second survey. Because of turnover, Soldiers who had and had not deployed were present in both surveys (9% at 3 months; 39% at 16 months). Rumination and considered-or-planned suicide were regressed on 3 PTSD criteria (B, C, and D) and 8 depression criteria (excluding self-harm) in relative prevalence (RP) models. At 3 months, PTSD criterion B (re-experiencing) (RP=1.5, CI=1.3-1.7), criterion C (numbing) (RP=1.2, CI=1.1-1.3), criterion D (RP=1.3, CI=1.1-1.4), and guilt (RP=1.2, CI=1.1-1.4) predicted rumination. Similar estimates PTSD were found at 16 months; depressed mood also predicted rumination (RP=1.3, CI=1.1-1.6). At 3 months re-experiencing (RP=2.3, CI=1.6-3.4), numbing (RP=2.4, CI=1.7-3.5), depressed mood (RP=5.5, CI=3.8-7.8), and guilt (RP=1.5, CI=1.2-1.8) predicted contemplating or planning suicide. At 16 months only numbing (RP=5.0, CI=2.6-9.3) and guilt (RP=2.6, CI=1.8-3.7) predicted considering or planning suicide. Lifetime attempt and combat intensity predicted suicidality, but did not confound or modify the associations of primary interest. These results suggest a distinctive pattern of symptoms in Soldiers during the recent wars, especially among those who have deployed and facing upcoming deployment, and reasons for caution against relying on measures of caseness alone when examining suicidality among Soldiers.

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THE ASSOCIATION BETWEEN SWEETENED BEVERAGE CONSUMPTION AND DEPRESSIVE SYMPTOMS AMONG ADOLESCENTS LIVING IN BOSTON, MASSACHUSETTS. Roman Pabayo*, Erin C. Dunn, Beth E. Molnar (University of Nevada, Reno)

Purpose: Adolescents who suffer from depressive symptoms are more likely to smoke, consume alcohol, be physically inactive, and have inadequate sleep. Increased sugar intake has been identified as a risk factor for depression. Although previous work has identified the association between sweetened beverage, i.e. soda or fruit juice, consumption and depression among adults, studies conducted among adolescents are needed. **Methods:** Socio-demographic data were collected from a cross-sectional study of 1,878 adolescents participating in the 2008 Boston Youth Survey. Adolescents were asked how often they drank soda and fruit juice in the past 7 days. Depressive symptoms were measures using a brief adapted version of the Modified Depression scale. Summation scores were standardized using the Z-transformation. We used multilevel linear regression models to estimate the association between soda and fruit juice consumption and depressive symptoms. **Results:** After adjusting for sex, age, race, nativity, and neighborhood economic deprivation, in comparison to those who never drank soda in the past 7 days, those who consumed soda 2-6 times a week (β=0.18, 95% CI=0.04, 0.32), or 1 or more times a day (β=0.29, 95% CI=0.13,0.45) had significantly higher depressive symptoms. Similarly, when fruit juice was tested as the exposure of interest, those who consumed fruit juice 2 to 6 times per week (β=0.14, 95% CI=0.00, 0.28) and those who consumed 1 or more a day (β=0.22, 95% CI=0.04,0.40) had significantly higher depressive symptoms, in comparison to those who never drank fruit juice. **Conclusion:** Frequent consumption of both soda and fruit juice consumption is associated with greater depressive symptoms among adolescents. Longitudinal studies are needed to evaluate whether sweetened beverage consumption is a cause or consequence of depressive symptoms. Key words: Soda and fruit juice consumption, depressive symptoms, and adolescents

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EATING ALONE AND DEPRESSION BY COHABITATION STATUS AMONG OLDER WOMEN AND MEN: THE JAGES LONGITUDINAL SURVEY. Yukako Tani*, Yuri Sasaki, Maho Haseda, Katsunori Kondo, Naoki Kondo, JAGES group (Department of Health and Social Behavior, School of Public Health, The University of Tokyo, Tokyo, Japan)

Background: Eating alone may be a risk factor for mental illness among older adults. It may operate differently by cohabitation status. **Objective:** To examine the associations between eating alone and depression by cohabitation status (ie, living alone or living with others) among older adults in Japan. **Methods:** We used longitudinal data from the Japan Gerontological Evaluation Study (JAGES) and analyzed 17,809 men and 19,923 women aged ≥65 years with no depression (Geriatric Depression Scale (GDS) < 5) at baseline in 2010. Eating status was classified into 2 categories: eating with others and eating alone. Poison regression estimated the risk of depression onset in 2013 by the cohabitation status. **Results:** 3.3% of men and 5.4% of women who lived with others, 86% of men and 79% of women who lived alone ate alone. Even adjusting for sociodemographic statuses, social support, social participation, working status, and frequency of meet friends, among men who lived alone, the adjusted rate ratio (ARR) for depression onset for those who ate alone was 2.24 (95% CI: 1.13-4.46) compared with those who ate with others, while the ARR was 1.09 (95% CI: 0.87-1.37) among men living with others (p for interaction = 0.02). Among women who lived alone, the ARR for depression for those who ate alone was 1.24 (95%CI: 0.95–1.63) compared with those who ate with others, whereas the ARR was 1.28 (95% CI: 1.09-1.51) among women living with others.**Conclusion:** Among men, the effect of eating alone on depression may be strengthen by living alone, whereas among women the effect of eating alone may be stronger, if they live with others. This gender differences may reflect the differences in gender roles in the community and household related to eating and preparing meals, which warrants further study.

930-S/P

MENTAL HEALTH RELATED EMERGENCY DEPARTMENT VISITS IN IMMEDIATE AFTERMATH OF HURRICANE SANDY IN NEW YORK STATE. Srishti Shrestha*, Seema Nayak, Cristian Pantea, Shao Lin (Bureau of Environmental and Occupational Epidemiology, New York State Department of Health)

Hurricane Sandy (Sandy) made landfall in New York State (NYS) on October 29, 2012 greatly impacting the health of populations in New York City (NYC) and surrounding areas. There are limited studies that quantify health impacts of Sandy especially mental health (MH) impacts. Therefore in this study, we assessed patterns of MH related emergency department (ED) visits among residents of seven Sandy-affected NYS counties. ED data was obtained from Statewide Planning and Research Cooperative System, a legislatively mandated database covering 95% of NYS hospitals. We assessed MH outcomes including anxiety, mood and adjustment disorders, psychosis, and substance abuse among residents in affected counties during the 13-day Sandy incident period (October 28 – November 9, 2012) using two comparison groups: 1) ED visits during Sandy (2012) versus previous years (2005-2011) and 2) ED visits among residents in storm zones versus non-storm zones. ED visits were geocoded and assigned exposure (storm zone vs. not). We fitted negative binomial regression models using generalized estimating equations to assess impact of Sandy daily ED visits adjusting for day of week and year, and population as an offset. We detected significant increase in ED visits due to anxiety in storm zones in the 13-day Sandy period compared to previous years (Prevalence Ratio (PR) = 1.30, 95% CI =1.07, 1.57), but did not detect increase in non-storm zones (PR = 1.07, 95% CI = 0.94, 1.22), indicating 21% greater increase in visits in storm zones as compared to non-storm zones. In stratified analysis, anxiety visits in storm zones compared to previous years were higher among those aged 64 years and older (PR = 2.09, 95% CI = 1.14, 3.84). Increase in anxiety visits in storm zones compared to previous years was significant among females only (PR = 1.42, 95% CI = 1.13, 1.79). There was no significant increase in other MH categories. Assessment of the long-term effect of Sandy on mental health is underway.

931-S/P

THE GERIATRIC DEPRESSION SCALE (GDS-15) AND INTERPERSONAL RELATIONSHIP WITH SURROUNDINGS AMONG OLDER ADULTS AT THE COMMUNITY LEVEL IN JAPAN – JAPAN GERONTOLOGICAL EVALUATION STUDY (JAGES). Yuri Sasaki*, Yasuhiro Miyaguni, Yukako Tani, Yuiko Nagamine, Hiroyuki Hikichi, Tami Saito, Naoki Kondo, Kazuhiro Kakimoto, Katsunori Kondo, the JAGES group (Chiba University)

Background & Objective: Some studies previously reported the association between depression and interpersonal relationship at individual level. However, few studies focused on the association at community level for the community diagnosis of community preventive approach. We examined the association at the community level among older adults in Japan. **Method:** We used cross-sectional data from JAGES in 2013, which targeted residents with aged 65 years or over (n=127, 041) in 29 municipalities. We aggregated individual data at individual level to community level. Multiple regression analysis was used. Population density, equivalent income, working condition, daylight hours, and education level at community level were adjusted, and age (65-74 years and 75 years and over) and sex were stratified. Self-rated depression was measured by using the geriatric depression scale (GDS-15) and interpersonal relationship, by the question whether someone listens to their concerns and complaints (receiving support) or not. **Result:** The prevalence of depression ranged from 21.5% to 36.2% among 29 municipalities. The depression was associated with receiving support from spouse (β=-. 74, p<0.001) and child living separately (β=-. 40, p<0.01) among men, and spouse (β=-. 76, p<0.001) among women aged 65-74; friend (β=-. 38, p<0.05) among men, and spouse (β=-. 42, p<0.01) and friend (β=-. 76, p<0.001) among women aged 75 years and over. **Discussion:** The association between depression and interpersonal relationship was differed by sexes and age groups at the community level, and friends as well as spouse seem important among the old age group (75 years and over) both men and women. Municipalities should consider the structures of target populations to design the community-based interventions such as the creation of 'salons' (or community centers). The utilization of human resources such as friends available to older adults in a community could be a good strategy for preventing depression.

932-S/P

STRESS AS A MEDIATOR IN THE NEIGHBORHOOD DEPRIVATION-DEPRESSION ASSOCIATION: A TWIN STUDY. Hannah Cohen-Cline*, Glen Duncan (Department of Epidemiology, University of Washington)

Residents of socially and materially deprived areas are generally considered at greater isk for depression than residents of less deprived areas. Further, sex can differentially influence access to resources and social interactions, regardless of level of neighborhood deprivation. This study examined the association between neighborhood deprivation and self-reported depression in women, and assessed the potential for mediation of this association by stress. The study employed a cross-sectional, multi-level random intercept model among female twin pairs (2826 individuals) from a community-based twin registry. Using twins allowed for control of shared childhood environment and genetic factors. Product-of-coefficient methods with bootstrapped confidence intervals were used to assess mediation. Analyses were conducted in the overall sample and stratified by zygosity, with and without adjustment for individual-level education and physical activity. For both twin pairs overall and monozygotic twin pairs separately, there was no association between neighborhood deprivation and depression. However, within dizygotic twin pairs, greater levels of neighborhood deprivation were associated with greater risk of depression (RD: 0.21; 95% CI: 0.03-0.39). Further, this observed association was mediated by stress (indirect effect: 0.13; 95% CI: 0.06-0.22), with stress accounting for 62% of the effect of neighborhood deprivation on depression. Our results suggest that stress is an important factor in linking neighborhood deprivation to depression. Further, genetic factors play an important role in facilitating this association. Future studies on this topic could strengthen causal inference by using longitudinal twin designs.

933-S/P

A LONGITUDINAL STUDY OF THE BIDIRECTIONAL RELATIONSHIP BETWEEN SOCIAL SUPPORT AND POSTTRAUMATIC STRESS SYMPTOMS FOLLOWING A NATURAL DISASTER. Jonathan Platt*, Sarah Lowe, Sandro Galea, Karestan Koenen (Columbia University Department of Epidemiology)

Background There is evidence that the relationship between social support and mental health in the aftermath of disasters is a product of social causation, wherein social support predicts psychiatric disorders, and social selection, where psychiatric disorders predict levels of social support. Few studies have examined these processes concurrently, nor investigated their durability using longitudinal data. The present study examined the longitudinal and bidirectional relationships between social support and posttraumatic stress (PTS) in a post-disaster context. **Methods** Data were taken from the Galveston Bay Recovery Study sample of 658 primarily non-Hispanic Black adults, enrolled 2-6 months after Hurricane Ike, and re-interviewed at 5-9 and 14-19 months. The Inventory of Post-disaster Social Support captured perceived emotional, informational, and tangible support. PTS was assessed using the PTSD Checklist-Specific Stressor Version. All measures were self-reported. Longitudinal, cross-lagged panel models were computed using Mplus version 7. **Results** Model estimates were statistically significant for the path from Wave 1 emotional support and Wave 2 PTS (-0.107; p=0.012), from Wave 1 PTS to Wave 2 emotional support (-0.098; p=0.043) and from Wave 1 tangible support to Wave 2 PTS (-0.087; p=0.028). All estimates between Waves 2 and 3 were non-significant. **Discussion** Causation and selection mechanisms were identified. Wave 1 tangible and emotional support were both negatively associated with Wave 2 PTS symptoms, consistent with social causation. Also, an increase in Wave 1 PTS symptoms was significantly associated with a decrease in perceived emotional support at Wave 2, consistent with social selection. Further, social support and PTS were no longer statistically associated at Wave 3, suggesting that the association diminishes over time. A greater understanding of social networks and PTS holds promise for improving mental health care in an immediate post-disaster context.

934-S/P

ASSOCIATIONS BETWEEN SOCIOECONOMIC STATUS AND PREVALENCE OF AUTISM SPECTRUM DISORDER IN THE UNITED STATES. Lam Tran* (University of Pennsylvania)

This study was to explore the associations between socioeconomic status (SES) indicators, specifically income and education, with the prevalence of autism spectrum disorder (ASD) in groups stratified by race. State-level autism spectrum disorder prevalence was derived from the 2003, 2007, and 2011/2012 surveys of the National Survey of Children's Health. Data were cross-tabulated in SPSS by socioeconomic status indicator and race. Pearson $\chi 2$ tests were used to evaluate the SES-ASD associations and the variation of these associations with respect to race. Mantel-Haenszel linear-by-linear association tests were utilized to assess the linear relationship between ASD prevalence and ordinal-scale socioeconomic status of racial groups. Pearson $\chi 2$ tests were also used to determine whether ASD/race associations varied by nominal-scale socioeconomic status. Results were mixed for the associations between ASD prevalence and both socioeconomic indicators. Using income as an indicator, the two statistical tests returned significant results for Hispanics in the 2003 NSCH, and negative associations for non-Hispanic blacks in the 2007 NSCH and non-Hispanic whites in the 2007 and 2011-12 NSCHs. There was no statistical difference among the races in ASD prevalence in the highest income band across survey years. Using education as an SES indicator, the statistical tests returned negative associations for Hispanics in the 2003 and 2007 NSCHs, positive associations for blacks in the 2007 NSCH, and positive associations for whites in the 2011-12 NSCH. The association between ASD and educational attainment for all races was statistically significant only in the 2003 NSCH.The associations between ASD prevalence and SES were found to be statistically significant in only some SES categories and race groups. There was the possibility of ascertainment bias differences across socioeconomic groups in access to services for children with ASD but a definite conclusion could not be reached.

935-S/P

A MULTILEVEL INTERACTION ANALYSIS OF SERVICE NEED FOLLOWING HURRICANE SANDY IN A REPRESENTATIVE SAMPLE OF SURVIVORS. Laura Sampson*, Sarah R. Lowe, Oliver Gruebner, Sandro Galea (Boston University School of Public Health, Department of Epidemiology)

Hurricane Sandy struck the New York Metropolitan area in 2012, resulting in over 100 deaths and over $50 billion in damages. Although there is a large body of research on the mental health effects of natural disasters, there have been few studies to date on the effects of Hurricane Sandy specifically. This study aimed to explore relationships between community-level damage and individual-level exposure to hurricane-related stressors on Sandy survivors' perceived mental health needs. We sampled 418 adults in 2013 who lived in the most affected areas of New York City at the time of the storm, based on the Operational Inundation Area identified by the Federal Emergency Management Agency (FEMA). We matched each individual to a census tract (n=293 tracts) using their address, and gathered community (census tract) level demographic data through the U.S. Census and the number of damaged buildings in each tract from the FEMA Modeling Task Force. Based on a telephone survey, about 8% of participants reported that they felt any need for counseling or treatment for their emotions, nerves or mental health since the hurricane. We used a multilevel binomial logistic regression to model individual responses to this question and found a cross-level interaction ($p = 0.035$) between individual stressor count and the number of damaged buildings in the individual's census tract, when controlling for sex, employment status, posttraumatic stress and depression scores, and total population in the census tract. In areas of higher damage (at least one damaged building per tract), individual stressors mattered more (OR: 2.11, 95% CI: 1.24-3.59) when predicting individual services needs compared to tracts with no damaged buildings (OR: 1.94, 95% CI: 0.56-6.66). We conclude that individuals' perception of their well being is affected by the combination of damage in their surrounding neighborhood and their own experience of stress, potentially through stigma.

936-S/P

EARLY CHILDHOOD HEIGHT GROWTH AND LIFETIME MAJOR DEPRESSIVE DISORDER. Mary Kilty*, Ezra Susser, Mary Beth Terry, Ying Wei, Jill Goldstein, Pam Factor-Litvak(Department of Epidemiology, Mailman School of Public Health, Columbia University)

Background. Childhood height has been suggested as a marker of postnatal child development. Early childhood height and height growth have been positively associated with cognitive function across the life course. Whether height and height growth are related to psychiatric outcomes over the life course is unknown. We hypothesized that early childhood height growth would be inversely associated with lifetime major depressive disorder (lifetime MDD) in adults. We tested this hypothesis with data from the Early Determinants of Adult Health (EDAH), a follow up study of two birth cohorts, the Child Health and Development Studies (CHDS) and the New England Family Study (NEFS). **Methodology.** We measured height growth as height percentile change (HPC) over specific growth periods. Lifetime MDD was assessed at a mean age 44 years using modules from the Structured Clinical Interview for Diagnoses (DSM-IV version). We analyzed associations between HPC and lifetime MDD in three growth periods: birth to 4 months, 4 months to 1 year, and 1 to 4 years. Cohorts were analyzed separately (i.e. CHDS and NEFS). Mixed models were used to account for inter-sibling correlations. The CHDS sample had 149 to 167 subjects, depending on the age period. The NEFS sample had 204 to 228 subjects. **Results.** We found no associations between HPC and lifetime MDD in the analyses. In the CHDS, the ORs for lifetime MDD given a 10 point increase in HPC for the three periods were: 0.98 (95% CI 0.82, 1.17) for birth to 4 months, 1.00 (95% CI 0.79, 1.26) for 4 months to 1 year, 0.99 (95% CI 0.81, 1.20) for 1 to 4 years. In the NEFS, the ORs for lifetime MDD given a 10 point increase in HPC for the three periods were: 0.97 (95% CI 0.86, 1.09) for birth to 4 months, 0.96 (95%CI 0.82, 1.12) for 4 months to 1 year, and 0.94 (95% CI 0.80, 1.10) for 1 to 4 years. **Conclusions.** These results provide no meaningful evidence that early childhood height growth is associated with lifetime MDD.

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APPLYING A STRUCTURAL NESTED ACCELERATED FAILURE TIME MODEL FOR THE EFFECT OF EXPOSURE ON TIME TO TERMINATION OF EMPLOYMENT: ASSESSING HEALTHY WORKER SURVIVOR BIAS IN THE DIESEL EXHAUST IN MINERS STUDY. Andreas M Neophytou*, Sally Picciotto, Sadie Costello, Ellen A Eisen (Division of Environmental Health Sciences, UC Berkeley School of Public Health)

Systematic underestimation of the effects of cumulative occupational exposure on health can arise when less healthy workers terminate employment earlier, accumulate less exposure, and yet remain at greater risk of the health outcome. If the exposure of interest also affects termination of employment, then the bias cannot be adequately addressed using conventional methods. The possible presence of healthy worker survivor bias was examined in the Diesel Exhaust in Miners Study (DEMS) to assess whether previous reports may have underestimated risk. We applied g-estimation of a structural nested accelerated failure time model to assess the effect of exposures to diesel exhaust (DE) on time to termination of employment in the sub-cohort of non-metal miners working underground in DEMS. An accelerated failure time model is particularly suitable to assess the relationship between occupational exposures and time to termination of employment. It avoids potential limitations of hazard ratios due to differential selection of more susceptible workers leaving the workforce. The accelerated failure time model also provides a direct measure of the effect on time to event - a relevant metric given that the termination is inevitable for all subjects with long enough follow-up. Using a counterfactual framework, we compared the median time to termination if always exposed above 25 μg/m3 respirable elemental carbon (surrogate for DE) to that if always exposed below. Results indicate that median time to termination was 26% shorter (95% CI: 21% – 31%) when miners were always exposed above 25 μg/m3. Methods to address time-varying confounding by work status are advised in order to potentially have more accurate effect estimates of DE exposure on health outcomes in DEMS.

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VALIDATE STUDIES AS WELL AS INSTRUMENTS TO IMPROVE RESEARCH QUALITY. C Mary Schooling* (School of Urban Public Health at Hunter College and City University of New York School of Public Health, Li Ka Shing Faculty of Medicine, The University of Hong Kong)

Validated instruments for measuring items, ranging from cytokines to mental health, are an indispensable part of biomedical research. Here we suggest extending the concept of validating instruments to validating observational study associations. Assessment of new potentially causal associations in observational studies could be validated by checking that relevant associations for the same exposure match known causal effects. For example, an observational study that did not show the expected causal effect of milk on blood pressure would not be a good basis for causal inference about the effect of milk on cardiovascular disease. More generally observational studies could be rated according to the concordance of their reported associations with known causal effects, and correspondingly prioritized for use in investigations of new potentially causal effects.

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DOES IT LOOK LIKE A SEQUENTIALLY RANDOMIZED TRIAL? COVARIATE BALANCE IN STUDIES OF TIME-VARYING AND OTHER JOINT-EXPOSURES. John W. Jackson* (Harvard School of Public Health, Department of Epidemiology)

Epidemiology often involves analyzing exposures that vary over time, and in recent years methods have been developed for situations when common causes of time-varying exposures and outcomes are affected by prior exposure (i.e. time-dependent confounding). Yet few diagnostics are available to assess the degree of confounding by such time-dependent risk factors in traditional analyses that improperly adjust for such factors, or to demonstrate how well g-methods such as marginal structural models or the longitudinal g-formula address such confounding by emulating a sequentially randomized trial. These complex methods involve several layers of parametric decision-making with consequences not readily apparent to research consumers. We extend approaches for evaluating covariate balance to the setting of time-varying exposures that naturally encompass other joint effects, including mediation and interaction. Balance measures appropriate for longitudinal data are explicitly cast in terms of the assumptions needed to draw causal inference using counterfactual statements and directed acyclic graphs. Intuitive covariate balance plots are then developed to diagnose (a) whether time-varying risk factors are imbalanced across time-varying exposures in crude data (b) whether time-varying risk factors are affected by prior exposures (c) whether time-varying risk factors are balanced after implementing inverse probability weighting or stratification upon longitudinal propensity scores. Using simulated data, we will explore how the conceptual framework and tools developed herein can be used to diagnose these issues and evaluate the performance of modeling decisions. This work represents a novel and practical advance in providing tools for transparent reporting of potential confounding in longitudinal data, evaluating the consequences of parametric decisions and post-hoc adjustments, and demystifying the application of sophisticated methods to longitudinal data.

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MODELING ASBESTOSIS MORTALITY RISK USING ALTERNATIVE EXPOSURE METRICS. Larissa Pardo*, Leonid Kopylev, Thomas Bateson (American Schools and Programs of Public Health (ASPPH)/United States Environmental Protection Agency (USEPA))

Background: In Libby, MT, the mining of asbestos-contaminated vermiculite ore exposed workers and residents to asbestos fibers. The mine closed in 1990. Libby vermiculite was used in attic insulation and as a soil conditioner. USEPA recently completed its Toxicological Review of Libby Amphibole asbestos (LAA) including toxicity values for cancer and pleural thickening. The work described here evaluated risks of asbestosis mortality. **Methods:** The main analysis was based on 880 Libby workers hired when higher quality exposure data were available. Cox models were used to assess the effects of LAA on asbestosis mortality. Sensitivity analyses included four lags for asbestosis latency and multiple exposure metrics including cumulative exposure, residence-time weighted exposure, and metrics allowing for fiber clearance. Results were compared using AIC weights which assign probabilities of each model being the best fit. **Results:** Models that contained 15-year lags and allowed for simulated clearance of fibers over time were the best fitting for asbestosis mortality ($p<0.01$). Compared to cumulative exposure, this class of models had better fit: AIC weights showed a higher probability (1.5−1.8 times) of being the best fitting model, while the residence-time weighted exposure models did not fit well. In the full cohort, where early exposure measurement was of lower quality, there was a substantial attenuation of effects (2.9- and 4.2-fold lower) from the main estimates for cumulative exposure and fiber clearance metrics. **Conclusions:** The effect of exposure misclassification in the early data results in a clear bias of the effect toward the null. The adverse effects of LAA exposure on asbestosis mortality in this cohort are clear. Models that mathematically allow for fiber clearance over time provide superior fit to these asbestosis mortality data. Disclaimer: The views expressed in this abstract are those of the authors and do not represent USEPA opinions and/or policy.

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ESTIMATING THE SAMPLE AVERAGE TREATMENT EFFECT IN THE SEARCH TRIAL. Laura Balzer*, Maya Petersen, Mark van der Laan, The SEARCH Consortium (UC Berkeley - Biostatistics)

In many observational studies and randomized trials, the goal is to estimate the effect of an exposure on the outcome of interest. Often, the causal parameter is the population average treatment effect: the expected difference in the counterfactual outcomes if all members of some population were exposed and if all members of that population were unexposed. Less consideration has been given to the sample effect: the average difference in the counterfactual outcomes for the study units. The sample parameter is easily interpretable and arguably the most relevant when the study units are not representative of a target population or when intervention effect is expected to be heterogeneous. Formally, the sample parameter is not identifiable from observed data distribution. Nonetheless, targeted maximum likelihood estimation (TMLE) can provide an unbiased and efficient estimate of both the population and sample parameters. In most settings, however, the sample parameter can be estimated with more precision and power than the population parameter. As a motivating example, we discuss the Sustainable East Africa Research in Community Health (SEARCH) study, an ongoing cluster randomized trial for HIV prevention and treatment, and also provide finite sample simulations.

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DATA-ADAPTIVE ADJUSTMENT IN THE SEARCH TRIAL. Laura Balzer*, Maya Petersen, Mark van der Laan, The SEARCH Consortium(UC Berkeley - Biostatistics)

In randomized trials, the average difference in outcomes among treated and control units provides an unbiased but inefficient estimate of the intervention effect. Adjustment for measured covariates during the analysis can yield more precision and more power. Specifically, we could first fit a regression model for the outcome as a function the exposure and covariates; then use this regression model to obtain the predicted outcomes for each unit under the intervention and control, and finally estimate the intervention effect with the average difference in the predicted outcomes. There is no risk of bias due to regression model misspecification. However, when faced with few independent units, as is common in cluster randomized trials, we are limited to the number of terms included in the regression model. Adjusting for too many covariates can result in over-fitting. The analysis plan must be a priori specified, but often it is unclear which baseline covariates to include or exclude. Consider, for example, the SEARCH trial for HIV prevention and treatment. There are 16 matched pairs of communities and many potential adjustment variables including region, HIV prevalence, male circumcision prevalence and measures of community-level viral load. To choose the optimal adjustment variable, we propose using cross-validation to select from a family of a priori specified regressions, each including an intercept and main terms for the exposure and one baseline covariate. For inference, we propose using a cross-validated estimate of the influence curve. Our finite sample simulations support the promise of this methodology to select the adjustment variable that yields the most power, while maintaining nominal (if not conservative) confidence interval coverage.

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GRAPHIC REPORT OF THE RESULTS FROM PROPENSITY SCORE METHOD ANALYSES. Ian Shrier*, Menglan Pang, Robert W. Platt (Department of Epidemiology, Biostatistics and Occupational Health, McGill University)

The propensity score is considered as a summary score of a set of covariates, and therefore can be used to control for confounding in observational studies. Because extreme propensity scores may lead to bias and decrease the precision of the estimated exposure effect, some recommend trimming the study population for the analysis based on the estimated propensity score distribution. However, trimming changes the population under study and the effect of such trimming is not always reported. Further, most investigators report one effect estimate after adjusting for propensity score differences without exploring heterogeneity of effect across propensity scores. We propose specific graphical displays to provide greater transparency and help readers understand how to best interpret the data. We use a pharmacopidemiological study: statins and the 1-year of all-cause mortality post-myocardial infarction, to demonstrate our graphical analyses. To demonstrate the effect of trimming, we explore several propensity score models that included different number of covariates, and superimpose graphs with text that is usually provided in the manuscript text. To describe heterogeneity, we use a forest plot commonly shown in meta-analysis to display the stratum-specific results, and calculate heterogeneity using tau-squared, the Q-statistic and I-squared to provide guidance as to whether one should summarize the data as a single estimate. The study shows that graphical techniques can present additional and useful information in data analysis based on propensity scores. Furthermore, they can be used to detect problems in estimating the propensity score and the final analysis, thus help in decision making during the analysis process.

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EVALUATION OF A METHODOLOGY TO VALIDATE NATIONAL DEATH INDEX RETRIEVAL RESULTS. Nancy A. Skopp*, Daniel Schwesinger, Derek Smolenski, Christopher Johnson, Melinda Metzger-Abamukong, Mark A. Reger (National Center for Telehealth & Technology)

Accurate determination of vital status is challenging and time intensive, particularly when vital status data resides in multiple administrative data bases. For US Service members, the Armed Forces Medical Examiner System (AFMES) captures all deaths as well as the causes of death. After discharge, however, there is no direct link between non-military vital status records and military enterprise data. Thus, a secondary vital status data source is required. The Centers for Disease Control's National Death Index (CDC-NDI) is such a data source, specifically developed to aid mortality ascertainment. The NDI is a valuable epidemiological tool and arguably the gold standard. Nonetheless, there are still challenges. It is not uncommon for originating data sources to be incomplete or contain inaccurate identifying information. To the extent that critical data items are missing/incorrect, death ascertainment is limited. To address this gap, the National Program of Cancer Registries (NPCR) developed an algorithm to aid death validation. NPCR algorithm can be modified to the characteristics of other populations. Thus far, there is no published research on the utility of the NPCR algorithm. We adapted and applied the NPCR algorithm to NDI vital status matching results in a cohort of nearly 4 million. We examined the sensitivity of the NDI to AFMES records among cohort members who could have been in both sources at the time of death. Sensitivity for the active duty subpopulation that died in the U.S. was 97.1%, and overall agreement on suicide as the manner of death between AFMES and the NDI was 98.2% ($\kappa = .94$, $p < .001$).

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MENDELIAN RANDOMIZATION ANALYSIS: CURRENT VIEWS AND A WAY FORWARD. Shiu Lun Au Yeun*, Mary Beth Terry, C Mary Schooling (School of Public Health, Li Ka Shing Faculty of Medicine, the University of Hong Kong)

Causal inferences is one of the main objectives of public health research. Failure to differentiate whether an exposure is causal or a risk marker will have unintended detrimental effect on population health. Observational studies have remained the main tool epidemiologists use to identify causes of diseases but are susceptible to confounding and bias whereas randomized controlled trials are not always feasible. Alternatively, Mendelian randomization analyses, i.e. instrumental variable analyses using genetic instruments, have been contributing to a better understanding of disease etiology such as the non causal role of C-reactive protein and HDL cholesterol in cardiovascular diseases. However, concerns have been raised concerning the potential bias related to this method. This paper summarizes the current views of Mendelian randomization, including its origin starting from Katan and the potential bias due to violation of exclusion restriction assumptions. We have proposed a new way to calibrate the Mendelain randomization estimate by calibrating the association of instrument and exposure using external knowledge from randomized controlled trials, similar to the separate sample instrumental variable analysis. We also urged for the implementation of relevant guidelines to standardize reporting and hence quality control. By providing a more up to date account of Mendelian randomization, researchers can be encouraged to use this method to help improve identification of causes of diseases, provided that the relevant assumptions of the method have been taken into account for.

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THE SOUTH CAROLINA CEREBRAL PALSY PROJECT. Qing Li*, Roger Newman, Nigel Paneth, Heather Kirby, John E. Vena, Stephen Kinsman, Russell S. Kirby (Medical University of South Carolina, Departments of Obstetrics & Gynecology and Public Health Sciences)

Cerebral Palsy (CP) is a relatively common and severe motor disability in which genetics, pregnancy and perinatal events play a role, and there is a suggestion of a higher prevalence in the US. A CP prevalence of 3.1 to 3.6 per 1,000 8-year old children was recently found by the CDC in Alabama, Georgia, Wisconsin and Missouri, figures much higher than the rate of 1.5 – 2 per 1,000 live births found in several European registries and older data from California. We attempted to ascertain all cases of CP diagnosed in South Carolina from 1996 to 2013. We identified 2,641 children up to age 4 years with a CP diagnosis by searching linked records from the Department of Disabilities and Special Needs (DDSN 429 cases), Hospital Discharge Files (805 cases), and Medicaid files (2,510 cases) using the International Classification of Diseases, Ninth Revision, Clinical Modification codes 343.0 - 343.9. DDSN serves any South Carolinian meeting the disability requirements, while a CP diagnosis qualifies a child for the Supplemental Security Income Program and the child is then eligible for the Medicaid program. The prevalence of CP was 2.7/1,000 live births. Among twins, CP prevalence was 6.0/1,000 births. Birth prior to 32 weeks was found in 28.1% (695) of 2,475 singletons and in 65.1% (69) of 106 twins. Birth below 1,500 g was found in 25.9% (641) of singletons and 67.0% (71) of twins. This study joins recent CDC research in finding a CP prevalence in the US above 2.5/1,000. CP prevalence may vary due to the sampling framework, case inclusion criteria or timing, exclusion of deaths and migrants, clinical practice, or new case ascertainment in the Medicaid data used for the first time in South Carolina.

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SERIAL ASSESSMENTS OF CERVICAL FUNNELING AND THE RISK OF PRETERM BIRTH AMONG WOMEN WITH A PRIOR PRETERM BIRTH. Qing Li*, Roger Newman, Scott A. Sullivan, Eugene Chang, Keith Willan (Medical University of South Carolina, Departments of Obstetrics & Gynecology and Public Health Sciences)

Objective: To evaluate whether cervical funneling detected during serial trans-vaginal ultrasonography in the second trimester is associated with the increased risk of preterm birth (PTB) among women with a prior PTB. **Study Design:** We performed a secondary analysis of a multi-center prospective cohort study (Preterm Prediction Study) of the NICHD Maternal-Fetal Medicine Units Network. We included 236 African American and White mothers with at least one prior spontaneous PTB < 37 weeks. Cervical length and funneling were assessed at 22-24 and 26-29 weeks' gestation. Controlling for maternal age, race, and insurance status, we estimate the adjusted relative risk (aRR) and confidence intervals (CI) for cervical funneling and PTB < 37 weeks' gestation in multivariate analyses. **Results:** PTB rate was 24.6% among this cohort of women with a prior PTB. Forty seven (19%) had funneling either one or both visits and delivered earlier than 189 women without funneling at either visit (36.9±3.4 vs 38.2±2.3 weeks; P=0.01). The progression from absent to present funneling at the second assessment was associated with earlier delivery (-1.2 weeks; CI: -2.3 to -0.1), while funneling at both assessments was associated with the earliest delivery (-1.8 weeks; CI: -3.4 to -0.2). When cervical lengths were more than 25 mm (n=205), the presence of funneling was associated with a significantly higher risk for PTB (45.2% vs 18.4%; aRR: 3.4; CI: 1.4-8.2). When cervical lengths were less than 25 mm (n=31), cervical funneling was not associated with an earlier gestational age at delivery compared to those without funneling (36.4±3.9 vs 36.5±3.2 weeks; P=0.94) or increased PTB (aRR: 2.2; CI: 0.4-12.3). **Conclusion:** Cervical funneling identified in the second-trimester was significantly associated with PTB and earlier gestational age at delivery among mothers with a cervical length>25 mm.

951-S/P

COMPARISON OF METHODS TO ADDRESS SURVIVAL BIAS ASSOCIATED WITH THE DIAGNOSIS OF DEPRESSION AND RISK OF MORTALITY USING A LARGE POPULARION-BASED COHORT. Isabelle Vallerand*, Jordan Engbers, Mark Lowerison, Samuel Wiebe, Gilaad Kaplan, Andrew Bulloch, Scott Patten (Faculty of Medicine, University of Calgary)

Background: Survival bias in cohort studies requires careful attention in defining risk periods. A previous study comparing methods to control survival bias recommended either a time-distribution matching approach or a time-dependent exposure method; however, few examples exist comparing these methods using a population-based dataset. Thus, we compared these methods in the context of a depression diagnosis and risk of mortality using The Health Improvement Network (THIN) database.**Methods:** THIN contains primary care electronic medical records for over 12 million patients and over 25 years of follow-up in some practices. In Method 1, patients without any codes for depression were randomly assigned an index date to match the distribution in the depression cohort. Patients were excluded if they had an outcome preceding their randomly assigned index date. In Method 2, depression acted as a time-dependent exposure. To compare these methods, we determined the number of excluded patients and conducted survival analyses using Cox proportional hazards models and time-dependent Cox models. **Results:** Method 1 resulted in 3,609,754 excluded patients without depression (48% of the referent group). Method 2 did not result in any exclusion. The risk of mortality associated with depression was similar across both methods, HR=1.52 (95%CI: 1.51-1.54) and HR=1.60 (95%CI: 1.58-1.62) respectively. The amount of precision observed in each risk estimate was also similar. **Conclusions:** While survival bias was controlled in both methods, we observed a substantial difference between the sample sizes retained for analysis. Method 2 preserved the entire population, which is advantageous for enabling finer stratification, maximizing statistical power, and maintaining population representation among covariates. Population-based studies with a large window of time at cohort entry and a high risk for outcome occurrence may benefit from using a time-dependent exposure method to control survival bias.

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ASSOCIATION BETWEEN VITAMIN D AND LEUKOCYTE TELOMERE LENGTH BY GENDER AND RACE. Jason J. Liu*(National Institutes of Health)

Background: Vitamin D has been associated with cancer risks and may play a role in the biology of telomeres, whose length has also been associated with cancer risks. Previous epidemiologic studies of vitamin D and telomere length found positive associations in analyses of exclusively or predominantly white women, but no study has evaluated this association across genders and races, even though potential mechanisms have been described for gender and racial differences in vitamin D activity. **Methods:** We examined the association between the vitamin D metabolite 25-hydroxyvitamin D [25(OH)D] and relative leukocyte telomere length in 711 women, 443 men, 651 whites, and 503 blacks from the United States Radiologic Technologists study. Plasma 25(OH)D level was measured by the chemiluminescence immunoassay. Relative leukocyte telomere length was measured by the quantitative polymerase chain reaction method. We used linear regression for tests of linear trend and multiplicative interaction, and unconditional logistic regression to obtain odds ratios and 95% confidence intervals by categories of 25(OH)D level. **Results:** We found no significant linear associations between 25(OH)D level and telomere length in all participants (P-trend=0.52), women (P-trend=0.59), men (P-trend=0.07), whites (P-trend=0.64), and blacks (P-trend=0.20). Vitamin D deficiency (defined as 25(OH)D level <30 nmol/L) was significantly associated with shorter telomere length among whites (P=0.02), but not blacks (P=0.97), women (P=0.64), or men (P=0.14). **Conclusions:** Our results suggest no significant linear associations between plasma 25(OH)D level and leukocyte telomere length by gender or race. However, vitamin D deficiency may influence telomere length more in whites than in blacks.

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THE ASSOCIATION BETWEEN HABITUAL COFFEE AND CAFFEINE CONSUMPTION, AND THE RISK OF HYPERTENSION. Jinnie J. Rhee*, FeiFei Qin, Haley K Hedlin, Wolfgang C. Winkelmayer (Stanford University School of Medicine, Department of Medicine, Division of Nephrology)

The relationship between chronic coffee and caffeine intake, and the risk of incident hypertension remains controversial, and data on the role of different types of coffee—caffeinated vs. decaffeinated—in hypertension are limited. We sought to assess longitudinal relations of caffeinated coffee, decaffeinated coffee, and caffeine intake with mean blood pressure and incident hypertension in postmenopausal women in the Women's Health Initiative Observation Study. Coffee and caffeine intake was assessed using self-reported questionnaires. Hypertension status was ascertained using both measured blood pressure and self-reported drug-treated hypertension. Using multivariate linear regression, we prospectively examined the relation between intakes of caffeinated coffee, decaffeinated coffee, and caffeine and measured systolic (SBP) and diastolic blood pressure (DBP) at annual visit 3 in 29,345 postmenopausal women. We used Cox proportional hazards models to calculate HRs and their 95% CIs for time to incident hypertension. During 110,910 person-years of follow-up, 5201 cases of incident hypertension were documented. Caffeinated coffee was not associated with mean SBP or DBP, but caffeine was associated with a small decrease in SBP (-0.5 mm Hg difference comparing the highest to lowest quintile, Ptrend=0.03). Compared with women who did not drink decaffeinated coffee, with a mean SBP of 120.2 mm Hg (95% CI, 119.9-120.4 mm Hg) and DBP of 71.5 mm Hg (95% CI, 71.4-71.7 mm Hg), those who drank ≥4 cups/day had a mean SBP of 119.8 (95% CI, 119.2-120.5) and DBP of 71.2 mm Hg [95% CI, 70.8-71.6 mm Hg (Ptrend =0.009)]. Intakes of caffeinated coffee, decaffeinated coffee, and caffeine were not associated with the risk of incident hypertension (all Ptrend >0.05). In summary, these findings indicate that it is unlikely that habitual consumption of caffeinated coffee, decaffeinated coffee, and caffeine is a major risk factor for hypertension in this prospective cohort.

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EATING DISORDERS, REPRODUCTIVE FACTORS, AND BREAST CANCER. Katie M O'Brien*, Denis R Whelan, Dale P. Sandler, Clarice R. Weinberg (Biostatistics Branch, National Institute of Environmental Health Sciences)

Background: Eating disorders such as anorexia nervosa and bulimia may affect reproductive endpoints and adult adiposity, which may, in turn, influence breast cancer risk. Objective: To explore the relationships between eating disorders, reproductive factors, adiposity, and breast cancer risk. **Methods**: The Sister Study in 2003-2009 enrolled 50,775 women, aged 35 to 77, who had a sister with breast cancer but had never been diagnosed with breast cancer themselves. We calculated odds ratios (ORs) and 95% confidence intervals (CIs) measuring associations between self-reported history of eating disorder between ages 9-22, demographic factors, and various health- or reproductive-related outcomes. Additionally, we used Cox proportional hazards models to estimate hazard ratios (HRs) and 95% CIs for the association between history of eating disorder and incident breast cancer. **Results:** Two percent (n=969) of participants reported having had an eating disorder between age 9 and 22. Women were more likely to report an eating disorder if they were born more recently (OR=1.08, 95% CI: 1.07-1.09 per year) or if they had a sister with an eating disorder (OR=3.59, 95% CI: 1.92-6.71). Women with a history of eating disorders were more likely to be white, have more educated parents, or be underweight in adulthood. They were also more likely to have a later age at first birth, to have experienced bleeding or nausea during pregnancy, to have experienced miscarriage or induced abortion, and to have breastfed. Eating disorder history was not related to breast cancer risk (HR=0.96, 95% CI: 0.68-1.34). **Conclusions:** Having an eating disorder was associated with both risk and protective factors for breast cancer and adverse reproductive outcomes, but there was no overall association between eating disorders and breast cancer.

963-S/P

QUANTITATIVE RISK ESTIMATION DUE TO BREASTFEEDING BASED ON KOREAN NATIONAL REPRESENTABLE DATA. Hye Ah Lee* (Ewha Womans University)

Introduction: Breastfeeding is well-known for short-term preventive effect on mortality and morbidity of infection disease during early life. Breastfeeding is optical nutrient to infants for their potential growth, but it's prevalence has been located with low level. Thus, we calculated the population attributable risk cause by non-breastfeeding with considering exposure prevalence, which derived from national representable survey data. **Methods:** The data of exposure prevalence for exclusive partial, and non-breastfeeding during the first 6 months obtained from the National Fertility and Family Health Survey (survey from Korea institute for Health and Social Affairs). Partial and non-breastfeeding combined and then named non-exclusive breastfeeding as risk exposure. The lists of reasonable disease refer to GBD 2010 study and the risks of above diseases obtained from literatures reviews.**Results:** The prevalence of exclusive, partial and non-breastfeeding were 32.3%, 34.4%, and 33.3%, respectively. The PAF for all -cause mortality due to non-exclusive breastfeeding was 83.6%, and both of mortality cause by diarrhea and pneumonia accounted for 81.6% and 83.9%, respectively. When expending the observation lifetime to first 24 months, quantitative risks for all-cause mortality by discontinued breastfeeding were 70.8%.**Conclusion:** This results were estimated PAF due to breastfeeding, which is the most major risk factor during early life, with reflecting the most recent national representable evidences. Thus, encouragement of breastfeeding with providing the evidences the favorable effect on their offspring's health required to reproductive aged women. Acknowledgements: "This study was supported by a grant of the Korean Health Technology R&D Project, Ministry of Health & Welfare, Republic of Korea (HI13C0729)."

964-S/P

THE RELATIONSHIP BETWEEN SOCIOECONOMIC STATUS AND QUALITY OF NUTRITION THROUGH BREAKFAST EATING IN CHILDREN AND ADOLESCENTS: USING KOREAN NATIONAL HEALTH AND NUTRITION EXAMINATION SURVEY. Hye Ah Lee* (Ewha Womans University)

Introduction: Healthy eating can support to children reaching their growth and development potential. To encourage people to have a breakfast has been a controversial issue in terms of excessive intake of calories and quality of nutrition. Although there has been suggested that socioeconomic status is associated with quality of nutrition, the mediate effect of breakfast on the quality of nutrition is unclear. Thus, we aimed to investigate the mediation effect of breakfast eating on quality of nutrition among children and adolescents using the Korean National Health and Nutrition Examination Survey (KNHANES). **Methods:** In present study, we focusing on person with 2 to 18 years of age, who surveyed two days 24-hour recall (n=999). Using causal mediation analysis, we investigated the mediate effect of breakfast eating on quality of nutrition. The quality of nutrition assessed using NAR (Nutrient Adequacy Ratio), MAR (Mean Adequacy Ratio), and INQ (index of nutritional quality). **Results:** The prevalence of breakfast eating was decreased with increasing age (2-5 years old: 13.6%, 6-11 years old: 13.2%, 12-18 years old: 36.8%, p for trend <0.0001). In present study, more than half of children did not reach recommendations for Vitamin A, Vitamin C, iron, and calcium. Individuals with the lowest household income had higher prevalence in instant noodle (ramyun) and showed poor quality of nutrition. In mediation analysis, socioeconomic status marginally associated with quality of nutrition through breakfast eating. The prevalence of several unhealthy behaviors was common in individuals with skip of breakfast. **Conclusion:** A number of children have insufficient intakes of micronutrient regardless both of skip of breakfast and socioeconomic status. Our result added the evidences that encouragement of breakfast eating to improve the quality of nutrition in children with low socioeconomic status is needed. **Acknowledgements:** This study was supported by National Research Foundation of Korea Grant funded by the Korean Government (NRF-2014R1A1A1007207).

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PROTEIN INTAKE CHANGES THROUGHOUT THE MENSTRUAL CYCLE IN HEALTHY PREMENOPAUSAL WOMEN. Anna M. Gorczyca*, Lindsey A. Sjaarda, Emily M. Mitchell, Neil J. Perkins, Karen C. Schliep, Jean Wactawski-Wende, Sunni L. Mumford (Epidemiology Branch, Division of Intramural Population Health Research, Eunice Kennedy Shriver National Institute of Child Health and Human Development Department of Epidemiology and Biostatistics, School of Public Health, Indiana University, Bloomington, IN)

PURPOSE: It is thought that total energy intake in women is increased during the luteal versus follicular phase of the menstrual cycle; however, less is understood regarding changes in diet composition (i.e., macro and micronutrient intake) across the cycle. Therefore, the aim of this study was to investigate changes in macronutrient, micronutrient and food group intake across phases of the menstrual cycle among healthy women. **METHODS:** The BioCycle Study (2005-2007) was a prospective cohort study of 259 healthy regularly menstruating women age 18-44 who were followed for up to 2 cycles. Dietary intake was measured using 24-h dietary recalls up to 4 times per cycle corresponding to menses, mid-follicular, expected ovulation and luteal phases. Food cravings were assessed at same time points using a standardized questionnaire. Linear mixed models adjusting for total energy intake were used to evaluate changes across the cycle. **RESULTS:** Total energy, fat, carbohydrate, and sugar intake did not significantly change across the cycle. However, total protein (p=0.03), animal protein (p=0.05), and percent of caloric intake from protein (p=0.02) was highest during the mid-luteal phase compared to the peri-ovulatory phase. There were also significant increases in appetite, craving for chocolate, craving for sweets in general, craving for salty flavor, and total craving score during the late luteal phase compared to the menstrual, follicular and ovulatory phases (P < 0.001). **CONCLUSIONS:** Our findings suggest an increased intake of protein, and specifically animal protein, as well as an increase in reported food cravings, but no changes in fat or carbohydrate intake during the luteal phase of the menstrual cycle. These results highlight a plausible link between certain macronutrient intake and menstrual cycle phase, and support the need to account for cycle phase for research regarding protein intake and appetite in premenopausal women.

966-S/P

AGREEMENT BETWEEN 24HDR REPORTED CAFFEINE INTAKE AND FASTING SERUM CAFFEINE AND PARAXANTHINE ACCOUNTING FOR POTENTIAL DIFFERENCES IN CAFFEINE METABOLISM. Karen Schliep*, Jean Wactawski-Wende, Neil Perkins, Shvetha Zarek, Rose Radin, Emily Mitchell, Lindsey Sjaarda, Zhen Chen, Sunni Mumford (NICHD Epidemiology Branch)

Caffeine exposure based on self-report may not reflect biologic dose due to within-beverage differences in caffeine content and between-person differences in caffeine metabolism. We aimed to assess whether reported caffeine intake as per 24-hour dietary recall (24HDR) adequately agrees with serum caffeine and its chief metabolite, paraxanthine, while taking into account potential differences in caffeine metabolism. Participants (n = 259) were followed for up to 2 menstrual cycles and provided fasting blood specimens for caffeine biomarker assessment along with 24HDRs to capture prior day's reported intake up to 4 times/cycle. 24HDR intake (taking into consideration women's weight) and caffeine biomarkers were categorized into quartiles and dichotomously (≥ vs < median), and weighted kappa (κ) and prevalence and bias-adjusted κ coefficients were calculated, respectively. Results showed moderate agreement between quartiles of 24HDR intake and serum caffeine (κ=0.44 [95% CI: 0.40, 0.48]) and paraxanthine (κ=0.44 [95% CI: 0.41, 0.48]) for all women. Linear mixed models showed that continuous 24HDR intake and serum caffeine differed significantly by race (P=0.01). Caucasian women had a higher adjusted κ between 24HDR intake and serum paraxanthine (0.52) compared to caffeine (0.45) whereas Asian women had a lower adjusted κ for serum paraxanthine (0.45) compared to caffeine (0.52). These results suggest that caffeine metabolism may be faster among Caucasians compared to Asians. Adequate agreement between 24HDR and caffeine/paraxanthine was found for the total population, although lower 95% CIs were on the borderline for what is considered a useful measure between dietary intake and nutritional biomarkers (κ=0.40). Due to high inter-individual differences in caffeine metabolism, serum caffeine biomarkers may, alone or in combination with reported intake, increase statistical power to detect associations with health outcomes by reducing misclassification.

967-S/P

ASSOCIATIONS BETWEEN DIETARY PATTERN AND DIABETIC RETINOPATHY IN THE ATHEROSCLEROSIS RISK IN COMMUNITIES (ARIC) STUDY. Michelle W Sahli*, Ronald Klein, Julie A Mares, Lyn M Steffen, William E. Brady, Barbara E K Klein, Heather M Ochs-Balcom, Richard P Donahue, Amy E Millen(University at Buffalo - The State University of New York)

Purpose: We tested the hypothesis that healthy diet patterns are associated with lower prevalence of diabetic retinopathy (DR) because healthy diets have been proven to lower established risk factors for DR and lower oxidative stress and inflammation markers. Few studies have examined associations between overall diet patterns and DR. **Methods:** We used logistic regression to calculate ORs and 95% CIs for prevalent DR by quartile (Q) of a score representing adherence to a diet pattern modelled after the Mediterranean diet and modified to account for common dietary habits of Americans using data from 1,430 ARIC participants with diabetes. DR was assessed with a retinal photograph from one randomly chosen eye taken at visit 3 (1993-95). Dietary intake was estimated with a 66-item food frequency questionnaire at visit 1(1987-89). **Results:** We identified a significant association between a Mediterranean-type diet and prevalent DR with an OR = 2.03 for Q4 (good adherence) vs. Q1 (poor adherence) (95% CI = 1.37 - 3.01; p for trend=0.0005) after adjusting for sex, age, race, duration of diabetes, center and energy intake. Since participants who knew they had diabetes may have changed their diet prior to assessment of DR, we excluded participants who knew they had diabetes at visit 1 (n=503), this association was no longer significant [OR (95% CI) for Q4 vs. Q1 =1.56 (0.78 - 3.11); p for trend 0.57]. The association was present in those with a duration of diabetes ≥6 years [OR 1.56 (1.16-2.16) comparing those with scores above the median to those below] but not in those with diabetes durations <6 years [OR 0.98 (0.47-2.10); p for interaction = 0.01]. **Conclusions:** We found that the odds of better adherence to a Mediterranean-type diet were greater among those with DR than those without DR. This may be because people with a longer duration of diabetes changed their diet after onset of diabetic complications but before assessment of diet in this study.

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PARENTHOOD-INDUCED WEIGHT GAIN IS SIMILAR BETWEEN GENDERS. Daniel Brown*, David Rehkopf, Barbara Abrams (University of California, Berkeley)

Pregnancy may be a risk factor in the development of overweight and obesity in women. Less is known about the role that fatherhood plays in weight gain among men. Using a nationally representative longitudinal survey of the life-course of 9,764 American youth recruited in 1979 between the ages of 14 and 18, we estimate the changes in BMI in both genders associated with child-bearing and rearing. Our univariate analysis showed that men gained on average 1.2 (95% CI: 1.1 – 1.3) and 2.4 (95% CI: 2.2 – 2.5) BMI units 5 and 10 years, respectively, subsequent to their first child's birth while women gained at a similar rate: 1.2 (95% CI: 1.1 – 1.3) and 2.7 (95% CI: 2.5 – 2.8) BMI units. We performed multivariate analysis and modeled change in BMI between follow-up start and age 40 on parent's gender, race, parity, weight at follow-up start, marital status, percent of time spent with children living in home, employment status and wealth, while including an interaction term between categorical parity and gender. This model demonstrated a significant positive dose-response of parity on weight gain by age 40, with changes in BMI of 0.2, 1.2, 1.2, and 1.8 units associated with one, two, three and four or more children, respectively, using no children as a reference. However, a significant negative dose-response was observed for the gender-parity interaction term, with changes in BMI of -0.1, -0.6, -0.7, and -0.9 for one, two, three and four or more children observed among women, as compared to men. These findings suggest that child-rearing, rather than just child-bearing, is associated with increased adult weight. Future study is needed to determine social and economic mediators of weight gain associated with the raising of and caring for children by both mothers and fathers.

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ASSOCIATION OF SLEEP DURATION WITH BODY MASS INDEX (BMI) IN AN ADULT RURAL POPULATION. David Strogatz*, Melissa Scribani, Paul Jenkins, John May (Bassett Research Institute, Bassett Healthcare Network, Cooperstown, NY)

Experimental and observational evidence suggests that short sleep duration may lead to weight gain and development of obesity. Epidemiologic studies also indicate excess levels of obesity in rural populations, but there is little rural-based data on prevalence of short sleep duration and its relationship to BMI. This association was examined in data from a 2009-2010 random sample of households in a rural region of upstate New York. Complete information was available on 9,601 adults, including self-reported height and weight, average hours of sleep per night, sociodemographic characteristics, chronic conditions and health-related behaviors. Prevalence of short sleep (< 6 hours) was 8.2% (784/9601), similar to findings in the National Health Interview Survey. In a weighted regression model adjusting for age, gender, education, sampling design and survey response patterns, adults in the short sleep category had an increase of 1.9 BMI units (95% CI: +1.1,+2.6) compared to adults in the reference category (7-8 average hours of sleep). This BMI difference was reduced to +1.3 in a model including adjustment for chronic conditions and behaviors potentially influencing weight and weight gain. A weaker positive association between sleep duration and difference in BMI was observed for the 1,845 adults who slept at least 6 but not 7 hours (+0.8, 95%CI: +0.4, +1.3). Analyses stratified by gender revealed the association of short sleep (<6 hours) with difference in BMI was more pronounced for women (+2.0, 95%CI: +0.9, +3.2) than men (+0.6, 95%CI: -0.4, +1.6). Limitations include the cross-sectional design and accuracy of self-reported information, while strengths include the population-based source of data, and the likelihood that non-differential misclassification and the full model adjustment may have produced conservative results. Intervention strategies for avoiding weight gain may consider including a sleep management component to go with guidance on diet and activity.

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THE ASSOCIATION BETWEEN OBESITY AND OBSTRUCTIVE SLEEP APNEA AMONG MALES AGED 20 YEARS AND OLDER IN THE UNITED STATES. Gilan Megeed*, Franka des Vignes (Deerfield Institute)

Introduction: Obesity has risen to become a major healthcare priority in the US due to its association with cardiovascular and endocrine diseases, yet its effect on other chronic diseases has been undervalued. Studies have shown a correlation between Obstructive Sleep Apnea (OSA) and obesity, however, the strength of the correlation has not been previously modeled. In this study we utilized regression forecast modeling to more closely examine the relationship between obesity and OSA. **Methods:** This study was conducted using obesity data for males ages 20 years and older from the 1988-2008 National Health and Nutrition Examination Survey (NHANES). A linear trend of the 1998-2006 obesity prevalence estimates was calculated and applied to 1998 published OSA prevalence to forecast 2006 OSA prevalence, with the assumption that the increase in obesity would drive an increase in OSA. We compared our forecasted OSA estimates to a 2006 published OSA prevalence study that is representative of the US population and comparable to the 1998 study in terms of methodology. **Results:** The linear trend for obesity from NHANES suggests a 25% increase in the prevalence of obesity from 27% to 33% during the period 1998-2006. Our study estimates the prevalence of OSA increased from 15% to 19% over the same study period for male adults with an apnea-hypopnea index (AHI) ≥5. The OSA study published in 2006 reported a prevalence of 21.5% for male adults with an AHI ≥5, comparable to our forecasted prevalence of 19%. **Conclusion:** By combining regression analysis with a forecasting model, we illustrated that the prevalence of OSA may be driven in part by obesity. This study further supports weight-related treatment modalities for OSA management, however, additional studies are needed to examine the effect reducing obesity may have on reversing the symptoms of OSA.

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DEVELOPMENTAL TRAJECTORIES OF PHYSICAL ACTIVITY, SPORT, AND TELEVISION VIEWING DURING CHILDHOOD TO YOUNG ADULTHOOD: IOWA BONE DEVELOPMENT STUDY. Soyang Kwon*, Kathleen F. Janz, Elena M Letuchy, Trudy L Burns, Steven M. Levy (Ann & Robert H. Lurie Children's Hospital of Chicago)

Importance: The diverse developmental patterns of obesogenic-behaviors during childhood and adolescence can be better understood by using new analytic approaches to assess the heterogeneity in variation during growth and development and to map the clustering of behavior patterns. **Objectives:** To 1) identify distinct trajectories of daily time spent in moderate- to vigorous-intensity physical activity (MVPA) from age 5 to 19 years, and 2) examine the relationships of MVPA trajectories with sport participation and television (TV) viewing trajectories. **Methods:** Iowa Bone Development Study (IBDS) cohort members participated in MVPA assessments via accelerometry at age 5, 8, 11, 13, 15, 17, and 19 years and completed a questionnaire every six months on sport participation and daily time spent in television viewing. Group-based trajectory analysis was conducted to identify distinct trajectory patterns of MVPA (minutes/day), participation in organized sports (yes or no), and TV viewing time (hours/day). **Results:** Based on the data from 537 IBDS participants (50% girls; 95% White), we identified four MVPA trajectories: consistently inactive (14.9%), consistently active (18.1%), decreasing moderate PA (52.9%), and substantially decreasing high PA (14.1%). All participants in the consistently inactive trajectory also followed a "no sport participation" trajectory. The consistently active trajectory was associated with decreasing (an already) low TV viewing trajectory. **Conclusions and Relevance:** This study provided a nuanced look at the known decrease in MVPA during childhood and adolescence. Sport participation could be a critical way to avoid the consistently inactive pattern. Importantly, we identified a subset of participants who maintained a seemingly healthy level of MVPA during childhood to young adulthood. The developmental pathways of healthy PA and TV viewing behaviors could be related.

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DOES LOW RISK OBESITY EXIST IN PREGNANCY?, Sung Soo Kim*, Yeyi Zhu, Katherine Laughon Grantz, Stefanie N Hinkle, Zhen Chen, Maeve Wallace, Melissa M Smarr, Niki M Epps, Pauline Mendola (National Institute of Child Health and Human Development)

Obesity is associated with adverse pregnancy outcomes, but whether obstetric complications are due to obesity or preexisting co-morbidity is unclear. In the Consortium on Safe Labor (2002-2008), a retrospective US cohort from 12 clinical centers, pre-pregnancy body mass index (BMI) was recorded for 148,469 singleton deliveries (65%). We further limited the analytic sample to women of normal weight or higher without chronic diseases including hypertension, diabetes, asthma, depression, hyperlipidemia, epilepsy, HIV and gastrointestinal, renal, heart, or thyroid disease (n=113,239, 76%). Women were classified as normal weight (BMI 18.5-24.9 kg/m2), overweight (BMI 25-29.9), class I obese (BMI 30-34.9) or class II/III obese (BMI $\geq$ 35). RR and 95% CI were calculated using Poisson regression with robust variance estimation adjusted for age, race/ethnicity, parity, insurance, smoking or alcohol use during pregnancy, and site, with normal weight as the reference category. Overall, obesity increased the risk of pregnancy complications for overweight, obese class I and obese class II/III women [RR=1.25(1.23-1.27), RR=1.45(1.42-1.48), RR=1.71(1.67-1.74)]. Risk for several obstetric complications increased in a dose-response fashion with increasing BMI category: cesarean delivery [RR=1.26(1.23-1.29), RR=1.49 (1.45-1.53), RR=1.82(1.77-1.88)], induction [RR=1.13(1.11-1.15), RR=1.16 (1.13-1.19), RR=1.23(1.19-1.26)], gestational hypertensive disorders [RR=1.64(1.56-1.73), RR=2.31(2.17-2.46), RR=3.01(2.82-3.21)], and gestational diabetes [RR=1.99(1.87-2.13), RR=2.95(2.73-3.18), RR=4.56(4.23-4.92)]. Obesity was not associated with an increased risk of hysterectomy, hemorrhage, blood transfusion, abruption or intensive care admission. Our findings suggest that even after the exclusion of women with chronic medical conditions, pre-pregnancy obesity remains a strong risk factor for major obstetric intervention and adverse maternal outcomes.

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PLACENTAL MITOCHONDRIAL CONTENT ASSOCIATED WITH MACROSOMIA IN A CHINESE POPULATION.. Xinjun Yang*, Qianying Cai, Jitai Zhang, Hao Sun, Chenchen Wang, Hongtao Yan, Hongying Shi (School of Environmental Science and Public Health Wenzhou Medical University Chashan, Wenzhou, Zhejiang 325035, China)

Background: Current researches have demonstrated that intrauterine growth retardation fetus has higher level of placental mitochondria content than normal birth weight newborns, which suggested that the placental mitochondrial content may be associated with fetal intrauterine growth. Our study aimed to assess the placental mitochondrial content of macrosomia. **Methods**: Sixty-four mothers and their newborns were recruited in this study from the Obstetrics Department of Yuying Children's Hospital of Wenzhou Medical University, China. Subjects were divided into normal birth weight group (n=32, birth weight from 2500g to 3999g) and macrosomia group (n=32, birth weight equal to or greater than 4000g). The placental mitochondrial content and mRNA expression of 5 mitochondrial copy related genes were measured by real-time Polymerase Chain Reaction, including mitochondrial transcription factor A (TFAM), DNA polymerase Y A (POLGA), polymerase Y B (POLGB), mtDNA-specific helicase (TWINKLE) and mtDNA single-stranded-binding protein (MTSSB). **Results:** There was no significant difference in demographic data between the two groups of subjects (such as gestational week, maternal pre-pregnancy body mass index (BMI), etc.). Compared with normal birth weight group, placental mitochondrial content decreased in macrosomia group(92.03±39.54vs130.65±71.26，p=0.010). Moreover, with the gestational week (37-41weeks) increasing, mitochondrial content declined in a linear trend (r=-0.436, p<0.001). The MTSSB expression also significantly decreased in macrosomia group (p=0.043). However, there was no significant difference in the expression of TFAM, POLGA, POLGB and TWINKLE between the two groups.**Conclusions:** Our results show that the decrease of placental mitochondrial content and MTSSB expression was associated with macrosomia. It could be a new view to understand the mechanism of macrosomia formation. This work was supported by the National Natural Science Foundation of China (No. 81072378).

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CLINICAL, SOCIAL AND GENOMIC FACTORS ASSOCIATED WITH OBESITY AT 12 MONTHS OF AGE. Yvonne Yui*, Nancy Gilchrist, Sahel Hazrati, Wendy S.W. Wong, Daniel Stauffer, Kathi Huddleston, Suchitra K. Hourigan, John Niederhuber (INOVA)

Background: Many genomic risk factors are associated with obesity. There are few prospective studies in infants, where genomic factors may have a more influential role. **Objective:** To examine genomic, social and clinical predictors of obesity at 12 months. **Design/Methods:** 367 infants had clinical and genomic data available at age 12 months. Whole genome sequencing was performed on blood. Clinical and social data was collected during pregnancy, birth, and at 6 and 12 months. Weight for length at 12 months was calculated using WHO gender specific growth charts with the following definitions: overweight ≥85th, obese ≥95th, severely obese ≥99th percentiles. A supervised genetic analysis was conducted using the SKAT for the association of rare variants (MAF<=0.1) with obesity. Gene-set level p-values were computed for 363 obesity related genes from the human obesity gene map. Chi-square and One-way ANOVA were used to test for association of clinical and social factors with obesity. **Results:** Of the 367 infants, 31% were overweight, 20% obese and 13% severely obese. After adjusting for multiple testing with Bonferroni correction, only two genes were significant at the 0.1 level, namely, WT1 (P=0.0033) and CNR1 (P=0.090), for the severely obese group. None of the genes were significant after Bonferroni correction for the overweight or obese groups. Clinical and socials factors that were significantly associated (p<0.05) with being overweight and obese in all 3 groups were Hispanic origin, lower maternal education and any juice consumption at 12 months. **Conclusions:** Clinical, social and genomic risk factors are associated with obesity at 12 months; pilot data suggests genomic factors may play an important role in those who are severely obese at this age. This is part of a large longitudinal genomic study where a comprehensive unsupervised genetic analysis is planned, to find novel genetic variants associated with childhood obesity.

977-S/P

EFFECT OF VITAMIN D3 SUPPLEMENTATION ON INFLAMMATORY MARKERS AND GLYCEMIC MEASURES AMONG OVERWEIGHT OR OBESE ADULTS: A SYSTEMATIC REVIEW OF RANDOMIZED CONTROLLED TRIALS. Aleksandra Zuk*, Tiffany Fitzpatrick, Laura Rosella (University of Toronto)

CONTEXT: Obesity induced low-grade chronic inflammation disrupts the proper immune an metabolic function. Vitamin D deficiency increases markers of inflammation associated with cardiometabolic risk. **OBJECTIVE:** The aim of this systematic review was to examine the association between oral vitamin D (VD) supplementation on circulating inflammatory biomarkers and glycemia outcomes from randomized controlled trials (RCTs) of overweight and/or obese adults. **METHODS:** MEDLINE OVID, EMBASE and Cochrane Central Register of Controlled Trials were searched according to a predefined protocol. Eligible RCTs included adults, randomized to receive either VD orally or placebo. Two reviewers independently assessed RCTs. Bias was assessed using the Cochrane Collaboration risk tool. Mean differences were calculated comparing end-of-study sample means between independent VD and placebo groups (PL). **RESULTS:** Eleven unique RCTs met inclusion criteria from a total of 3,383 identified citations, 79-screened articles and 14 full text data-extraction. Inflammatory and glycemia measures are reported in 7 and 10 RCTs, respectively. Most trials were non-significant with considerable heterogeneity in design, participants and outcomes. In all but one, trials were rated as high or unclear risk of bias. Two RCTs reported significant changes in inflammatory biomarkers. However, calculated mean differences were not significant between VD and PL group; CRP 0.12 mg/L (P = 0.87), TNF-α -0.54 pg/ml (P = 0.07). Two other trials had significant changes in FPG -0.32 mmol/L (P = 0.03), HbA1c -0.13 % (P = 0.04), and insulin resistance HOMA-IR -0.86 (P = 0.02), following VD supplementation. **CONCLUSION:** Overall, the results of this systematic review do not clearly establish a benefit of VD supplementation on inflammatory and glycemic markers in this population. However, there is some indication that baseline serum VD influences the effect of VD repletion on inflammatory markers.

978-S/P

OBESITY PROJECTIONS TO 2023 IN QUEBEC, CANADA: REGIONAL-LEVEL HETEROGENEITY AND IMPLICATIONS FOR PUBLIC HEALTH MONITORING. Deepa Jahagirdar*, Ernest Lo (McGill University)

Future projections of obesity are pertinent for public health authorities to estimate health burden, plan services and set targets. Past projection studies have been done at the national level. However extensive heterogeneity in obesity and its determinants has been noted at finer scales, where authorities are often situated. This study aimed to, i) Project obesity prevalence (2013-2023) for 16 public health jurisdictions in Quebec; ii) Measure the magnitude of, and temporal trend in the regional heterogeneity of obesity; iii) Explore the role of determinants in explaining heterogeneity in obesity prevalence and slope We constructed obesity prevalence time series (1987-2012) to estimate regional mean yearly increase in obesity prevalence (slopes) from cross-sectional surveys. Projections to 2023 were done using compositional regression. We characterized the magnitude and time trend of heterogeneity in obesity prevalence and slope using standard deviation. National surveys were used to construct time series for 25 sociodemographic/lifestyle determinants. Spearman correlations of regional prevalence and slope of each determinant, against regions' obesity prevalence and slope, were measured. Obesity prevalence is projected to increase in all regions. Heterogeneity between regions' obesity prevalence measured in 2012 (σ=2.0%) is projected to increase to 2023 (σ=3.1%). Substantial regional heterogeneity in slope (β=0.22-0.51) drove the heterogeneity in prevalence. Determinants were also systematically more strongly correlated with obesity slope than prevalence ($\Delta\rho$avg=0.3). Provincial obesity trends mask substantial, and increasing, regional heterogeneity in both prevalence and rate of increase (slope). Regions' differential slopes drive their prevalences increasingly apart. Obesity determinants also explained more variation in obesity slope than prevalence. Thus, rate of increase may be a more pertinent monitoring metric and intervention target than prevalence.

979-S/P

THE EFFECT OF PARENT INVOLVEMENT ON MAIN OUTCOMES OF THE LA SPROUTS NUTRITION, COOKING AND GARDENING PROGRAM FOR HISPANIC/LATINO YOUTH. Kristen N. Arthur*, Jaimie N. Davis, Lauren C. Martinez, Nicole M. Gatto (School of Public Health, Loma Linda University)

Background: Hispanic/Latino youth, youth whose head of the household has less than a high school education, and girls are disproportionally at risk for childhood obesity. During 2011–2013, the LA Sprouts 12-week nutrition/cooking, and gardening program was implemented in four Los Angeles schools with 3rd–5th grade students. This paper examines whether there were differences in LA Sprouts main outcomes including change in anthropometric measures and dietary intake by parent involvement among LA Sprouts participants who received the intervention. **Methods:** Gardens were constructed on campus and 90-minute weekly lessons were taught to students on gardening, cooking healthfully, and strategies to increase fruit and vegetable intake. Anthropometric measures and questionnaire data were collected on participants pre- and post-intervention. Parents were offered parallel classes and were asked to complete a questionnaire. **Results:** Forty-one parents (23.8%) of LA Sprouts intervention subjects attended one or more classes and completed a questionnaire. Parent participants were predominantly female (68.3%), born outside of the U.S. (70%) and to be of a two parent household (63.4%). Female students (p-value= 0.047), 3rd or 4th grade students (p-value = 0.05) and those who reported to speak English at home (p-value= 0.007) were more likely to have parents participate. There were no statistically significant differences at baseline in anthropometric measures between LA Sprouts students whose parents participated and those who did not. After adjusting for age, sex, ethnicity, school and speaking English at home, LA Sprouts students whose parents participated had a greater reduction in waist circumference compared to students whose parents did not (2.2cm versus 0.28cm, p-value< 0.0001). Dietary outcomes are currently being analyzed. **Conclusion:** Additional research is merited examining how parental support plays a role in improving health outcomes of children.

980-S/P

BODY WEIGHT DISCREPANCY AND ITS INFLUENCE ON LOW-INCOME ADULTS' KNOWLEDGE AND RESPONSE TOWARDS AVAILABLE CALORIE INFORMATION IN THE RETAIL SETTING. Roch A. Nianogo*, Lisa V. Smith, Tony Kuo, Onyebuchi A. Arah (Department of Epidemiology, The Fielding School of Public Health, University of California, Los Angeles, Los Angeles, California, USA)

Although some evidence supports the notion that self-perceived weight status can influence how grocery store and restaurant patrons use available calorie information, only few studies have examined how self-reported body weight discrepancy (or desired versus current weight) can influence food choice. We investigated whether body weight discrepancy in a group of low-income, minority adults positively influenced their knowledge and is associated with intention to select lower calorie foods if exposed to calorie information. The 2007-2008 Calorie and Nutrition Information Survey was a local health department study of 639 low-income adults recruited from five large, multi-purpose public health centers in Los Angeles County. Logistic multivariable regression analysis was performed to examine the relationships between body weight discrepancy and health center clients' knowledge and response towards calorie information if made available. Compared to those whose desired weight equals current weight, survey participants with desired weight less than current weight, reported greater intention to: 1) use calorie information to order lower calorie food and drinks (aOR = 2.0; 95% CI: 1.0, 3.9) and 2) look at calorie information at MacDonald's (aOR=2.7; 95% CI: 1.4, 5.3). The analyses adjusted for age, sex, race/ethnicity, and education, self-reported desired and actual weight. Study findings suggest that body weight discrepancy can affect a person's intention to use calorie information to select food. To achieve optimal reach and impact, present and future public policy strategies should tailor interventions with this consideration in mind, especially if they are targeting low-income, minority populations.

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A LONGITUDINAL ANALYSIS OF EAR INFECTION AND HEARING IMPAIRMENT IN PRE-SCHOOL AGED CHILDREN: THE U.S. EARLY CHILDHOOD LONGITUDINAL STUDY–BIRTH COHORT:2001. Chuan-Ming Li*, Howard J. Hoffman (Epidemiology and Statistics Program, National Institute on Deafness and Other Communication Disorders, National Institutes of Health)

Objective: To estimate prevalence of ear infections (EIs) and hearing impairment (HI) and impact of EIs on HI in a nationally-representative study of early childhood. **Methods:** The ECLS–B is a longitudinal study of 2001 U.S. births. Parent interviews and brief exams were completed at 9 months (N=10,688 infants), 2 years (N=9,835), 4 years (N=8,903), and upon kindergarten entry (N=6,856). HI was doctors' diagnosis of child's hearing difficulty or deafness. Exposure was parent-report of at least one medically-diagnosed EI. Multivariable logistic regression was used to model the effect of preceding EIs on subsequent HI, while adjusting for covariates using national sampling weights. Adjusted odds ratios (aOR) and 95% CI are reported. **Results:** Period-specific prevalence of 1+ medically-diagnosed EIs from birth–9 months was 41.4%; 46.6%, 9 months–2 years; 48.7%, 2–4 years; 20.8%, 4 years–kindergarten. Period-specific prevalence of HI was 0.6%, birth–9 months; 1.1%, 9 months–2 years; 1.6%, 2–4 years; 1.2%, 4 years–kindergarten. Multivariable logistic regression showed HI at kindergarten entry was significantly associated with EI at 2–4 years (aOR=4.75, 95%CI: 1.83-12.37), at 4 years–kindergarten entry (aOR=5.55, 95%CI: 2.73-11.30), from birth–4 years (aOR=5.46, 95%CI: 1.51-19.81), and from birth–kindergarten entry (aOR=5.13, 95%CI: 1.27-20.67) after adjusting for sex, race/ethnicity, birth weight, newborn medical problems, breastfeeding, family poverty, health insurance, health status, child care, mother's education, and geographic region. **Conclusion:** Preceding EIs have significant impact on subsequent HI in preschool-aged children. Special attention and follow-up are needed for pre-school aged children with EIs.

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MATERNAL EARLY PREGNANCY SERUM METABOLITES AND RISK OF GESTATIONAL DIABETES MELLITUS., Daniel Enquobahrie* (University of Washington)

Background: Metabolites represent cellular functions and can provide important insights into gestational diabetes mellitus (GDM) pathogenesis. However, only a handful, mostly small, GDM metabolomics studies exist. Few were conducted in early pregnancy and none evaluated joint metabolite profiles, limiting assessment of metabolite interactions underlying GDM. We investigated maternal early pregnancy serum metabolites and subsequent risk of GDM. **Methods:** We identified 178 GDM cases and 180 controls among participants of the Omega study, a pregnancy cohort study. Information on participant characteristics and GDM diagnosis was collected using in-person interviews and medical record abstraction, respectively. Early pregnancy (~16 weeks gestation) serum samples were used for non-targeted metabolite profiling using a gas chromatography-mass spectrometry platform. Lasso regression was used to select a set of metabolites that are jointly associated with GDM case-control status. We evaluated predictive performance of the set of selected metabolites using a receiver operating characteristics curve and area under the curve (AUC). Functional relationships of identified metabolites were examined using pathway analytic tools. **Results:** A set of 20 metabolites (fatty acids, sugars/alcohol, amino acids, and organic acids) differentiated GDM cases from controls. Fold changes of relative abundance for these metabolites ranged from 1.47 (linoleic acid) to 0.88 (urea). Selected metabolites participate in solute-carrier-mediated transmembrane transport. Addition of selected metabolites to the set of well-known GDM risk factors improved the AUC significantly (0.71 to 0.87, p-value=3.97e-07). **Conclusions:** A combination of maternal early pregnancy serum metabolites predicts GDM risk. Replication of findings may have implications for design of GDM prevention or early diagnosis protocols.

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PRE-PREGNANCY ANTIOXIDANT LEVELS AND SUBSEQUENT PERINATAL OUTCOMES IN BLACK AND WHITE WOMEN: THE CARDIA STUDY. Emily W. Harville*, CE Lewis, Amber Solivan, Janet M. Catov, David Jacobs, Myron Gross, Erica P. Gunderson (Tulane University School of Public Health and Tropical Medicine)

Background: Observational studies have reported protective associations between antioxidant intake during pregnancy and outcomes, but randomized trials have been almost uniformly ineffective. We hypothesized that supplementation during pregnancy may be too late, and that pre-pregnancy nutrient status would be more influential on pregnancy outcomes. **Methods:** We used longitudinal data from the multicenter CARDIA Study. Pre-pregnancy fasting serum concentrations of antioxidants (carotenoids a- and b-carotene, lycopene, zeaxanthin/lutein, and b-cryptoxanthin) were measured at study baseline, and an interviewer-administered food frequency questionnaire assessed diet and supplement use. Pregnancy outcomes were reported at subsequent exams every 2 to 5 years. The analysis included 1215 women with one or more singleton live births delivered post-baseline. Multiple linear and logistic regression models evaluated pre-pregnancy antioxidants levels (as standardized continuous predictors and quartiles) with infant birthweight and length of gestation. **Results:** In adjusted models, serum lycopene was associated with an increased risk of low birthweight (<2500 g; aOR 1.37 per 1-SD unit, 95% CI 1.11-1.69; aOR for highest quartile 2.15, 95% 1.16-3.98) and shorter gestational age (adjusted beta -0.21 weeks per SD, p=0.02; -0.51 weeks, p=0.04 for highest quartile). Dietary intake of tocopherols was associated with lower birthweight, while supplement use of vitamin C was associated with increased gestational age. Significant interactions were found with age: among women <30 years, higher b-carotene, a-carotene, the sum of the carotenoids, and lycopene were associated with increased risk of low birthweight, which was not seen in older women. **Discussion:** Our results do not support the hypothesis that higher preconception antioxidant levels improve birth outcomes.

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HEARING LOSS AND EAR INFECTIONS FROM BIRTH THROUGH FIRST GRADE: THE U.S. EARLY CHILDHOOD LONGITUDINAL STUDY–KINDERGARTEN CLASS OF 2010–11 (ECLS–K:2011). Howard J. Hoffman*, Chuan-Ming Li, Christa L. Themann (National Institute on Deafness and Other Communication Disorders (NIDCD), NIH)

Objective: To describe associations between ear infections since birth and hearing loss in kindergarten (K) and first grade. **Methods:** ECLS–K:2011 children were drawn from a national sample of public and private schools, both full- and part-day kindergarten classes in 2010–11. Information on children's health and development, including medically-diagnosed ear infections (EIs) and hearing loss, were reported by parents; additional information was provided by teachers, schools, and child care providers. Trained examiners conducted age-appropriate assessments of intellectual development and hearing in school settings. Logistic regression models were statistically-adjusted for covariates using national sampling weights. **Results:** Of 13,399 sample children, 66.8% had 1+ EIs by kindergarten entry and 80.3% by spring of first grade. Before age 2, 39.6% had 1+ EIs and 20.9% had 3+ EIs. From K to first grade, the annual EI prevalence was 20.4%. Before age 2, 90.2% with EIs were treated with antibiotics, 14.7% ear drops, 13.0% surgically-implanted ear tubes (ETs) usually in both ears, 2.3% 'watch/wait' (multiple treatments occurred); for EIs from K to first grade, 72.1% received antibiotics, 21.1% ear drops, 3.6% ear tubes, 10.1% 'watch/wait'. Most common physicians' diagnoses for children referred for hearing trouble were 'middle-ear fluid' and 'acute ear infection', respectively. 1.3% of children with no EIs had hearing loss, compared to 3.4% with EIs (without ETs) and 10.3% with ETs. Hearing loss was associated with EIs (without ETs), odds ratio (OR)=4.1, 95% confidence interval (CI): 1.1–15.3, while ETs increased the risk, OR=9.1, 95% CI: 1.3–65.2 in multivariable models adjusted for parent's education, insurance, child's sex, race, birth weight, birth complications, breastfeeding, and overall health. **Conclusion:** Hearing loss in early primary grades is associated with EIs, and the risk is nearly 3-fold higher for children treated with ETs.

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LEVERAGING "BIG DATA" FOR OBESITY RESEARCH IN LOW-INCOME INFANTS AND CHILDREN: THE ADVANCE EARLY LIFE COHORT. Janne Boone-Heinonen*, Jean P O'Malley, Carrie J Tillotson, Erika K Cottrell, James A Gaudino, Anthony Amafah, Marc Rivo, Kenneth Mayer, MaryAnn McBurnie, Rachel Gold, Jennifer E DeVoe (Oregon Health & Science University)

Background: Early life is a critical period in obesity etiology. Safety net populations, composed of predominantly uninsured or publicly insured patients, have high risk of adverse early life exposures and later disease, but are understudied due to challenges in health care access and recruitment and follow-up in longitudinal research. **Methods:** We constructed a unique cohort of infants and children using retrospective electronic health record data from the ADVANCE Clinical Data Research Network of PCORNet, a national network of Federally-Qualified Health Centers serving over 1 million safety net patients across the US. This cohort includes patients who were 0-5 years of age and had at least one valid Body Mass Index measure in 2012-2014. We calculated prevalence of elevated weight-for-length in patients 0-2 years (≥95% percentile, WHO growth curves) and of obesity (≥95% percentile, CDC growth curves) and severe obesity (≥20% greater than 95th percentile) in patients >2 years. **Results:** The cohort includes 98,312 infants and young children and is racially/ethnically diverse (e.g., 14.0% Black, 45.3% Hispanic). Among patients 0 to <6, 6 to <12, and 12 to <24 months, 5.3, 12.1, and 20.2% had elevated weight-for-length, respectively. Among children 2-5 years, 15.0% were obese, compared to <11% nationally. Severe obesity prevalence in our cohort was 1.8% overall, 2.6% in Hispanics, and 3.8% in Native Hawaiians and Pacific Islanders. Nearly 70% of children had ≥2 BMI measures. Among 4-5 year olds, 74% had BMI measures at least 2 years apart. **Conclusions:** There is a critical need for obesity research in uninsured and publicly insured infants and children. ADVANCE's data repository provides a powerful resource for identifying and characterizing this Early Life Cohort. It offers unique and critically important opportunities to identify and mitigate early life determinants of obesity in this large population of hard-to-reach children.

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FAMILY STRUCTURE AND CHILD HEALTH: DETAILED DATA CAPTURE IS REQUIRED TO IDENTIFY MEANINGFUL ASSOCIATIONS. Rebecca Ragar*, Crystal Silva, Kara Kronemeyer, Pamela Garcia-Filion (Phoenix Children's Hospital)

Background: Family structure is routinely included as a covariate in child health analyses as a proxy for household stability, resource availability, and parenting time. Due to changes in family structure over the past 50 years, new categories of families are available for raw data capture. **Methods:** Eight years (2007-2014) of data from a child abuse registry at a Level I pediatric trauma center were used to refine the registry's family structure data field. Family structure information is obtained through parent report during social work consults and in some cases, confirmed/corrected by police investigation and legal documentation. **Results:** The field consists of two sections: biological relationship of caregiver(s) to child and marital status of caregiver(s). The biological relationship section consists of six categories that account for the biological relationship between caregiver(s) and child. The marital status section contains 11 mutually exclusive categories to describe the marital status of the caregiver(s) and further describes biological relationship to child. Combined, the sections are designed to identify 22 distinct family structures, expanding the eight structures collected by the National Health Interview Survey (NHIS) used by the Centers for Disease Control and Prevention by distinguishing between biological, adoptive, kinship, foster, and unrelated caregiver(s). **Conclusion:** The impact of new family structures on child health is unknown, warranting detailed measurement of family structure beyond what is captured by the NHIS. Measuring family structure in greater detail during the data collection phase, with the option to collapse categories during analysis, may improve generalizability across disease states. Further research is necessary to determine if capturing marital histories and living arrangement transitions is important in the analysis of child health outcomes.

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RISK FACTOR COMPARISON OF DIFFERENT CONGENITAL HEART DEFECTS IN GUANGDONG, CHINA. Yi Lu *, Yanqiu Ou, Maijinzhuang, Xiaoqing Liu, Zhiqiang Nie (Guangdong Cardiovascular Institute)

BACKGROUND: There are limited reports to address risk factors for congenital heart defects (CHD) in China, especially in Southern China, Guangdong Province. This study was conducted to explore the risk factors for CHDs in Guangdong Province by different type of this defect. **METHOD:** The current study was a population-based 1:1 matched case-control study, which included case infants with CHDs (n=4034) and live born control infants without birth defects (n=4034) enrolled in the Guangdong Registry of Congenital Heart Disease (GRCHD) study (2004-2013). GRCHD is an ongoing population-based CHDs surveillance system including 40 member units, covering 21 cities in Guangdong, actively reporting birth defects and conduct survey on risk factors among live born and stillborn infants over 20 weeks gestation. Potential risk factors were screened and chosen by conditioned univariate logistic regression, and entered into the multivariate logistic regression analyses (enter method), which was used to compute adjusted ORs for potential risk factors after control all risk factors simultaneously. **RESULTS:** For general isolated CHDs, potential risks factors included maternal age older than 40 years old, house income less than 1000 CNC/month/person, maternal education lower than high school, previous pregnancy history with still birth, exposure at the 1st trimester to harmful chemical, living in newly renovated room, maternal occupation as labor/service industry/housekeeper/lay off, maternal fever, pregnancy diabetes, influenza, threatened abortion and antibiotic taking, paternal alcohol intake and smoke before maternal pregnancy. The top five potential risk factors listed as: maternal chemicals contact (OR: 9.43, 95% CI:3.94, 22.58), maternal antibiotic use (OR: 3.96, 95% CI:1.78, 8.79), living in newly renovated room(OR:2.99, 95% CI:1.89, 4.73), maternal fever (OR:2.78, 95% CI:1.74, 4.44), and maternal diabetes (OR:2.38, 95% CI:1.32, 4.28). **CONCLUSION:** These results suggested that low social-economy status, mat

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MATERNAL SMOKING DURING PREGNANCY AND OFFSPRING BLOOD PRESSURE IN ADOLESCENCE AND EARLY ADULTHOOD. Khady Kâ*, Marie-Pierre Sylvestre, Erika Dugas, Geetanjali Datta, Jennifer O'Loughlin (The CHUM Research Center and the University of Montreal)

Maternal smoking during pregnancy (MSP) is a modifiable risk factor for a compromised intrauterine environment, and a well-established risk factor for low birth weight and obesity in offspring. However, controversy exists on the association between MSP and offspring blood pressure (BP). Most studies focus on the pediatric population although it has been suggested that birth weight and body weight throughout life may mediate this association. **Aim:** To examine the association between MSP and offspring BP in adolescence and early adulthood. **Methods:** We used data from the Nicotine Dependence in Teens Study, a prospective cohort of 1294 grade 7 students recruited in 1999-2000 in Montreal, Canada. The analytical sample includes 236 subjects for whom data on MSP as well as on BP at baseline and 3 follow-up visits were available. BP was measured using a Dinamap XL by trained technicians at age 12, 15, 17 and 24 years. Data on MSP (yes/no) were collected retrospectively in parental questionnaires. The association was modeled using linear regression adjusting for potential confounders (sex, alcohol during pregnancy, parent education, family history of hypertension) in each age group. Our analytic sample excluded participants with low birth weight and those who were overweight during the study period. We also checked for residual confounding by body weight and there was none. **Results:** 17.4% of mothers reported smoking during pregnancy. At age 12, 15 and 17, MSP was associated with higher diastolic BP {Beta (95% confidence interval [CI]) were respectively 2.66 (0.32 – 4.99), 2.99 (0.57 – 5.42) and 3.30 mm Hg (0.77 – 5.83)}. However, at age 24, MSP was associated with both higher systolic (4.97 mm Hg; 95% CI = 1.32 – 8.762) and diastolic BP (3.22; 95%CI (0.71-5.75). **Conclusion:** Our findings suggest a direct effect of MSP on offspring BP. Promoting smoking cessation during pregnancy may alleviate the hypertension burden in offspring.

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ASSOCIATIONS OF POSTNATAL GROWTH WITH BODY COMPOSITION AND CARDIOMETABOLIC RISK DURING MID-CHILDHOOD. Wei Perng*, Hanine Hajj, Mandy Brown Belfort, Sheryl L. Rifas-Shiman, Matthew W. Gillman, Emily Oken(Michigan State University Department of Epidemiology & Biostatistics)

Aim: To investigate the effects of fetal and postnatal growth on cardiometabolic health during mid-childhood. **Methods:** We studied 963 participants from Project Viva, a US pre-birth cohort. Within tertiles of birthweight-for-gestational-age ('fetal growth'), we examined how BMI z-score (BMIZ) change during four postnatal periods (birth-6mo, 6mo-1y, 1-2y, 2-3y) corresponded with adiposity and metabolic risk during mid-childhood. Using multivariable linear regression, we accounted for child age, sex, race, breastfeeding duration, maternal education, continuous fetal growth, and BMIZ change in previous periods. **Results:** Children were 6.6-10.7y; 50% were male. The combination of higher fetal and higher postnatal growth, especially from birth-6mo, corresponded with greater mid-childhood adiposity. For children in the highest tertile of fetal growth, being in the 4th vs. 1st quartile of BMIZ gain predicted higher DXA total fat: 3.14kg (95% CI: 0.74, 5.55) for birth-6mo, 0.42kg (-1.41, 2.24) for 6mo-1y, 2.43kg (0.68, 4.17) for 1-2y, and 2.86kg (0.87, 4.85) for 2-3y. For children in the lowest fetal growth tertile, the estimates were: -0.78kg (-0.92, 2.49) for birth-6mo, 1.90kg (0.31, 3.50) for 6mo-1y, 1.63kg (-0.11, 3.38) for 1-2y, and 1.74kg (-0.07, 3.54) for 2-3y. Trends with BMI and waist circumference were similar. For the metabolic outcomes, higher fetal growth and greater BMIZ gain from birth-6mo correlated with greater insulin resistance according to HOMA-IR (P-trend=0.04) and higher C-reactive protein (P-trend=0.03); weaker associations were observed for later postnatal periods. **Conclusions:** Heavier newborns who gain weight rapidly during the first 6 postnatal months may be at risk for greater adiposity and a poorer cardiometabolic profile during mid-childhood.

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ADVERSE CHILDHOOD EXPERIENCES AND RISK OF STILLBIRTH. Alexa Freedman*, Carol Hogue (Rollins School of Public Health, Emory University)

Background: Little research has been conducted to assess the relationship between adverse childhood experiences (ACEs) and stillbirth. ACEs have been associated with a variety of health complications, including maternal depression and risky health behaviors. These behaviors increase the risk for adverse pregnancy outcomes, including stillbirth. Childhood sexual abuse, a subset of ACEs, has also been tied to adverse pregnancy outcomes including hospitalization, premature contractions, and preterm birth. **Methods:** Data from a population based case-control study from the Stillbirth Collaborative Research Network (SCRN) and the SCRN-Outcomes after Study Index Stillbirth study were used to examine this association. The Childhood Trauma Questionnaire (CTQ) was used as a measure of ACEs and was completed by the mother between 6 months and 3 years postdelivery. Exclusion criteria included multiple gestations and a missing CTQ, leaving 273 stillbirths and 674 healthy live births for analysis (live births additionally excluded those <37 weeks gestation, neonatal intensive care unit admission, and death). The CTQ was analyzed as a summary score and five subscales: physical abuse, physical neglect, emotional abuse, emotional neglect, and sexual abuse. The summary score and subscale scores will be modeled as continuous variables using multivariable logistic regression. The dataset will be weighted to account for oversampling and differential consent. Marginal structural models will also be used to account for potential bias due to loss to follow up. Maternal race/ethnicity and maternal age will be considered as potential confounders. **Preliminary Results:** The mean summary score was 36.6 (STD 15.3) for stillbirths and 35.1 (STD 12.1) for healthy live births. There were no significant differences in the summary scale or five subscales between stillbirths and healthy live births using unadjusted logistic models.

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DOES GESTATIONAL AGE AT BIRTH MEDIATE THE RELATIONSHIP BETWEEN MATERNAL SMOKING DURING PREGNANCY AND NEONATAL DEATH? Alexandra Seaward*, Olga Basso, Jay Kaufman, Robert Platt (McGill University, Montreal, Canada)

An intermediate variable lies on the causal pathway between exposure and outcome. Previously, the standard method for identifying pathways of direct and indirect effects was through conditioning on the intermediate variable of interest, but biases can arise from this conditioning that distorts the true exposure-outcome relationship. In perinatal epidemiology, conditioning on potentially intermediate variables occurs frequently in the context of calculating gestational-age-specific associations. The objective of this preliminary study was to determine if gestational age at birth mediates the relationship between maternal smoking during pregnancy and the outcome of neonatal death. We used data from the US Vital Statistics 2006 birth cohort linked birth/infant death dataset. Singleton live births with no reported congenital anomalies were included in the final analyses (n=4,038,603). Maternal smoking during pregnancy was classified as never smoker vs. smoker. Gestational age at birth was classified as term (≥37 weeks) vs. preterm (<37 weeks). The outcome of neonatal death was defined as infant death under 28 days of life. Log-poisson regression models were used to estimate the total effect of maternal smoking on neonatal death as well as the direct effect by conventional methods. Log-poisson marginal structural models with inverse probability weighting were used to model the relative risk of the controlled direct effect. All models were adjusted for maternal age, race, marital status, and medical risk factors. The total effect of smoking on neonatal death, the direct effect estimated by standard methods and the controlled direct effect estimated using MSMs were all very similar (adjusted RR 0.998, 95% CI: 0.997, 0.998). Results from this study suggest that preterm birth does not mediate the effect of maternal smoking on neonatal death; however, future studies should focus on modeling gestational age at different cut-offs as well as the impact of unmeasured confounding.

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DO MATERNAL AND FETAL CHARACTERISTICS EXPLAIN TEMPORAL TRENDS IN PRETERM DELIVERIES IN PUERTO RICO FROM 1995 - 2012? Cassandra M. Gibbs Pickens*, Carol J. R. Hogue (Department of Epidemiology, Rollins School of Public Health, Emory University, Atlanta, GA)

Background: Preterm births (live births at <37 weeks' gestation) recently rose steeply in Puerto Rico, from 12.3% in 1995 to 19.9% in 2006, decreasing to 16.9% in 2012. Using U.S. National Vital Statistics System fetal death and period-linked birth-infant death datasets, we extend our previous analysis of trends in very preterm delivery (VPTD, liveborn and stillborn deliveries of <32 weeks' gestation) and moderately preterm delivery (MPTD, all deliveries at 32-36 weeks' gestation) from 1995-2006 to include the years 2007-2012. **Hypothesis:** Birth year will have a significant effect on the odds of VPTD and MPTD after accounting for other known fetal and maternal predictors of preterm delivery. **Methods:** We excluded 4,614 observations with missing information or <20 weeks' gestation (0.49% of 949,776 deliveries). We used multivariable polytomous logistic regression with year of delivery modeled as a linear spline with one node at year 2006. Independent covariates with sufficient information for all years included maternal age, marital status, parity/history of stillbirth, diabetes, chronic hypertension, pregnancy-induced hypertension/eclampsia, infant sex, plurality, and method of delivery. **Results:** MPTD peaked in 2006 at 17.6% of all deliveries. After accounting for maternal and infant characteristics, all of which were statistically significant predictors of VPTD and MPTD ($p<0.0001$ for all covariates), increasing birth year remained a significant predictor of VPTD and MPTD ($p<0.0001$ for all linear spline terms). Adjusted Odds Ratios for VPTD and MPTD were highest in 2006 (adjusted OR for MPTD, year 2006 vs. 1995=1.88 [95% CI 1.84, 1.92]; adjusted OR for VPTD, year 2006 vs. 1995= 1.44 [95% CI 1.38, 1.51]) and decreased thereafter.**Conclusion:** Time trends in VPTD and MPTD remained after accounting for known risk factors. Future research should focus on how societal-level factors like access to health care contributed to these trends.

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MISSING PATERNAL DATA AND BIRTH OUTCOMES IN CANADA. Gabriel D. Shapiro*, Michael S. Kramer, Jay S. Kaufman, Tracey Bushnik, Amanda J. Sheppard, Russell Wilkins, Michael Tjepkema, Seungmi Yang (McGill University, Montreal)

Background: Research on predictors of birth outcomes has focused on maternal characteristics. Less is known about the role of paternal factors. Missing paternal data may serve as a useful marker for adverse birth outcomes. In addition, studies of paternal factors and birth outcomes may be biased by missing exposure data, and the extent of such bias has not been well characterized. **Objective:** To compare rates of preterm birth (PTB), small-for-gestational-age (SGA) birth, stillbirth and infant mortality in Canada, based on the presence or absence of paternal data, controlling for maternal characteristics. **Methods:** We analyzed a cohort of births between May 2004 and May 2006 created by linking vital records data from the Canadian perinatal health database with the 2006 Canadian census. Binomial regression was used to estimate risk ratios and 95% CIs for adverse birth outcomes (PTB, SGA birth, stillbirth and infant mortality) associated with absence of a link to paternal information between the census and vital records data. Analyses were controlled for maternal education, age, marital status, parity, ethnicity, nativity and household income. **Results:** 135,426 births were included in our analyses, with matched paternal data between the census and vital records in 117,299 (86.6%). Compared to those with paternal data available, the adjusted RR (95% CI) in births without a paternal data match were 1.14 (1.07–1.22) for PTB, 1.11 (1.05–1.18) for SGA, 1.47 (1.15–1.87) for stillbirth and 1.24 (0.96–1.61) for infant mortality. **Conclusions:** Our study suggests that missing paternal data is a marker for increased risk of adverse birth outcomes, over and above maternal characteristics. Our results shed light on the magnitude and direction of bias due to missing exposure data in studies of paternal factors and birth outcomes. We recommend that future studies explore mechanisms, such as psychosocial or instrumental support, by which partners of pregnant women may affect birth outcomes.

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METHODOLOGY FOR STUDYING CHILD ABUSE USING A PROSPECTIVE REGISTRY: BRIDGING THE GAP BETWEEN CLINICIAN DOCUMENTATION AND MEANINGFUL RESEARCH. Kara Kronemeyer*, Rebecca Ragar, Crystal Silva, Summer Magoteaux, David M Notrica, Pamela Garcia-Filion (Phoenix Children's Hospital)

Intro: Child abuse is a public health problem, with research focusing on identifying at-risk groups. The epidemiology and social determinants of child abuse are incompletely understood due to limitations of retrospective data collection, small sample sizes, and reliance on administrative datasets for population-level studies. Registries are useful to collect meaningful epidemiologic data; systematic and standardized methods are necessary to assure data quality, accuracy, and completeness. **Purpose:** To describe development of a comprehensive child maltreatment registry. **Methods:** Using a multidisciplinary approach, an institutional registry of child abuse was implemented in 2007. Development occurred in 3 phases: team identification, clinical documentation assessment, and data standardization. Over 8 years, the registry underwent audits to monitor documentation completeness and to optimize data quality. **Results:** Input from child abuse clinicians steered development of data definitions and collection methods, and the translation of open-ended questions into categorical fields. Documentation was monitored prospectively for completeness and standardization. Ongoing collaboration with clinicians and social workers improved characterization of social and behavioral fields. The registry expanded from 22 to 165 variables with the greatest growth in characterizing social and behavioral elements. Modifications also included refinements in the measurement of injury circumstances, clinical findings, and custody disposition. **Conclusion:** A multidisciplinary, prospective approach standardized documentation and resulted in a robust registry with reduced variability and increased statistical power. Collaborative interaction between registry staff and clinicians was vital for translation of clinical topics of interest into measurable exposures and outcomes. Definitions of social demographics, an on-going limitation in the literature, underwent the most significant transformation.

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BENZODIAZEPINE EXPOSURE DURING PREGNANCY AND ADVERSE OUTCOMES AMONG INFANTS. Kathryn A. McInerney*, Lee S. Cohen, Abigail C. Davies, Marlene P. Freeman (Boston University School of Public Health)

Benzodiazepines are used during pregnancy to alleviate severe psychiatric symptoms, specifically anxiety, though little is known about their reproductive safety. Prior studies indicate possible association between benzodiazepine use during pregnancy and adverse neonatal and obstetric outcomes including preterm birth, low birth weight, NICU admissions, and neonatal withdrawal. We examined the relationship between benzodiazepine use anytime during pregnancy and a variety of neonatal (prematurity, low/high birth weight, small head circumference, low APGAR score, NICU admissions, breathing difficulties, feeding difficulties, muscular symptoms of withdrawal) and obstetric (cesarean section, preeclampsia) outcomes. Data from the National Pregnancy Registry for Atypical Antipsychotics were used. Participants complete telephone interviews at enrollment, 7 months pregnant, and 3 months postpartum. Medication information is obtained at each timepoint. Outcome information is predominately obtained through medical record review. 304 women were included in this analysis, including 82 who used a benzodiazepine any time during pregnancy and 222 psychiatrically ill women who remained unexposed to this class of medications. Crude and exposure propensity score adjusted logistic regression models were used to examine the exposure-outcome relationships of interest. Benzodiazepine use was associated with increased odds of newborn breathing difficulty (OR: 2.26, CI: 1.04, 4.94), and NICU admissions (OR: 2.87, CI: 1.43, 5.77). Effect modification by use of selective serotonin reuptake inhibitors (SSRI) was assessed with null findings. Overall, use of a benzodiazepine during pregnancy was associated with an increased risk for some adverse neonatal outcomes.

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THE ROLE OF SLEEP ON CHILD BEHAVIOR IN THE INFANT APHAKIA TREATMENT STUDY. Lauren Daniels*, Carolyn Drews-Botsch (Emory University)

Background: Studies have shown a link between behavior problems and disordered sleep in children with developmental delay and sleep apnea. Additionally, research suggests that in older children limitations in sleep duration are associated with behavioral problems. However, relatively few reports have examined the relationship between the overall duration of sleep and the variance in hours of sleep and behavior problems in typically developing preschool-aged children. **Methods:** To examine the relationship between caregiver reported sleep behaviors, data on hours of sleep were reported by the caregivers of 114 participants in the Infant Aphakia Treatment Study, a randomized clinical trial comparing two treatments for unilateral congenital cataract among otherwise healthy infants treated between 28 days and 7 months of age. Sleep and wake times were assessed via 48-hour retrospective telephone interview from three months after surgery through age 5 and via annual 7-day prospective diaries. Behavior problems were assessed at age 54 months using the Child Behavior Checklist. The current analyses focus on the average reported hours of sleep and variance in caregiver reported sleep hours between 36 and 54 months of age and in the 7-day prospective diary collected at 49 months of age. **Results:** Average hours of sleep was unrelated to total problems (r=0.06; p=0.57), externalizing problems (r=0.06; p=0.55), internalizing problems (r=0.06; p=0.58), or sleep problems (r=0.03; p=0.77). Similarly, the variability in reported hours of sleep was not correlated with behavior problems (total problems r=0.04; p=0.66; externalizing problems r=0.02; p=0.84; internalizing problems r=0.04; p=0.66; or sleep problems r=-0.002; p=0.98). **Conclusions:** These data suggest that in typically developing preschool-aged children, the amount and variability of sleep are unrelated to behavioral problems.

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VARIATIONS IN VERY PRETERM BIRTHS RATES IN EUROPE: CAN VALID COMPARISONS BE MADE USING ROUTINE DATA?
Marie Delnord*, Ashna Mohangoo, Jennifer Zeitli (Inserm UMR 1153, Obstetrical, Perinatal and Pediatric Epidemiology Research Team (Epopé), Center for Epidemiology and Statistics Sorbonne Paris Cité, Paris Descartes University)

Objective: Very preterm infants (<32 weeks gestational age (GA)) face high risks of mortality, neonatal morbidity and long term cognitive and motor impairments. Preterm birth rates vary greatly in Europe, but less is known about variations in very preterm birth. It is unclear if routine data can be used to make valid international comparisons. We investigated very preterm birth (VPTB) rates in Europe and assessed the impact of periviable births and stillbirths on country rates and rankings. **Methods:** Using routine aggregate data from 2010 collected by the Euro-Peristat project from 32 European countries/regions covering 4,450,135 births, we computed extremely (<28 weeks GA) and very (<32 weeks GA) preterm birth rates. We studied the impact of including stillbirths as well as births at 22-23 weeks GA on these rates. **Results:** VPTB rates ranged between 8.8 and 19.8 per 1000 total births with a median of 12.9 (IQR 11.5-14.3) and between 6.5 and 14.1 per 1000 live births with a median of 10.3 (IQR 8.2-13.0). Removing births at 22-23 weeks GA reduced the median to 11.7 per 1000 total births (IQR 10.5-13.0) and to 10.0 per 1000 live births (IQR 9.0-11.3), with reductions of 20% in some countries. Stillbirths represented between 2% and 62% of births 24-27 weeks GA (median: 21%) and between 3% and 26% of births 28-31 weeks GA (median: 8%). For births at 28-31 weeks GA, rankings were almost identical with and without stillbirths (rho=0.94, p=0.00); this association was also strong at 24-27 weeks GA (rho=0.80, p=0.00) and weaker for births at 22-27 weeks GA (rho=0.56, p=0.00). **Conclusion:** VPTB birth rates vary substantially across Europe, but differences in the proportion of births at 22-23 weeks GA and of stillbirths appear to strongly influence these variations. Sensitivity analyses removing stillbirths and periviable births can be used to flag countries where registration practices and thresholds for recording live and stillbirths require further investigation.

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SEX-SPECIFIC ASSOCIATIONS OF PLACENTAL CADMIUM AND INFANT BIRTH SIZE.
Mark Hensley*, April Mohanty, Mahlet Tadesse, Michelle Williams, Daniel Enquobahrie (University of Washington Department of Epidemiology)

Background: Higher maternal urinary cadmium (Cd) has been associated with reduced fetal growth, particularly among females. The effect of maternal Cd burden on the fetus may involve the placenta, a major component of the intrauterine environment. The placenta bioaccumulates Cd and serves as an efficient but imperfect barrier to fetal Cd exposure. We investigated infant sex-specific associations of placental Cd and birthweight. **Methods:** Placental samples were collected at delivery from participants (N=544) of a pregnancy cohort. Placental Cd was measured using Agilent 7500 ICP-MS. Information on birth weight was abstracted from medical records. Participants were categorized into infant-sex specific placental Cd quartiles. Multivariable linear regression models were used to examine associations between placental Cd and birth weight, adjusted for maternal age, race/ethnicity, body mass index, preeclampsia, gestational diabetes, and smoking history. **Results:** Medians of placental Cd for male and female infants were 0.0037ng/mg and 0.0034ng/mg, respectively. Among males, infants in the upper quartiles for placental Cd had 360.5g (quartile 2), 148.9g (quartile 3), and 372.9g (quartile 4) lower birth weights, compared with infants in the lowest quartile (trend p-value=0.017). We did not observe similar associations among female infants. Corresponding estimates for quartiles 2, 3, and 4, compared with quartile 1, were -2.4g, -184.0g, and 25.5g (trend p-value=0.746). **Conclusions:** Placental Cd is inversely associated with birth weight among male infants, but not female infants. This contrasts with previous reports of urinary Cd-birth weight associations among females. Inconsistencies between these associations and underlying mechanisms are potential areas of future research.

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DIAGNOSIS OF POSTPARTUM DIABETES AFTER PHARMACOLOGICAL TREATMENT FOR GESTATIONAL DIABETES, 2001 TO 2011.
Suzanne Landi*, Wendy Camelo, Castillo, Kim Boggess, Mitchell Conover, Michele Jonsson Funk (University of North Carolina Chapel Hill)

Background: Gestational diabetes mellitus (GDM) is a prevalent pregnancy complication in the U.S. for which pharmacological treatment with glyburide or insulin may be required. Despite being off-label, glyburide use is frequent and has become more common than injectable insulin in recent years. However, glyburide's comparative impact on maternal health has not been adequately assessed, particularly with respect to the risk of developing type 2 diabetes postpartum. **Methods:** We identified pregnant women aged 15 to 50 who received glyburide or insulin treatment for GDM in Truven Health Analytics' MarketScan database from 2001 to 2011 (n=5238). Women were followed two years postpartum to identify incident cases of type 2 diabetes, defined as ≥ 2 outpatient or ≥ 1 inpatient relevant ICD-9 codes (250.xx). Continuous enrollment was required for one year prior to and two years after the delivery date. We estimated risk ratios and 95% confidence intervals using log-binomial regression to compare diagnosis outcomes between glyburide and insulin users, adjusting for age, region, calendar year, and claims for obesity diagnosis. **Results:** Over half of women received glyburide for GDM during their pregnancy (n=2764, 52.8%). Overall, 364 (7.0%) women were diagnosed with type 2 diabetes within two years postpartum. Of those diagnosed, 53.9% were previously treated with insulin, and 46.2% were previously treated with glyburide. Women receiving glyburide treatment were 22% less likely to be diagnosed with type 2 diabetes in the two years after delivery (adjRR=0.78 [95% CI 0.63, 0.96]) as compared with women receiving insulin treatment. **Conclusion:** The lower risk of type 2 diabetes among those treated with glyburide may be attributed to residual confounding or differences in utilization of health services during the postpartum period. Characterization of clinical surveillance in pharmacologically-treated women with GDM requires further exploration.

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MATERNAL AEROBIC AND STRENGTH TRAINING PHYSICAL ACTIVITY AND OFFSPRING BIRTHWEIGHT: THE OMEGA STUDY.
Sylvia E Badon*, Chunfang Qiu, Michelle A Williams, Daniel A Enquobahrie (University of Washington School of Public Health)

Background: Despite differing cardiometabolic benefits of aerobic physical activity and strength training, and increasing participation in strength training among women, few studies have assessed associations of maternal aerobic activity and strength training with offspring birthweight (BW). **Methods:** Study participants (N= 2907) were identified from the Omega study, a prospective pregnancy cohort. During a structured interview at 15 weeks gestation, participants reported leisure time physical activities performed in the year before pregnancy (ppLTPA) and in the week before the interview (epLTPA). BW was abstracted from medical records. Regression models were used to determine mean difference in BW across activity categories: inactive, strength training and aerobic LTPA, or aerobic LTPA only. Stratified analyses were used to assess if associations differ by infant sex or pre-pregnancy overweight/obese status (body mass index ≥25kg/m2). **Results:** During pre-pregnancy and early pregnancy, 65% and 64% of participants, respectively, performed aerobic LTPA only, while 26% and 11% of participants, respectively, performed both aerobic and strength training LTPA. During pre-pregnancy and early pregnancy, 0.5% and 0.4% of participants, respectively, performed strength training LTPA only and were excluded from further analyses. Overall, no differences in BW were observed between women who participated in strength training and aerobic ppLTPA compared to women who only participated in aerobic ppLTPA (β= -10g; 95% CI: -46, 26). Similarly, no difference in BW was observed by type of epLTPA (β= -34g; 95% CI: -84, 17). Neither infant sex nor pre-pregnancy overweight/obese status modified the associations. **Conclusion:** Our findings indicate that maternal LTPA type (aerobic or strength training) is not associated with birthweight. Future studies in other populations are needed to inform LTPA recommendations prior to and during pregnancy.

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MATERNAL OBESITY AND RACE/ETHNICITY IN PERINATAL OUTCOMES: ARE THERE INTERACTION EFFECTS? Jonathan M Snowden*, Brian Quigley, Aaron B Caughey (Oregon Health & Science UniversityObjective: Maternal obesity is a risk factor for a variety of adverse perinatal outcomes, and there are well-documented racial/ethnic disparities in birth outcomes. Although prior research has demonstrated interactions between maternal obesity and race/ethnicity for some outcomes (e.g., gestational diabetes), little is known about potential interactions for other outcomes. **Study design:** This was a retrospective cohort study of California deliveries in 2007, analyzing linked birth certificate and patient discharge data. We categorized maternal BMI as obese versus non-obese, and racial/ethnic categories used were: non-Hispanic white, non-Hispanic black, Hispanic, and Asian-American. As outcomes, we analyzed: gestational diabetes, preeclampsia, low birthweight, preterm delivery, macrosomia (birthweight >4,500 g), and low-risk cesarean delivery. We fit multivariable logistic regressions for each outcome, controlling for maternal age, education, public insurance status, prenatal care initiation, and parity. **Results:** Significant antagonistic interactions were found between Asian and Hispanic ethnicity and obesity for GDM (OR=0.77 and OR=0.84 respectively, P<0.001). Obesity is less of a risk factor for these women as compared to white women, likely reflecting the higher risk of GDM at baseline among non-obese Asian and Hispanic women (OR=2.63 and 1.56 respectively, P<0.001). Similar associations were seen in preeclampsia among Black women (interaction term OR=0.82, P=0.007) and Hispanic women (OR=0.77, P<0.001). For preeclampsia, there was a synergistic effect for obese Asian women (OR=1.74, P<0.001). Obese Asian women were also at increased risk for preterm birth and macrosomia, while there was antagonism for obese black women's risk for macrosomia.**Conclusion:** Maternal race/ethnicity and obesity interact for a number of perinatal outcomes. Clinicians and populations researchers should bear this in mind when considering clinical counseling and research design.

1020

MENSTRUAL CYCLE CHARACTERISTICS AND FECUNDABILITY IN A NORTH AMERICAN PRECONCEPTION COHORT. Amelia Wesselink*, Shruthi Mahalingaiah, Elizabeth Hatch, Kenneth Rothman, Ellen Mikkelsen, Craig McKinnon, Lauren Wise (Boston University School of Public Health)

Abnormal menstrual cycle patterns may be an important indicator of reduced fertility. We examined the association between menstrual cycle characteristics and fecundability in the Pregnancy Study Online (PRESTO), a North American preconception cohort study (2013-2014). Female pregnancy planners completed a baseline questionnaire in which they reported their cycle length, duration and heaviness of menstrual flow, age at menarche, and time from menarche until cycle regularity. Outcome data were updated every 8 weeks until clinically-recognized pregnancy, fertility treatment, loss to follow-up, or end of observation (12 months), whichever came first. Adjusted fecundability ratios (FR) and 95% CIs were estimated using a proportional probabilities model. Women who reported recent irregular cycles were excluded from the analyses of cycle length, duration of flow, and heaviness of flow. Among 1291 women, FRs for cycle lengths of <25, 25-26, 30-31, 32-33, and ≥34 days were 0.60 (CI: 0.36-1.00), 0.86 (CI: 0.67-1.16), 0.86 (CI: 0.72-1.03), 1.06 (CI: 0.81-1.37), and 1.04 (CI: 0.81-1.33), respectively, compared to average cycle lengths (27-29 days). FRs for early (<12 years) and late (≥15 years) menarche were 0.93 (CI: 0.78-1.10) and 0.86 (CI: 0.67-1.09), respectively, compared to ages at menarche of 12-13 years. Relative to women whose menstrual cycles became regular <2 years after menarche, FRs for women whose cycles took 2-3 years to become regular, at least 4 years to become regular and whose cycles never became regular were 0.95 (CI: 0.73-1.23), 0.81 (CI: 0.57-1.17) and 0.74 (CI: 0.62-0.89), respectively. Duration and heaviness of flow were not appreciably associated with fecundability.Our findings are consistent with results from previous studies and suggest that short cycle length and cycle irregularity may be important indicators of reduced fertility potential.

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INTAKE OF CAFFEINATED BEVERAGES AND FECUNDABILITY IN A PRECONCEPTION COHORT. Amelia Wesselink*, Lauren Wise, Shruthi Mahalingaiah, Kenneth Rothman, Ellen Mikkelsen, Elizabeth Hatch (Boston University School of Public Health)

Caffeine is an adenosine receptor agonist that may influence fertility potential by affecting ovulation or other menstrual characteristics. Literature on this topic shows conflicting findings, which may stem from retrospective designs coupled with exposure misclassification. We studied the relation between preconception caffeine intake and fecundability in Pregnancy Study Online (PRESTO), a cohort of pregnancy planners. Frequency of coffee, tea, soda, and energy drink intake was self-reported at baseline. We used caffeine content values from the National Nutrient Database for Standard Reference to calculate caffeine intake. Outcome data were updated every 8 weeks until clinically-recognized pregnancy, fertility treatment, loss to follow-up, or end of observation (12 months). We restricted analyses to women who had been trying to conceive for ≤6 cycles at study entry. Adjusted fecundability ratios (FR) and 95% CIs were estimated using a proportional probabilities model. Over 60% of daily caffeine intake among 1,367 women was from coffee consumption. Compared with <100 mg/day of caffeine, FRs for 100-199, 200-299, and 300+ mg/day at baseline were 1.01 (CI: 0.88, 1.16), 1.04 (CI: 0.84, 1.27), and 1.25 (CI: 0.92, 1.69), respectively. FRs for 1 and 2+ servings/day of coffee, compared with 0 servings/day, were 1.28 (CI: 0.99, 1.67) and 1.32 (CI: 0.88, 2.00), respectively. High intake of other caffeinated beverages was rare, resulting in imprecise FR estimates. We found a suggestion of reduced fecundability among women who consumed the most caffeinated tea, herbal tea, caffeinated soda, and sugar-sweetened soda. Energy drink intake was weakly associated with fecundability. Results were consistent when we stratified by attempt time at study entry (0-2 cycles vs. 3-6 cycles). Our findings do not support the hypothesis that caffeine or coffee intake causes reduced fecundability.

1022

IS AMNIOTIC FLUID PERFLUOROOCTANE SULFONATE LEVEL ASSOCIATED WITH FETAL LEYDIG CELL FUNCTION, CRYPTORCHIDISM AND HYPOSPADIAS? Gunnar Toft*, Bo AG Jönsson, Jens Peter Bonde, Bent Nørgaard-Pedersen, David M Hougaard, Arieh Cohen, Christian H Lindh, Richard Ivell, Rainder Anand-Ivell, Morten S Lindhard (Department of Clinical Epidemiology, Aarhus University Hospital, Denmark)

Background: Exposure to Perfluorooctane Sulfonate (PFOS) may potentially disturb fetal Leydig cell hormone production and male genital development. **Objectives:** We aim to study the associations between amnion fluid PFOS level and fetal steroid hormone and Insulin-like factor 3 (INSL3) level as well as the risk of cryptorchidism and hypospadias. **Methods:** Utilizing the Danish National Patient Registry, we selected 270 cryptorchidism cases, 75 hypospadias cases and 300 controls with stored maternal amnion fluid samples available in a Danish pregnancy-screening biobank (1980-1996). PFOS was measured in amnion fluid from 645 persons and steroid hormones in samples from 545 persons by mass spectrometry. INSL3 was measured by immunoassay from 475 persons. Associations between PFOS concentration in amnion fluid, hormone levels and genital malformations were assessed by confounder adjusted linear and logistic regression.**Results:** The highest tertile of PFOS exposure (>1.4 ng/ml) in amnion fluid was associated with 40% (confidence interval (CI) 11% to 69%) lower INSL3 level and 18% (CI 7% to 29 %) higher testosterone level compared to the lowest tertile (<0.8 ng/ml). Amnion fluid PFOS concentration was not associated with cryptorchidism or hypospadias. **Conclusions:** Environmental PFOS exposure may be associated with steroid hormone levels and INSL3 concentration but is not associated to increased risk of cryptorchidism and hypospadias. Whether altered fetal hormone levels is associated to long¬term consequences for reproductive health will need to be addressed in future studies.

1023

NIGHT SHIFT WORK AND TIME-TO-PREGNANCY IN THE BLACK WOMEN'S HEALTH STUDY. Lauren A Wise*, Todd R Sponholtz, Edward A Ruiz-Narvaez, Lynn Rosenberg, Julie R Palmer(Slone Epidemiology Center, Boston University)

Background: Night shift work has been associated with infertility in some studies, but previous studies have been either cross-sectional or retrospective in design. **Objective:** We assessed the association between night shift work and fecundability among participants aged 21-40 years from the Black Women's Health Study, a prospective cohort study. **Methods:** Night shift work histories, including frequency and duration of night shift work, were reported in 2005. In 2011, time-to-pregnancy (TTP) was reported in months. Proportional probabilities regression was used to estimate fecundability ratios (FRs) and 95% confidence intervals (CI), with adjustment for age, body mass index, education, household income, geographic region, smoking status, and alcohol consumption. Data on male factors, intercourse frequency, and persistence in trying were not collected. **Results:** During 2005-2011, there were 575 planned pregnancy attempts reported by 497 women, resulting in 331 births. Night shift work was associated with a delay in conception: relative to never having worked on a night shift, the FR for ever having worked on a night shift was 0.79 (95% CI: 0.61, 1.01). Both frequency and duration of night shift work were associated with longer TTP: relative to never having worked on a night shift, FRs for frequencies of <1/month and ≥1/month were 0.82 (95% CI: 0.52, 1.31) and 0.79 (95% CI: 0.60, 1.04), respectively, and FRs for <2 and ≥2 years of night shift work were 0.87 (95% CI: 0.61, 1.24) and 0.78 (95% CI: 0.57, 1.07), respectively. Women who had worked on the night shift for at least once per month for ≥2 years had the lowest fecundability (FR=0.71, 95% CI: 0.50, 0.99). **Conclusions:** These data suggest that night shift work may be an independent risk factor for subfertility in black women.

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USING THE BEHAVIORAL RISK FACTOR SURVEILLANCE SYSTEM TO EXPLORE FEMALE INFERTILITY. Sachiko A. Kuwabara*, Ruben Smith, Sara Crawford, Violanda Grigorescu (The Centers for Disease Control and Prevention, ORISE Fellow)

Introduction: Population-level data on infertility are sparse. As patient-generated-data gain more attention, we explored the use of Centers for Disease Control and Prevention (CDC)'s Behavioral Risk Factor Surveillance System (BRFSS) to assess the prevalence of infertility in the context of behaviors and other chronic conditions, as well as factors associated with access to services and treatment utilization. BRFSS is a coordinated collection of population health surveys conducted by state's public health departments. **Methods**: 2013 BRFSS data from 5 states (CT, KY, MA, OH, UT) that administered questions related to infertility to women age 18-50 were used. Prevalence estimates of female infertility were measured. Multinomial logistic regression was used to 1) identify factors associated with female infertility (categorized as infertility, difficulty staying pregnant and no infertility), and 2) explore the impact of health care coverage on type of treatment received among women with infertility. **Results:** Lifetime prevalence of female infertility averaged 11.7%, ranging from 10.6% in CT to 13.2% in UT. Controlling for age and marital status, history of depressive disorder was associated with having ever experienced female infertility (OR=1.89, 95% CI: 1.28, 2.79). The most common treatment received was medication alone to improve or stimulate ovulation (23%). Having health care coverage was associated with receiving either medication (OR=3.79, 95%CI: 1.60, 8.97) or IUI and/or ART (OR=8.89, 95% CI: 2.13, 37.0) compared to no treatment. **Conclusions:** Use of existing and ongoing epidemiologic data collection systems such as BRFSS provides an opportunity to obtain population-based measures of the burden of infertility and serves as effective method for gathering state-specific data on health and access to care. Expanding the use of such systems would enable tracking of trends, allow for comparability of measures across states and is adaptable for local use.

1025

MISSING PATERNAL DATA AND BIRTH OUTCOMES IN CANADA. Gabriel D. Shapiro*, Michael S. Kramer, Jay S. Kaufman, Tracey Bushnik, Amanda J. Sheppard, Russell Wilkins Michael Tjepkema, Seungmi Yang (McGill University, Montreal)

Background: Research on predictors of birth outcomes has focused on maternal characteristics. Less is known about the role of paternal factors. Missing paternal data may serve as a useful marker for adverse birth outcomes. In addition, studies of paternal factors and birth outcomes may be biased by missing exposure data, and the extent of such bias has not been well characterized. **Objective:** To compare rates of preterm birth (PTB), small-for-gestational-age (SGA) birth, stillbirth and infant mortality in Canada, based on the presence or absence of paternal data, controlling for maternal characteristics. **Methods:** We analyzed a cohort of births between May 2004 and May 2006 created by linking vital records data from the Canadian perinatal health database with the 2006 Canadian census. Binomial regression was used to estimate risk ratios and 95% CIs for adverse birth outcomes (PTB, SGA birth, stillbirth and infant mortality) associated with absence of a link to paternal information between the census and vital records data. Analyses were controlled for maternal education, age, marital status, parity, ethnicity, nativity and household income. **Results:** 135,426 births were included in our analyses, with matched paternal data between the census and vital records in 117,299 (86.6%). Compared to those with paternal data available, the adjusted RR (95% CI) in births without a paternal data match were 1.14 (1.07–1.22) for PTB, 1.11 (1.05–1.18) for SGA, 1.47 (1.15–1.87) for stillbirth and 1.24 (0.96–1.61) for infant mortality. **Conclusions:** Our study suggests that missing paternal data is a marker for increased risk of adverse birth outcomes, over and above maternal characteristics. Our results shed light on the magnitude and direction of bias due to missing exposure data in studies of paternal factors and birth outcomes. We recommend that future studies explore mechanisms, such as psychosocial or instrumental support, by which partners of pregnant women may affect birth outcomes.

1026-S/P

VAGINAL LUBRICANT USE AND TIME TO PREGNANCY: A PROSPECTIVE COHORT STUDY, Kristen A Hahn*, Elizabeth E Hatch, Anne Z Steiner, Ellen M Mikkelsen, Thala M Snerum, Kenneth J Rothman, Lauren A Wise (Boston University School of Public Health)

Several in vitro studies have found that exposure to common vaginal lubricants (such as KY Jelly, Astroglide), but not water-based, pH balanced, "fertility-friendly" lubricants (such as Pre-Seed), diminishes sperm motility. However, in vivo studies of the impact of vaginal lubricants on fertility are limited. We conducted a combined analysis of data from two preconception cohorts in North America (Pregnancy Study Online, 2013-2014) and Denmark (Snart Foraeldre, 2011-2014). Analyses were restricted to women attempting pregnancy for 6 or fewer cycles at study entry. Participants reported data on current lubricant use at baseline and were contacted every 8 weeks for 12 months or until clinically-recognized pregnancy, whichever came first. Lubricant brands were separated into the following mutually exclusive categories: water-based, "fertility-friendly", and other lubricants (silicone, oil, petroleum-based, mixed and unknown types). Proportional probabilities regression models were used to estimate fecundability ratios (FR) and 95% CIs, with control for age, BMI, parity, intercourse frequency, oral contraceptive use, smoking and cohort. Overall, 508 of 3,144 women (12.5%) reported current lubricant use. A higher proportion of women (19.3%) from North America reported lubricant use than women from Denmark (7.1%). Multivariable FRs were 1.13 for water-based lubricants (CI: 0.96, 1.34), 1.08 for "fertility-friendly" lubricants (CI: 0.84, 1.38)), and 1.05 for other lubricants (CI: 0.90, 1.22), compared with non-users. Results changed little when stratified on attempt time at entry (<3 vs. ≥3 cycles) and age (<30 vs. ≥30 years). No decrease in fecundability was seen among women who used vaginal lubricants while attempting to get pregnant.

1027-S/P

PREDICTORS OF HEALTH RISK BEHAVIORS IN A DIVERSE POPULATION OF PREGNANT WOMEN. Carrie Nobles*, Bess Marcus, Brian Whitcomb, Barry Braun, Ed Stanek, Glenn Markenson, Lisa Chasan-Taber (School of Public Health and Health Sciences, University of Massachusetts Amherst)

Cigarette smoking, low-levels of moderate-intensity physical activity, and sedentary behavior during pregnancy are potentially modifiable risk factors for adverse pregnancy outcomes, but studies among Hispanic women are sparse. Therefore, we assessed how demographic and family-level factors are related to health-risk behaviors using baseline data from the Behaviors Affecting Baby and You (B.A.B.Y.) Study, a randomized controlled trial of exercise on risk of gestational diabetes. Smoking was assessed using a modified version of the PRAMS questionnaire and sedentary behavior and physical activity were assessed via the Pregnancy Physical Activity Questionnaire. Participants (n=488) enrolled at a mean of 12.4 (SD 3.6) weeks gestation and were predominantly Hispanic (54.3%), young (46.5% <25 years) and low-income. A total of 16% reported smoking, 25.1% reported < 28 MET-hrs/wk moderate-intensity activity, and 26.3% reported ≥4 hrs/day sedentary behavior. A health risk index was calculated as the number of health risk behaviors (smoking, lowest quartile of moderate-intensity activity, and top quartile of sedentary behavior) with a possible range of 0 to 3. The mean health risk index was 1.1 (SD 0.7) with 44.1% engaging in 1 health risk behavior, 10.9% engaging in 2 risk behaviors, and 1.2% engaging in 3 risk behaviors. In multivariable models, having low income (OR 2.3, 95% CI 1.2, 4.5), lack of a partner (OR 2.4, 95% CI 1.2, 4.5) and not having children in the household (OR 2.5, 95% CI 1.4, 4.4) were significantly associated with engaging in at least one health risk behavior. While Hispanic ethnicity was not associated with the health risk index, it was inversely associated with smoking during pregnancy (OR 0.49, 95% CI 0.27, 0.90). Finally, obesity, education, and parity were not associated with the health risk index. Findings can help to better characterize high-risk groups and inform interventions designed to target these health risk behaviors.

1028-S/P

SERUM PERFLUOROALKYL ACIDS AND TIME TO PREGNANCY IN NULLIPAROUS DANISH WOMEN. Cathrine Carlsen Bach*, Bodil Hammer Bech, Ellen Aagaard Nohr Niels, Bjerregaard Matthiesen, Jørn Olsen, Eva Cecilie Bonefeld-Jorgensen, Tine Brink Henriksen (Perinatal Epidemiology Research Unit, Aarhus University Hospital, Aarhus, Denmark)

Background Studies on exposure to perfluoroalkyl acids (PFAAs) and female fecundability or infertility provided conflicting results. We aimed to investigate the association between several PFAAs and time to pregnancy. We restricted the study to nulliparous women to eliminate reverse causality among parous women. **Methods** From 2008 - 2013, we included 1385 women from the Aarhus Birth Cohort who gave a blood sample before 14 gestational weeks and had data on time to pregnancy. We measured levels of 16 PFAAs in maternal serum and report data for seven compounds with at least 75 % of all samples above the limit of quantification. We used discrete-time survival analysis to estimate fecundability ratios according to quartiles of PFAAs, adjusted for potential confounders chosen with guidance from a directed acyclic graph. We estimated the association between PFAAs and infertility (time to pregnancy>12 months or infertility treatment prior to the studied pregnancy) by multivariate logistic regression. **Results** Median levels of perfluorooctane sulfonate and perfluorooctanoate were 8.3 and 2.0 ng/mL, respectively. Overall, no obvious associations were apparent between any PFAAs and fecundability ratios or infertility odds ratios (e.g. the adjusted fecundability ratio for perfluorooctane sulfonate was 1.06 (95 % confidence interval 0.89 - 1.26, highest versus lowest quartile).**Conclusion** We found no association between serum levels of PFAAs and time to pregnancy or infertility in a recent sample of women with lower average exposure levels compared to most studies. This study adds to the sparse knowledge on other PFAAs than perfluorooctane sulfonate and perfluorooctanoate.

1029-S/P

LOW MATERNAL 25-HYDROXYVITAMIN D CONCENTRATION INCREASES THE RISK OF SEVERE, MILD, AND LATE-ONSET PREECLAMPSIA. Katharyn M. Baca*, Hyagriv N. Simhan, Robert W. Platt, Lisa M. Bodnar (Department of Epidemiology, Graduate School of Public Health, University of Pittsburgh, Pittsburgh, PA)

The objective of this case-cohort study was to evaluate the relationship between maternal 25-hydroxyvitamin D (25(OH)D) concentration and preeclampsia overall and by subtype. From an eligible cohort of 65,867 women who had serum banked from aneuploidy screening and subsequently delivered at Magee-Womens Hospital, we randomly sampled 2327 pregnancies and all remaining preeclampsia cases (n=650 cases). Preeclampsia, defined as new-onset hypertension and proteinuria, was identified by ICD-9 codes. Maternal serum collected at ≤20 weeks gestation was measured for 25(OH)D. We used multivariable log-binomial regression to estimate the association between 25(OH)D and preeclampsia after adjusting for confounders including season, race/ethnicity, prepregnancy BMI, parity, and smoking. The weighted incidence of preeclampsia was 5.0%, while 21.3% of the subcohort had 25(OH)D <50 nmol/l. Using restricted cubic splines with four knots, we found a dose-response association between maternal 25 (OH)D and the adjusted risk of preeclampsia. As serum 25(OH)D increased, the risk of preeclampsia declined to 75 nmol/l and plateaued. Women with serum 25(OH)D <25 nmol/l had a 2.4-fold increased risk of preeclampsia compared with those with 25(OH)D ≥75 nmol/l (adjRR 2.4, 95% CI 1.2, 4.8). After adjustment, women with 25(OH)D 25 to <50 nmol/l and 25(OH) D 50 to < 75 nmol/l had trends of increased risks of overall preeclampsia compared with those with 25(OH)D ≥ 75 nmol/l. Similar findings were observed when limited to late-onset preeclampsia and when cases were subdivided into severe and mild disease. Randomized trials of vitamin D supplements are needed to test the causality of this association.

1030-S/P

ASSOCIATION BETWEEN DIETARY MAGNESIUM AND SYMPTOMS OF PREMENSTRUAL SYNDROME. Robyn Kalwerisky*, Aijun Ye, Lindsey Sjaarda, Neil Perkins, Karen Schliep, Torie Plowden, Shvetha Zarek, Rose Radin, Jean Wactawski-Wende, Sunni Mumford (Epidemiology Branch, Eunice Kennedy Shriver National Institute of Child Health and Human Development)

Nearly all regularly menstruating women of reproductive age are affected by Premenstrual Syndrome (PMS) symptoms in the weeks prior to menses, and thus there is a need to explore potential modifiable factors that might relieve symptoms. Evidence suggests that micronutrient—specifically, magnesium—intake could play a role in alleviating symptoms. We aimed to further explore the association between dietary magnesium intake and PMS symptoms among a cohort of 259 healthy premenopausal women ages 18-44 who were followed for up to 2 menstrual cycles in the BioCycle study. Dietary intake was evaluated 4 times per cycle using 24-hour recalls and averaged per cycle, while 27 PMS symptoms (including anxiety, depression, craving, hydration, or other), and their respective severities were assessed up to 4 times per cycle via standardized questionnaires. Linear mixed models adjusted for energy intake, age, and race were used to evaluate associations. We observed that dietary magnesium intake above versus below the recommended levels (≥310 mg/day [n=28, 10.8%] versus <310 mg/day [n=231, 89.2%]) was not associated with reported PMS-related physical pains and sicknesses, like flu, cold, or other non-specific pain symptoms (beta: -0.24, 95% CI: -0.93, 0.45). Magnesium was also not associated with psychological symptoms—such as depression or anxiety (beta: 0.43, 95% CI:-0.74,1.6)—or food cravings (beta: 0.39, 95% CI: -0.65,1.43). These data do not support the hypothesis that dietary magnesium intake may provide natural relief for symptoms of PMS. Future research is needed to determine other potential dietary and lifestyle factors that may relieve symptoms.

1031-S/P

PLACENTAL TELOMERE LENGTH AND RISK OF PLACENTAL ABRUPTION. Tsegaselassie Workalemahu* (University of Washington)

Background: Placental telomere length (PTL), a marker of cellular senescence, chronicles antepartal stress from oxidative stress and inflammation. We investigated the relation between relative PTL and risk of placental abruption (PA). We also examined interactions between relative PTL and mitochondrial DNA copy number (mitDNA CN), another marker of oxidative stress, on PA risk. **Methods:** A total of 105 PA cases and 73 controls were selected among participants of a two-phased PA study conducted in Lima, Peru. Information on participant characteristics was collected using questionnaires. Relative PTL and mitDNA CN were measured using qRT-PCR techniques. Mean differences in relative PTL between PA cases and controls were evaluated, adjusted for study source, gestational age and maternal age at delivery. Interactions between PTL and mitDNA CN were evaluated using logistic regression analyses, stratified by respective median cutoffs for relative PTL (short/long) and mitDNA CN (low/high). **Results:** Relative PTL of PA cases and controls were 2.00 and 2.04, respectively. Multi-variable adjusted mean difference in relative PTL between PA cases and controls was 0.09 (p>0.05). Among controls, relative PTL and mitDNA CN were inversely correlated (Spearman's rho=-0.30, p=0.04). Participants who had short relative PTL and low mitDNA CN had a 2.71-fold higher odds of PA as compared with the reference group (participants with long relative PTL and low mitDNA CN). On the other hand, participants who had short relative PTL and high mitDNA CN had a 1.40-fold higher risk odds of PA as compared with the reference group (interaction p-value=0.05). **Conclusion:** PA cases had shorter relative PTL compared with controls, although our findings were not statistically significant. We observed significant interactions between relative PTL and mitDNA CN on risk of PA. Larger studies evaluating relationships between PTL, mitDNA CN, and PA risk are warranted.

1032-S/P

SERUM OMEGA-3 FATTY ACIDS AND PREGNANCY OUTCOMES AMONG WOMEN UNDERGOING ASSISTED REPRODUCTION. Yu-Han Chiu*, Anatte E Karmon, Audrey J Gaskins, Paige L Williams, Irene Souter, Bo R Rueda, Russ Hauser, Jorge E Chavarro (Department of Nutrition, Harvard T. H. Chan School of Public Health, Boston, MA, 02115 USA)

BACKGROUND: Omega-3 polyunsaturated fatty acids (ω3-PUFA) have been shown to improve oocyte and embryo quality in animal and human studies. However, a recent epidemiologic study found no relation between circulating ω3-PUFA and pregnancy rates after assisted reproduction technology (ART). We evaluated the association between serum levels of PUFA and reproductive success among women undergoing ART. **METHODS:** Serum fatty acids were measured in samples taken between day 3 and 9 of stimulated cycle by gas chromatography in a random sample of 100 women (contributing to 168 ART cycles) from an ongoing prospective cohort study at a medical fertility center (2007-2014). Clinical endpoints, including implantation, clinical pregnancy, and live birth, were obtained from medical records. Generalized estimating equation models with a log link were used to analyze the association of total and specific PUFAs with ART clinical outcomes adjusting for age, body mass index, smoking status, FSH levels, and infertility diagnosis. **RESULTS:** The median [25th, 75th percentile] serum level of ω3-PUFA of the subjects was 4.69% [3.75%, 5.77%]. Serum ω3-PUFA were positively related to dietary intake of ω3-PUFA (rSpearman=0.38). Higher levels of serum ω3-PUFA were associated with higher implantation and live birth rates. Specifically, implantation, clinical pregnancy, and live birth rates increased by 11% (95%CI: 8%, 13%), 9% (95%CI: 11%, 18%), and 18% (95%CI: 14%, 22%) per interquartile range increase in serum ω3-PUFA. The associations remained significant for implantation rate (RR=1.14, 95%CI: 1.07, 1.21) and live birth rate (RR=1.16, 95%CI: 1.02, 1.32) after adjustment for potential confounders. Serum ω6-PUFA and total PUFA were not associated with ART outcomes. **CONCLUSIONS:** Higher serum levels of ω3-PUFA were associated with higher implantation and live birth rates among women undergoing ART.

1033

USE OF NSAIDS AND OTHER WEAK ANALGESICS AND TIME TO PREGNANCY. Ellen M. Mikkelsen* Senior researcher

Background: Weak analgesics are commonly used by women of reproductive age. Recent studies have shown that use of non-steroidal anti-inflammatory drugs (NSAIDs) during pregnancy might be a risk factor for miscarriage. Little is known about the effect of NSAIDs and other weak analgesics on fertility. **Objectives:** To examine the role of preconceptional intake of aspirin, non-aspirin NSAIDs, and paracetamol in relation to time to pregnancy (TTP). **Methods:** We examined the association between use of these drugs and TTP in a combined cohort (Snart Forældre and Snart Gravid) of 7,272 Danish pregnancy planners. We restricted analyses to 5,673 women who had tried to conceive for ≤ 6 cycles at study entry. Data were collected through web-based questionnaires at baseline and updated every two months for a year or until conception. Weak analgesics were reported by name, including the number of pills taken per week within the last month. We categorized time varying exposure as aspirin, non-aspirin NSAIDs, paracetamol, or a combination of these categories. We used a proportional probabilities model to estimate adjusted fecundability ratios (FRs) and 95% confidence intervals (CI). **Results:** 78.7 % of the study population took ≥ 1 pill of weak analgesics per week. Among users, mean intake was 2.5 pills per week. Compared with women not taking any mild analgesics, the FRs and CIs for women taking one pill or ≥ 2 pills per week were; aspirin, 0.95 (0.75-1.17) and 0.88 (0.65-1.18); non-aspirin NSAIDs, 0.95 (0.83-1.09) and 0.88 (0.75-1.04); and paracetamol, 1.03 (0.94-1.12) and 1.00 (0.90-1.10). Women taking a combination of weak analgesics with a dose of 2 or ≥ 3 pills per week compared with no use had little difference in TTP (FR=0.97 (CI: 0.86-1.08) and FR= 0.93 (CI: 0.84-1.02)). **Conclusion:** Our data suggest that preconceptional intake of low dose, and occasional use of weak analgesics is not appreciably associated with reduced fecundability.

1040-S/P

AN OUNCE OF PREVENTION: DEATHS AVERTED FROM IMPLEMENTING EVIDENCE-BASED PRIMARY PREVENTION INTERVENTIONS IN THE UNITED STATES IN 2010. Sabrina Hermosilla*, Stephanie Kujawski, Catherine Richards, Peter Muennig, Sandro Galea, Abdulrahman M El-Sayed (Columbia University)

The United States (U.S.) lags in the nationwide adoption of primary prevention interventions. However, the potential population health benefit of various primary prevention interventions remains unclear. Based on a systematic review the literature, we estimated the number of deaths that could have been averted in the U.S. in 2010 if all rigorously-studied, efficacious primary prevention interventions for which population attributable risk could be estimated were implemented nationwide. We calculated the number of preventable deaths from interventions by applying the population attributable risk formula to the Centers for Disease Control and Prevention Underlying Cause of Death database for all causes of death with greater than 1,000 deaths in 2010. We estimated that 186,498 (7.4%) deaths in the United States could have been averted if all rigorously-studied, efficacious primary prevention protocols were implemented nationwide. Two in 3 deaths averted would have been from cardiovascular disease or malignancy. The proportion of preventable deaths varied by cause of death, prevention protocol, and demographic profile. Protocols ranged in efficacy from RR=0.15 (human papillomavirus vaccine, type 16) to RR and OR=0.88 (school-based smoking prevention program and home fall prevention environment or assistive technology interventions). Implementing a smoking prevention protocol was responsible for the highest number of potential deaths averted in 2010 (51,485; 2.1% of all-cause mortality), despite being among the least efficacious protocols identified. Despite the considerable gaps in the current primary prevention science literature, our findings suggest that increased investment in efficacious primary prevention could result in substantial improvements in mortality.

1041

ARE TOBACCO TAXES INCREASING SMOKING INEQUALITIES? RECENT EVIDENCE FROM CANADA. Sam Harper*, Phongsack Manivong, Erin C. Strumpf (McGill University)

Although smoking has been in steady decline in past decades, educational inequalities in smoking have increased in Canada. Given the concomitant rise in cigarette prices (largely via tax increases), this suggests that taxes may be less effective among the lower educated. We exploited the quasi-random timing of changes to tobacco taxes across Canadian provinces to estimate the differential effect of cigarette tax increases on smoking participation and smoking frequency by education. We used data from the 2002-2012 Canadian Tobacco Use Monitoring Surveys and linked individuals aged 25 and over to the cumulative amount of cigarette taxes in their province of residence at time of interview (based on the precise date of adoption of tax increases). We used difference-in-differences regression models including province and year fixed effects, adjusted for time-varying provincial unemployment rates and smoke-free policies, and estimated marginal effects. The overall effect of a $1 increase in cigarette taxes for a package of 20 cigarettes was null for both smoking participation and frequency, but we found evidence of heterogeneity by education ($\chi2=72.0$, 3 df, $p< 0.0001$). For those with less than secondary education taxes increased smoking participation by 2.4 percentage points (95%CI: 1.3, 3.5), and increased smoking frequency by 2.8 cigarettes per week (95%CI: 1.4, 4.3). Among university graduates, the same increase in taxes decreased smoking participation by 2.0 percentage points (95% CI: -2.6, -1.4) and decreased smoking frequency by 0.4 cigarettes per week (95% CI: -0.9, 0.2). These results were robust to inclusion of retail sales taxes, province-specific time trends, and restriction to ages 25-64. Though tobacco taxes are generally considered effective as a tobacco control policy, we find some evidence that taxes may be contributing to strong and persistent smoking inequalities. Alternative tobacco control policies may be needed to reduce socioeconomic inequalities.

1042

A COMPARISON OF SMOKING SOCIAL PATTERNS IN YOUNG LATINO ADULTS REACHED VIA CELL PHONE ONLY VS. TRADITIONAL LANDLINE TELEPHONE SAMPLING. Sandra E. Echeverría*, Michelle T. Manderski Daniel A. Gundersen, Cristine D Delnevo (Rutgers School of Public Health)

Smoking remains a significant public health problem among Latinos in the United States (US), with prevalence estimates as high as 18% and sharp gradients observed by socioeconomic position and immigrant factors. A growing body of evidence suggests that surveys employing traditional landline telephone sampling designs can result in biased health estimates due to non-coverage bias of particular groups of the population such as young adults, the poor, and racially/ ethnically diverse groups. These groups are more likely to live in cell phone only households and hence may be underrepresented in national health surveys. We compared national smoking estimates and social gradients in smoking obtained for young Latino adults reached via the National Young Adult Health Survey (NYAHS), a nationally representative sample of the young adult US population employing cell phone only sampling, and the Behavioral Risk Factor Surveillance Survey (BRFSS). Our study population includes 873 Latinos aged 18-34 years of age sampled in NYAHS between 2011-2013 compared to Latinos of the same age group sampled in BRFSS 2010 (n=1,018), and 2011 (n=1,711), which includes landline only and a mixed sampling design, respectively. We estimate smoking prevalence overall and by social determinants (education, income, employment, nativity and generational status), and calculated prevalence differences across the surveys with accompanying standard errors. We found significant differences in smoking prevalence across the surveys and in the magnitude of social gradients observed. Our study is one of the first to investigate the extent to which sampling undercoverage in traditional sampling deigns can bias health estimates and discuss the implications this bias may pose for monitoring the nation's health and designing interventions to address the health needs of underserved populations.

1043-S/P

THE EFFECTIVENESS OF INDIVIDUAL HIGH-RISK STRATEGIES TO REDUCE SOCIAL INEQUALITIES IN TYPE 2 DIABETES IN CANADA: A MODELLING STUDY. Brendan T Smith*, Laura C Rosella (Dalla Lana School of Public Health, University of Toronto/ Public health Ontario)

Reducing social inequalities in type 2 diabetes is a public health priority. Current prevention strategies target interventions to high-risk individuals. It is unclear how this approach impacts social inequalities in diabetes given that those most disadvantaged have been shown to be at higher risk for developing diabetes. The objective was to model the effectiveness of high-risk interventions and their impact on reducing the social inequalites in diabetes risk over 10 years in Canada. Ten-year diabetes incidence was calculated for respondents to the nationally representative 2011-12 Canadian Community Health Survey (n=74,444) who were over 28 years of age and diabetes free using the validated Diabetes Population Risk Tool (DPoRT). Ten-year diabetes incidence (2021-22) was generated across four levels of education. Intervention benefit, including cases prevented and number need to treat (NNT), was estimated according to best practice pharmacotherapy (RR=0.51) and lifestyle counseling (RR=0.70) from meta-analyses. High-risk individuals were defined as: 1) obese (BMI>30); or 2) 10-year diabetes risk≥16.5% (threshold empirically derived previously). Comparing less than secondary graduation to bachelor's degree or higher, increased 10-year diabetes risk was observed (women=13.2% vs. 5.9%, risk difference (RD)=7.3%; men=15.1% vs. 9.0%, RD=6.1%). All interventions modeled resulted in decreased social inequalities in diabetes, with the largest reduction in pharmacological interventions targeted to the DPoRT high-risk group (women:RD=4.3%; men:RD=3.2%). Despite reductions in future diabetes risk across education groups, even in the most optimistic scenario absolute risk remained highest among individuals with the lowest level of education. Further analyses will quantify the impact of population-wide health interventions, alone and in combination with targeted high-risk strategies, on social inequalities in diabetes across a range of intervention coverage scenarios.

1044-S/P

HOUSING FORECLOSURE AND INCREASES IN IL-6 DURING THE GREAT RECESSION. Erline Miller*, Lydia Feinstein, Sandro Galea, Karestan Koenen, Monica Uddin, Allison Aiello(University of North Carolina at Chapel Hill)

Increased levels of the inflammatory marker interleukin 6 (IL-6) have been linked to numerous health outcomes, including cardiovascular disease, diabetes, and depression. Mounting evidence from cross-sectional studies suggests that psychosocial stress is associated with higher levels of IL-6. However, there are no studies of which we are aware, that have examined the impact of experiencing financial stressors associated with the Great Recession, such as home foreclosure and job loss, on changes in IL-6 levels over time. We examined the effect of home foreclosure, job loss, and perceived financial stress, on changes in IL-6 over a one year period (2008-2009). Our analyses used a subsample of participants (N=234) in the Detroit Neighborhood Health Study, a community-based study that began at the start of the Great Recession. Linear regression analyses that accounted for the complex survey design were used to assess the effect of incident home foreclosure, job loss, and perceived financial stress on changes in IL-6 between 2008 and 2009. All models were adjusted for age, gender, race/ethnicity, education, and self-rated health. Participants who foreclosed on their home in the prior year had a 2.08 (95% CI: 0.44-3.72) unit increase in IL-6 compared to participants who did not foreclose on their home. Job loss was associated with a 1.44 (95% CI: 0.06-2.82) unit increase in IL-6 compared to participants who had not lost their job. Individuals whom reported financial stress in the prior year experienced a 2.23 (95% CI: 1.25-3.22) unit increase in IL-6 compared to participants who did not report financial stress. Housing foreclosure, job loss, and financial stressors may be key sources of biological stress and subsequent inflammation during the Great Recession. Future research should examine whether these changes are sustained over longer durations and assess the underlying bio-behavioral pathways linking home foreclosure, job loss, and inflammation.

1045-S/P

THE RELATIONSHIP BETWEEN COUNTY AND STATE VOTING BEHAVIORS AND SELF-REPORTED HEALTH STATUS. Sherry Owens*, Haslyn Hunte (West Virginia University)

The associations between political affiliation and health are growing yet largely understudied field (Pabayo, Kawachi, & Muenning, 2015). We examined the self-reported general physical health status (health status) of politically marginalized vs. non-marginalized counties in the United States. Politically marginalized counties were defined as counties whose majority voted in favor of a presidential candidate other than their states'. On the other hand, non-marginalized counties were defined as counties that voted for the same candidate as their state's majority. The mean county-level health status (age-adjusted proportion reporting fair/poor health), in addition to median county-level income, education-level, and race was created from the Behavioral Risk Factor Surveillance System were merged with 2012 county-level presidential election data to assess the effect of political marginalization on self-reported health status. Counties and states voting for President Obama were referred to as "blue", while counties and states voting for Governor Romney were referred to as "red." A total of 2742 counties were included in the study, 1036 of which were identified as politically marginalized. Among marginalized counties, 692 (67%) favored Governor Romney while 406 (33%) favored President Obama. Surprisingly, marginalized counties reported better overall health than non-marginalized counties ($p<0.001$). Post-hoc ANOVA analyses revealed that both types of marginalized groups (blue counties in red states; red counties in blue states) reported significantly better health outcomes than non-marginalized counties ($p<0.001$). The health of marginalized blue counties was slightly but not significantly better than marginalized red counties. Further analysis revealed that non-marginalized red counties reported significantly worse health than all other groups ($p<0.001$), but non-marginalized blue counties did not differ significantly from marginalized voters.

1050

WEIGHTED GENE CO-EXPRESSION NETWORK ANALYSIS APPLIED TO SALIVARY MICROBIOME RELATIVE ABUNDANCE DATA. Adam D Bohr*, Kenneth S Krauter Brittany Demmitt Matthew B McQueen. (University of Colorado Boulder)

Objectives: The described research tested the efficacy of using weighted gene co-expression network analysis (WGCNA) to analyze the relative abundance of bacterial families in saliva samples of adolescents. In addition, we demonstrate utilizing the output from this analysis to test associations between the salivary microbiome and body mass index (BMI). **Methods and Sample**: Saliva samples were amplified by polymerase chain reaction and sequenced using the Illumina HiSeq Instrument on a sample of 390 adolescents from the Center for Antisocial Drug Dependence (CADD) at the University of Colorado. Data cleaning resulted in 105 families of bacteria that were measured in terms of their relative abundance for each participant. All analyses were performed using R via the R studio platform and the R package, "WGCNA." We utilized a soft power of $\beta = 4$ for construction of the adjacency matrix and the "cutreeDynamic" function for module assignment. We then performed regression analysis to test the association between module eigenvalues and our primary phenotypic outcome, BMI. **Results:** Our analysis generated 5 modules that are arbitrarily assigned a color label. A total of 79 families were assigned module membership. The families Bacteroidaceae, Mogibacteriaceae, Campylobacteraceae were the most connected nodes in the "blue", "turquoise", and "brown" modules, respectively. The "yellow" and "green" modules had candidate families that had not been assigned a particular phylum as their most connected nodes. BMI was found to be a significant predictor of membership in both the "brown" module ($\beta = -0.105$, $P = 0.041$) and the "green" module ($\beta = 0.122$, $P = 0.021$). **Conclusion:** WGCNA is a useful analytical tool for assessing relationships among bacterial families and may be useful in assessing what constitutes a healthy oral microbiome. In addition, categorizing bacteria into related modules allows for testing associations between the oral microbiome and various disease and phenotypic outcomes.

1051

DISCRETE-TIME METHOD IN THE ANALYSIS OF BREAST CANCER RISK AND CUMULATIVE DURATION OF EXPOSURE TO ANTI-HYPERTENSIVE AGENTS. Chan Zeng* Susan Shetterly, Nikki M. Carroll, Heather M. Tavel, Kristin Goddard, Heather S. Feigelson, Marsha A. Raebel, Stanley Xu (Kaiser Permanente Colorado Institute for Health Research, Denver, Colorado, USA)

Background: Cox regression is often used to examine the association between the cumulative duration of drug exposure and an adverse event, in which time to event is the dependent variable and duration is a covariate. However, this approach can be problematic because time to event and cumulative duration of exposure are measured on the same time scale and may be highly correlated. **Methods:** We used duration to event as the dependent variable to examine the risk of breast cancer and cumulative duration of exposure to antihypertensive agents among 165,807 hypertensive women. We used the life-table method to obtain the crude hazards of breast cancer for pre-defined duration categories and employed a discrete-time method to obtain hazard ratios (HR) after adjusting for time-invariant and time-varying demographic and clinical risk factors. These results were compared to those from Cox regression with time to event as the dependentvariable and duration categories as time-varying covariates. **Results:** Mean (SD) cumulative duration was 2.8(2.8) years. Correlation between time to event and cumulative duration was 0.6. Using 1 year duration as reference, the HR from both the Cox model (time to event) and the discrete-time model (duration to event) decreased over time. The trend for the Cox model decreased more rapidly than the discrete-time model. HRs were significantly >1 for durations 2 (HR=1.25, 95%CI 1.13-1.37) and 3 (HR=1.12, 95%CI 1.00-1.26) years from Cox model, but were significantly <1 for estimates from the discrete-time model for durations 2 (HR = 0.90, 95%CI 0.82-0.99) and 3 (HR=0.80, 95%CI 0.71-0.89) years. **Conclusion:** High correlation between drug exposure durations and time to event may result in inconsistent results and false interpretations in survival analyses. Using duration to event as the dependent variable and discrete-time method is appropriate in assessing the association between cumulative exposure duration and an adverse event in drug safety studies.

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UNTANGLING TIME AMONG PRETERM PREDICTORS: A SURVIVAL APPROACH TO PRETERM DELIVERY. Emily Mitchell*, Stefanie Hinkle, Enrique Schisterman (NICHD)

There is substantial interest in understanding the impact of gestational weight gain (GWG) on preterm birth (delivery < 37 weeks). The major difficulty in analyzing the association between GWG and preterm birth lies in their mutual dependence on gestational age, as GWG naturally increases with increasing pregnancy duration. In this study, we untangle this inherent association by reframing preterm birth as time to delivery and assessing the relationship through a survival framework, which is particularly amenable to dealing with time-dependent covariates such as GWG. We derive the appropriate analytical model for assessing the relationship between GWG and time to delivery when measurements of GWG at multiple time points are available. Since epidemiological data may be limited to GWG measurements taken at only a few time points or at delivery only, we conduct simulation studies to illustrate how several strategically timed measurements can yield unbiased risk estimates. Analysis of the NICHD Study of Successive Small-for-Gestational-Age Births demonstrates that a naive analysis that does not account for the confounding effect of time on GWG suggests a highly significant association of higher GWG with later delivery (HR 0.89, 95% CI: 0.84 to 0.93). Properly accounting for the confounding effect of time using a survival model, however, mitigates this bias (HR 0.98, 95% CI: 0.97, 1.00). These results emphasize the importance of considering the effect of gestational age on time-varying covariates during pregnancy, and the proposed methods offer a convenient mechanism to appropriately analyze such data.

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MIXTURE MODELING FOR THE CHARACTERIZATION OF AGE AT DIAGNOSIS OF FEMALE BREAST CANCER. Gabriel Escarela* (Universidad Autónoma Metropolitana - Iztapalapa)

This paper investigates the distribution of age at diagnosis of female breast cancer and its association with temporal trend, clinicopathologic and sociodemographic variables in the presence of two latent clusters that are directly unobservable. Such clusters help to identify two subpopulations of either young or old patients whose etiologies are thought to be different. A large sample drawn from registry data from the National Cancer Institute's Surveillance, Epidemiology, and End Results program from 1990 to 2009 was analyzed using a two-component Gaussian mixture model. Evidence of a steady delay of age at diagnosis and an increasing proportion of young patients being diagnosed during the 20-year period was found. Histopathologic effects indicate that duct and lobular carcinomas differ significantly in regard to subpopulation membership, which confirms that they represent different etiologies. While the presence of estrogen receptor status in the model overlaps the effects of other important variables it is highly correlated with, it is found that the grade, extension and size of the tumor along with lymph node involvement status, race and marital status are important predictors of age at diagnosis. The results highlight the significant impacts that such features can have on breast cancer control efforts, and point to the importance of ensuring that medical decision making should use them along with an indicator of the age subpopulation a patient may belong to.

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ALCOHOL MISUSE FOLLOWING SEXUAL TRAUMA – FINDINGS FROM A COHORT OF MALE AND FEMALE US MILITARY SERVICE MEMBERS. Amber Seelig*, Anna Nagel, Teresa Powell, Emily Williams, Alyson Littman, Charles Maynard, Arthur Peterson, Jonathan Bricker, Amy Street, Edward Boyko (VA Puget Sound Health Care System, Seattle, WA & Naval Health Research Center, San Diego, CA)

The objective of these analyses was to determine if military service members who experienced sexual harassment or sexual assault had higher risk of alcohol misuse initiation or relapse. Data from the first 2 enrollment panels of the longitudinal Millennium Cohort Study (2001-2012) were used for these analyses. Alcohol misuse was defined as either screening positive for problem drinking on the validated Patient Health Questionnaire, or drinking over recommended limits (women: ≥7 drinks/week or 4 drinks/occasion, men: ≥14 drinks/week or 5 drinks/ occasion). Initiation was assessed among those with no alcohol misuse at baseline (n=14,019, women = 5,078) and relapse was assessed among those who were remittent at baseline (n=4,065, women = 1,138). Self-report of sexual assault and sexual harassment was collected on the Millennium Cohort questionnaire and was included in the models as a 3 level variable: neither, sexual harassment (only), and sexual assault (without or without harassment). Complementary log-log models, adjusted for demographics, military, behavioral, and mental and physical health measures, were used to determine the relative risk of alcohol misuse initiation and relapse following sexual harassment and assault. During 3-6 years of follow-up, 1449 (7% of men, 6% of women) initiated alcohol misuse and 1421 (25% of men, 21% of women) relapsed. Final models were conducted among women only due to the small number of men who reported sexual harassment and assault (1%). Among women, sexual harassment was not significantly associated with initiation (RR: 1.2, 95% CI: 0.7-2.0) or relapse (RR: 1.0, 95% CI: 0.5-2.0). Sexual assault was also not associated with initiation (RR: 1.3, 95% CI: 0.6-2.7) but was significantly associated with relapse (RR: 2.1, 95% CI: 1.0-4.4). Female service members with a history of alcohol misuse who experienced sexual assault were at higher risk for relapse. Results have important implications for policy and intervention.

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ADOLESCENT CIGARETTE SMOKING AS A GATEWAY TO MARIJUANA AND COCAINE USE: POPULATION LEVEL IMPLICATIONS FROM EIGHTEEN US BIRTH COHORTS. Ava Hamilton*, Katherine Keyes, Denise Kandel(Columbia University)

Introduction: Adolescents tend to use drugs in a typical sequence, starting with drugs that are licit for adults, such as cigarettes, and moving to drugs such as marijuana and cocaine. The present study uses historical birth cohort information to determine whether birth cohorts with higher rates of smoking in early adolescence had higher rates of marijuana and cocaine use later in adolescence. **Methods:** Data of 8th, 10th, and 12th graders were drawn from Monitoring the Future, an annual nationally-representative cross-sectional survey of adolescents in the United States, from 1991-2012 (N=1,053,574). Adolescents were asked about their lifetime use of cigarettes, marijuana, and cocaine. **Results:** Lifetime cigarette use in 8th grade and in 10th grade are significantly associated with lifetime marijuana use (8th to 12th grade: β=0.57, C.I.= 0.14 – 1.00; 10th to 12th grade: β=0.43, C.I.= 0.04 – 0.82) and lifetime cocaine use (8th to 12th grade: β = 0.59, C.I.= 0.17 – 1.02; 10th to 12th grade: β=0.37, C.I.= 0.01 – 0.73) in 12th grade, controlling for secular trends in marijuana and cocaine use. Each percentage point increase in the prevalence of smoking in 8th and 10th grade is associated with a 3-4% increase in the prevalence of later marijuana use and 7-11% increase in the prevalence of cocaine use for individuals in the same birth cohort. Relationships are consistent by sex and race. **Conclusion:** Cohorts with higher rates of smoking in early adolescence have a higher rate of using marijuana and cocaine in late adolescence. Our epidemiological data are consistent with translational research linking nicotine exposure with later cocaine use, and provide an important historical link to understanding how birth cohort shape later substance outcomes. We suggest that public health campaigns should focus on the early stages of adolescence when drug use habits are forming.

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CIGARETTE SMOKING IN MILITARY SPOUSES: FINDINGS FROM THE MILLENNIUM COHORT FAMILY STUDY. Daniel W. Trone*, Edward J. Boyko, Teresa M. Powell, Lauren M. Bauer, Art V. Peterson, Alyson J. Littman, Charles Maynard, Jonathan B. Bricker, Emily C. Williams, Amber D. Seelig (Naval Health Research Center, San Diego)

Previous research has shown that military personnel have higher prevalence of smoking compared to civilian populations, yet it is not known whether the smoking disparity is also seen in spouses of military personnel. This research is the first to report data on this issue from The Millennium Cohort Family Study, the only comprehensive epidemiologic study on the health of military families that collects data through separate surveys of paired Service members and spouses (n=9,928). Cross-sectional analyses examined current cigarette smoking among military spouses in relation to Service member deployments and other potentially stressful military experiences. Logistic regression models were used adjusting for demographic, mental health, and potentially stressful military life experiences of the spouse, and for Service member military characteristics. Current smoking was reported by 17.3% (women 16.0%; men 25.7%) of military spouses. Smoking among spouses with a currently deployed partner did not differ significantly compared to spouses with a Service member not currently deployed (p=0.25). Among spouses with a partner with a history of deployment, not discussing the Service member's deployment experiences was associated with more prevalent cigarette smoking (OR: 2.2, 95% CI: 1.0-4.7), but how much the spouse was bothered by the discussed deployment experiences was not (p=0.20). Three military life stressors were analyzed. Spouses who experienced combat-related deployment or duty assignment, combat-related injury to their spouse, or caring for an ill, injured, or disabled spouse did not have significantly more prevalent cigarette smoking compared to spouses who did not report these experiences (p=0.25; p=0.73; p=0.82, respectively). Although rates of cigarette smoking in female spouses of military personnel were substantially greater than women in the general population (5.8%), these results suggest that stressful military experiences are not associated with smoking.

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FUNCTIONAL DRUG USE DEFINED: A LATENT CLASS ANALYSIS. Eric T Roberts*, Sandro Galea, David Vlahov, Danielle C Ompad (Global Institute of Public Health, New York University)

Drug use is associated with health and social consequences, however not all use is harmful. Functional drug users are persons with moderate, non-abusive drug use able to meet social expectations. We use latent class analysis to determine to what extent, if any, patterns of functional and non-functional drug use exist. Data come from the IMPACT study in New York City. Our final model included measures of drug use behaviors (frequency of cocaine, crack and heroin use; use of non-prescribed opiates and club drugs; injection), drug use harms (interference with work, school, child care or recreational activities due to cocaine, crack or heroin use; failure to meet expectations due to alcohol use; over doses; HIV and Hepatitis B serostatus) and social expectations (whether the participant was hungry in the past 6 months but did not have enough money to buy food, and the participants main source of income). Model fit statistics indicated a 5-class solution fit best. Class 1 was characterized as non-drug users, and class 2 as former-drug users. Participants in class 3 were characterized by low or moderate frequency of cocaine and crack use, low levels of interference from their use and moderate success meeting social expectations (53% report being hungry; 19% report illegal income). Participants in class 4 were characterized by low or moderate frequency of heroin use, and use of non-prescribed opiates. A moderate number experience interference from their use and moderate success meeting social expectations (53% report being hungry; 19% report illegal income as their main source). Class 5 were non-functional drug users characterized by high frequency cocaine, crack and heroin use, use of non-prescribed opiates and club drugs, high levels of interference and failure to meet social expectations (87% report being hungry; 59% report illegal income). We find evidence of functional and non-functional drug use; identifying drivers of these patterns may improve population health.

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CHILDHOOD ABUSE AND NEGLECT ARE ASSOCIATED WITH NON-FUNCTIONAL PATTERNS OF DRUG USE IN ADULTHOOD. Eric T Roberts*, Sandro Galea, David Vlahov, Danielle C Ompad (Global Institute of Public Health, New York University)

Research has documented many health and social consequences associated with drug use, however not all drug use is deleterious. We define functional drug users as persons with moderate, non-abusive drug use who are able to meet and fulfill social roles and expectations. One often-studied exposure in relation to drug use is childhood abuse and neglect (CAN), which may have particular value in distinguishing functional from non-functional drug users. This analysis tests whether childhood neglect, physical abuse or sexual abuse are associated with non-functional patterns of drug use. Data come from the IMPACT study. Participants were sampled from 38 neighborhoods in New York City using random street intercept. In a previous analysis we used latent class analysis on measures of frequency of drug use, drug use related harms, and fulfillment of social roles and found a 5 class solution: non-drug users, former drug users, primary stimulant users, primary opiate users, and heavy drug users. The stimulant and opiate users had lower frequency drug use, fewer harms associated with use and more often met social expectations compared to the heavy drug users. In multinomial logistic regression models adjusted for age, sex, race/ethnicity, education and marital status participants who experienced childhood neglect were more likely to be a heavy drug user than a primary heroin user (OR=1.67, 95%CI 1.20, 2.38), or a primary stimulant user (OR=1.40, 95%CI 1.02, 1.93). Similarly, participants who experienced childhood physical abuse were more likely to be heavy drug users than primary heroin users (OR=1.41, 95%CI 1.02, 1.96), or primary stimulant users (OR=1.46, 95%CI 1.07, 2.01). Participants who experienced childhood sexual abuse were equally likely to be primary stimulant users, primary heroin users or heavy drug users. Sex did not modify these associations. Our results suggest traumatic events, here CAN, may be an important driver of maladaptive patterns of drug use behaviors.

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POINT OF SALE SCANNER DATA FOR RAPID SURVEILLANCE OF THE E-CIGARETTE MARKETPLACE. Hannah R. Day*, Bridget K. Ambrose, Catherine G. Corey (Food and Drug Administration)

Background: E-cigarette use is on the rise and the characteristics of products are rapidly evolving. Traditional surveys provide valuable information on user characteristics, but point of sale scanner data can accurately describe product characteristics more rapidly. Previous studies used Nielsen scanner data from 2012-2013 to describe E-cigarette sales, but changes to the market in 2014 included the nationwide rollout of RJ Reynolds' VUSE and Altria's MarkTen e-cigarettes. **Methods:** We used Nielsen e-product files (e-cigarettes, e-cigars and e-accessories) from convenience, food, drug and 12 retailers from mass merchandiser, club and dollar stores during the 4 week period ending 1/18/14 through the 4 week period ending 10/25/14 to calculate sales dollar volume, market share and percent growth by brand. Internet searches using brand or UPC code were used to supplement Nielsen's description of type, flavor and nicotine. Results will be updated through the end of 2014 once data are available. **Results:** Blu held the largest percent of market share dollars in January (44.8%), but only 22.3% in October. In contrast, VUSE increased from a market share of 1.2% in January to 33.5% in October, making it the market leader. In 2014, sales of disposable products decreased. Although only approximately 5% of the 2014 dollar sales, sales of fruit flavored products more than doubled. Market share of e-cigarettes reporting higher nicotine percentages appear to have increased in 2014. **Conclusion:** Scanner data can be used to complement traditional epidemiologic surveillance methods, and capture rapid market changes. In 2014, changes in brand, type, flavor and reported nicotine percentages occurred in the channels covered by Nielsen, highlighting the need for broad surveillance of the e-cigarette market, including of vape shops and online sales not covered by these data.

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NEIGHBORHOOD DRINKABILITY? A FINITE MIXTURE MODELING APPROACH TO IDENTIFYING NEIGHBORHOOD SUBTYPES RELATED TO ALCOHOL MISUSE. Isaac C. Rhew*, Rick Kosterman (University of Washington)

When studying the joint role of multiple neighborhood features on outcomes including alcohol misuse, traditional methods that include multiple neighborhood factors as covariates may be biased due to insufficient overlap in distribution of the factors. As an alternative approach, this study used finite mixture models to classify neighborhoods into discrete latent categories according to multiple indicators, and examined cross-sectional associations between these categories and frequency of past year heavy episodic drinking (HED) and alcohol use disorder (AUD). The sample consisted of 404 adults, ages 32 to 34 years, living in King County, WA, and participating in the Seattle Social Development Study. There were 303 neighborhoods, defined as Census block groups, represented among the participants. For finite mixture models, neighborhood indicators included economic characteristics (median income and percent living in poverty), density of liquor stores and bars, and perceptions of collective efficacy (CE). Based on bootstrapped likelihood ratio tests, a 4-class model showed the best fit. The 4 classes could be described as: 1) low income/moderate alcohol accessibility (AA)/ low CE, 2) moderate income/low AA/moderate CE, 3) moderate income/ high AA/moderate CE, and 4) high income/low AA/high CE. Adjusted for individual characteristics, there were statistically significant differences in alcohol outcomes across the four neighborhood classes. Poisson models showed that compared to those living in Class 1 neighborhoods, those in Classes 3 and 4 reported less HED (Count Ratio (CR) = .41, 95% CI: .34, .49; CR = .67, 95% CI: .58, .77; respectively). Further, log-binomial models showed that compared to those in Class 1, those in Class 4 neighborhoods had a lower likelihood of AUD (Prevalence Ratio = .37, 95% CI: .14, .98). Neighborhood subtypes derived from finite mixture models may represent meaningful categories that can help identify areas at higher risk for alcohol misuse.

1067

CONCORDANCE BETWEEN SELF-REPORTED HEAVY DRINKING AND PHOSPHATIDYLETHANOL BIOMARKER AMONG FEMALE SEX WORKERS AND THEIR MALE CLIENTS IN CAMBODIA. Marie-Claude Couture*, Neth Sansothy, Judy Hahn, Kimberly Page (University of San Francisco, San Francisco, CA USA)

Background: Heavy alcohol drinking has been shown to be ubiquitous in sex work settings, contributing to the HIV epidemic. In Cambodia, the majority of the female sex workers (FSW) work in entertainment venues where alcohol is often part of the transaction. However, no accurate data exists on heavy alcohol drinking. We examine the validity of self-reported heavy alcohol drinking in Cambodian FSW and their male clients, using a biomarker of alcohol intake. **Methods:** A cross-sectional pilot study was conducted in October 2011 among FSW (n=100) and their male clients (n=100) in entertainment and other sex work venues in Cambodia. We compared self-reported heavy alcohol drinking (AUDIT-C) to detectable (>8ng/ml) Phosphatidylethanol (PEth), a biomarker if alcohol intake, in dried blood samples (DBS). A standardized questionnaire was used to collect socio-demographics data. Sensitivity and specificity were calculated. **Results:** Prevalence of self-reported heavy alcohol drinking was 85% in FSW. PEth biomarker showed similar results: 83.0% of the women tested positive. Among male clients, self-reported heavy alcohol drinking was 47%. However, 76% of the men tested positive for PEth. Self-reported heavy alcohol drinking had a high sensitivity (93.4%) among FSW, but lower specificity (58.5%). The sensitivity and specificity of AUDIT-C screening compared to the PEth. biomarker was lower among male clients: 47.4% and 54.2% respectively. **Conclusions:** This is the first study examining the validity of self-reported heavy alcohol drinking in FSW and their male clients. Heavy alcohol drinking was prevalent in Cambodian sex work settings, potentially contributing to the HIV epidemic. High concordance between self-reported heavy drinking and the biomarker results was observed in FSW, but not among male clients. These findings highlight the urgency of using accurate measures of heavy alcohol drinking and the need to integrate alcohol abuse problems into HIV prevention interventions.

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ESTIMATES OF INCIDENCE AND RECURRENCE OF GAMBLING DISORDER IN THE UNITED STATES. Patrick F. McArdle*, Paul Sacco, J. Kathleen Tracy (University of Maryland School of Medicine)

With the publication of the 5th edition of the Diagnostic Statistical Manual (DSM-5), Gambling Disorder is now recognized as the lone substance free addiction disorder. While many estimates of the prevalence of the disorder exist in the literature, few have been updated with the new DSM-V criteria and population based estimates of incidence and recurrence are not available. Data from the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC) were used to compute weighted estimates of Gambling Disorder representative of the adult, non-institutionalized population of the United States. Using NESARC data the prevalence of Gambling Disorder is estimated to be 0.27%. The incidence rate, defined as the rate of newly identified cases is estimated at 0.8 per thousand per year. The majority of new cases exhibited only mild symptoms of the disorder; the progression from no prior history of the disorder to either moderate or severe symptoms within a year is rare at 0.2 per thousand per year. Recurrence, defined as the rate of identified cases in the past year with a history of Gambling Disorder is 32.37%. per year. Nearly 1/3 of individuals with a history of symptoms reflective of Gambling Disorder are likely to show symptoms of the disorder again in the ensuing 12 months. People initiate and terminate gambling behavior over the life course, and symptoms of gambling-associated problems also vary with time. Of those prevalent cases in a given year, 10.4% will have no history of symptoms of the disorder, 19.6% will have history of some symptoms and 70.0% will have exhibited enough symptoms to be classified for the disorder previously, though not necessarily diagnosed due to the lack of screening for the disorder. Understanding the incidence and recurrence of Gambling Disorder is critical when developing treatment programs and assessing their effectiveness.

1069

PAST 15-YEAR TRENDS IN ADOLESCENT MARIJUANA USE. Renee M Johnson* (Johns Hopkins Bloomberg School of Public Health)

We are currently in a moment of significant secular change in terms of marijuana policy, and these policy changes may have implications for adolescent marijuana use. Importantly, adolescence is the period during which most people use marijuana for the first time, and national data show that, in 2013, 23% of high school students reported past-month use of marijuana, and 40.1% reported lifetime use. Moving forward, it will be important to closely monitor changes in adolescent marijuana use to assess how policy impacts patterns of use and to respond appropriately. Therefore, the purpose of the study is to examine the prevalence and trends in reported marijuana use from 1999-2013, overall and by race/ethnicity and sex. Data come from the National Youth Risk Behavior Survey, a nationally representative school -based survey of 9th-12th graders in the US. We examined the statistical significance of trends in: any lifetime use, repeated lifetime use, any past 30 -day use, repeated past 30-day use, and early use (ie, before age 13). We calculated the prevalence of and 95% CI for current marijuana use overall and by sex, within each race/ethnic group. We also tested the statistical significance of linear and quadratic trends to assess trends over time. Although there has been a downward linear trend in marijuana use since 1999, there has been a modest uptick in use since 2009. For all race/ethnicity groups, the gender gap in use has gotten smaller over time. Implications for policy will be discussed.

1070

PEOPLE AND PLACES: RELOCATING TO NEIGHBORHOODS WITH BETTER ECONOMIC AND SOCIAL CONDITIONS IS ASSOCIATED WITH LESS RISKY DRUG/ALCOHOL NETWORK CHARACTERISTICS AMONG ADULTS IN ATLANTA, GA. Sabriya L. Linton*, Hannah L.F. Cooper, Ruiyan Luo, Conny Karnes, Kristen Renneker, Danielle F. Haley, Josalin Hunter-Jones. Zev Ross, Loida Bonney, Richard Rothenberg (Rollins School of Public Health at Emory University)

Introduction: Characteristics of places and social networks are related to substance use. Few studies assess whether place characteristics are related to social network characteristics associated with substance use. **Methods:** This longitudinal study analyzed 7 waves of data (2009-2014) from a predominantly substance-using cohort of 172 adults relocated from public housing in Atlanta, GA, to determine the relationships of post-relocation changes in neighborhood conditions to four network characteristics over time: proportion of drug/alcohol network members, overall drug/alcohol network stability, and turnover-into and turnover-out of drug/alcohol networks. Individual- and network-level characteristics were captured via survey; administrative data were used to describe census tracts where participants lived. Multilevel models were used to assess relationships of individual- and tract-level factors to network characteristics. **Results:** On average, participants relocated to tracts that had less economic deprivation, social disorder, and rental housing. Reduced economic deprivation was related to reduced proportions of drug/alcohol network members (adjusted beta(b)=0.03; p-value<0.01). Perceived community violence was associated with reduced drug/alcohol network stability (b=0.02; p-value=0.07). Reduced tract-level instability, economic deprivation, and rental housing were related to reduced turnover-into drug/alcohol networks (instability: b=1.33, p-value=0.06; economic deprivation: b=0.18; p-value=0.03; rental housing: b=0.66; p-value=0.07). Reduced perceived community violence and increased social disorder were related to increased turnover-out of drug/alcohol networks (violence: b=-0.12; p-value=0.06; disorder: b=0.19; p-value=0.08). **Conclusion:** Moving to "better" neighborhoods may reduce substance use by altering networks. Additional research should assess whether social network characteristics mediate the association between place characteristics and substance use.

1071-S/P

THE ASSOCIATION BETWEEN SUBSTANCE USE AND IMMUNE RESPONSE TO PERSISTENT HERPESVIRUS INFECTIONS IN THE DETROIT NEIGHBORHOOD HEALTH STUDY. Lydia Feinstein*, Kathleen M Harris, Xuan Zhou, Amanda M Simanek, Sandro Galea, Allison E Aiello (University of North Carolina at Chapel Hill)

Mounting evidence suggests that highly prevalent herpesviruses, which once acquired persist as latent infections, are a driving force behind age-related immunological declines. Cigarette smoking and heavy alcohol use may play a key role in this pathway due to the suppressive effects of these substances on the immune system, but the associations between substance use behaviors and salient measures of cell-mediated immune response to persistent herpesvirus infections have not been established in a population-representative sample. Using data from 501 adults 25-54 years of age who participated in the community-based Detroit Neighborhood Health Study (2008-2009), we assessed cross-sectional associations between substance use behaviors (i.e., cigarette smoking and heavy drinking) and immunoglobulin G antibody response to four of the most prevalent herpesviruses: cytomegalovirus (CMV), Epstein-Barr virus (EBV), herpes simplex virus type 1 (HSV-1), and varicella-zoster virus (VZV). Cigarette smoking was dichotomized as any use in the prior 30 days. Heavy drinking was defined as consuming an average of >4 drinks on at least 5 occasions during the prior 30 days. Accounting for the complex survey design, linear regression models were used to assess the associations between substance use behaviors and antibody levels to each herpesvirus among seropositive participants. Models adjusted for age, gender, race/ethnicity, education, self-rated health, and heavy alcohol use. Cigarette smoking was associated with a 1.43 (95% CI: 0.65, 2.22) unit increase in CMV antibodies. Heavy alcohol use was strongly associated with higher HSV-1 antibodies (β: 2.95, 95% CI: 1.14, 4.76) and moderately associated with higher EBV antibodies (β: 0.37, 95% CI: -0.01, 0.74). No associations were found with VZV antibodies. Substance use may be a determinant of the immune system's ability to keep latent infections in a quiescent state and consequently an important driver of age-related immunological declines.

1072-S/P

SLEEP DISTURBANCES AS ADVERSE DRUG REACTIONS. RESULTS FROM THE BASELINE EXAMINATION OF THE HEINZ NIXDORF RECALL STUDY. Anna-Therese Lehnich* (University Hospital Essen)

As sleep disturbances are a common problem we assessed the role of drugs known to be sleep disturbing in a population-based study. For this analysis we used data of 4814 participants aged 45 to 75 years from the Heinz Nixdorf Recall Study. The interview provided information on difficulties falling asleep (DFA), difficulties maintaining sleep (DMS) and early morning arousal (EMA) during the last four weeks and whether they occurred never, sometimes, frequently or nearly every night. Poor sleep quality (PSQ) summarizes the three types of sleep disturbances. Only drugs used at least four weeks before interview serve as exposure. We used the summary of product characteristics (SPC) to assign probabilities of sleep disturbances to drugs. The probabilities range from very rare (<0.01%) to very common (>10%) according to MedDRA-terminology. Based on a directed acyclic graph we adjusted for age, sex, social status, alcohol consumption and diseases considering coronary heart disease, diabetes, depressed mood, arthrosis, asthma, thyroid diseases and overall health status. We applied a multinomial log regression model with robust Poisson distribution to estimate Prevalence ratios (PRs) and 95 % confidence intervals. The PRs for poor sleep quality per additional sleep disturbing drug in reference to subjects who took no sleep-disturbing drug are 1.04 (95% CI: 0.91-1.19), 0.99 (95% CI: 0.88-1.11), 0.97 (95% CI: 0.92-1.03), for the frequencies "sometimes", "frequently" and "nearly every night" respectively. The PRs for DFA, DMS and EMA are lower than 1. Drugs with a probability for sleep disturbances ≥ 0.1% show smaller PRs for sleep disturbances compared with drugs with a lower probability. Hence a priori known probabilities on sleep disturbances caused by drugs show no association with self-reported sleep disturbances. A potential reason for our null result finding may be the limited data quality and generalizability of the SPC information to the general population.

1073-S/P

ADDICTION OF BETEL-QUID CHEWING AND ITS EXTENDED EFFECT ON ANXIETY AMONG CHEWERS IN TAIWAN. Chiao-I Chang*, Hsu-Chin Tu, Cheng-Jou Yu, Chia-Lin Chang, Hsiao-Ling Huang, Chien-Hung Lee (Department of Public Health, College of Health Sciences, Kaohsiung Medical University)

Betel-quid (BQ) is the fourth most frequently consumed psychoactive substance worldwide after caffeine, alcohol and nicotine. Studies have showed that BQ has pharmacological effects on the nervous system. In chemical analyses, areca nut contains 11%-26% tannins and 0.15%-0.67% alkaloids, among these, arecoline has a chemical structure comparable to nicotine. Despite the understanding of pharmacological reactions for BQ, little is known about the consequences of chewing on BQ addiction and its extended effect on anxiety. To investigate these issues, we conducted a community-based cross-sectional study using a multi-stage, geographically stratified sampling method to recruit participants. A total of 626 BQ chewers recruited from 165 BQ shops in two different urbanization-levels of areas in Taiwan participated in this study. All chewers were evaluated for BQ addiction using the Diagnostic and Statistical Manual of Mental Disorders V criteria (DSM-V), and anxiety status using the Beck Anxiety Inventory (BAI). Binary and polytomous logistic regression models were used in the multivariate analyses for adjusted for covariates. The prevalence of mild, moderate and severe BQ addiction among chewers was 27.7%, 15.9% and 18.4%. A 5-BQ increase in the amount consumed and a 1-year increase in the use were associated with a 1.6 and 1.1-fold significant risk of contracting BQ addiction, respectively. Chewers who concurrently have alcohol and cigarette addiction had a higher risk of BQ addiction (adjusted ORs, 16.4 and 16.5, respectively). As compared to non-addictive chewers, chewers with a higher level of addiction had a higher anxiety score (P for trend <0.05). Our results highlight the effects of BQ chewing on addiction and anxiety.

1074-S/P

SCHOOL ENVIRONMENTS PROTECTIVE AGAINST MARIJUANA USE. Deson G. Haynie*, Ray M. Merrill (Brigham Young University)

Objective: The purpose of this study was to better understand the protective effects of three school environments (participation, discipline, and importance) against marijuana use and factors associated with these school environments. **Methods:** Analyses were based on the 2013 Prevention Needs Assessment Survey involving 5,713 students in grades 6, 8, 10, and 12 in Utah County, Utah. **Results:** The prosocial school environment scales showed a direct, inverse association with marijuana use, but, in combination, school participation and school discipline had an indirect effect on marijuana use by influencing school importance. Statistical modeling showed that the three school environment scales had the greatest potential for improvement by increasing school participation, discipline, and importance in males, students in later school grades, students whose parents had less education, students whose mother or father did not live with them, and students with no religious preference or who did not attend religious services regularly. **Conclusion:** Perceived school importance is protective against marijuana use. School importance is positively associated with school participation and discipline. The greatest potential for improving these school environments is identified in this study.

1075-S/P

USE OF MARIJUANA AND CHANGING RISK PERCEPTIONS. Deson G. Haynie*, Ray M. Merrill (Brigham Young University)

Objective: To better understand who among a large group of adolescents was most likely to perceive marijuana as not harmful. **Methods:** Analyses were based on the Student Health and Risk Prevention (SHARP) survey conducted in 3 large Utah school districts in 2009, 2011, and 2013 among students in grades 6, 8, 10, and 12. **Results:** Across school grades, students who viewed marijuana as not harmful were 9 times or more likely to have used marijuana. The perception that marijuana has no risk was higher in males, Hispanics, and those not living with their mother or father, and increased with school grade but decreased as the education of the student's guardian increased. **Conclusions:** Those historically identified as being at high risk for marijuana use were also most likely to view marijuana as not harmful.

1076-S/P

SMOKELESS TOBACCO USE 1992-2011: TRENDS IN THE CURRENT POPULATION SURVEY OF THE TOBACCO USE SUPPLEMENTS. Joanne T. Chang*, David T. Levy, Rafael Meza(Department of Epidemiology, School of Public Health, University of Michigan, Ann Arbor, Michigan)

Background: While the declines in smoking prevalence in the United States have been well documented, trends of smokeless tobacco (SLT) use are less clear, particularly with the appearance of new products like e-cigarettes. This study updates previous analyses of SLT use in the US, based on national representative data to better understand SLT trends from 1992-2011.**Methods:** Data on prevalence of SLT in the US from 1992 to 2011 were obtained from Tobacco Supplement Use of the Current Population Surveys (TUS-CPS). SLT prevalence trends were examined by sex, age, education, race/ethnicity, and smoking category. Consumption of SLT in the US from 1985 to 2011 was obtained from the Federal Trade Commission Smokeless Tobacco Report for 2011. Trends of consumption were analyzed using Joinpoint Regression. **Results:** Continued declines in smoking and SLT prevalence overall were observed from 1992 to 2011, although the reductions slowed down since the year 2000. SLT use is more prevalent among men, younger individuals, whites, people living in rural areas, people with low levels of education level, and current smokers. SLT per capita consumption decreased at an annual percentage rate (APC) of 2.23% per year from 1991-1999, but has since decreased at only 0.35% per year (1999-2011).**Conclusions:** Significant declines in SLT product use were found, suggesting an impact of tobacco control. However, the decreases appear to have slowed down since 2000, and still about 1.3% of U.S. adults use SLT. This is consistent with trends in per capita SLT consumption. Targeting tobacco control in particular for young males from low socioeconomic status, low education, and living in rural regions, as well as dual users is needed to further reduce SLT use in the U.S. The emergence of e-cigarettes and the potential adoption of Swedish snus are likely to greatly affect the SLT landscape.

1077-S/P

USING HCUP DATA TO EXAMINE HOSPITAL READMISSION RISK IN INDIVIDUALS WITH SCHIZOPHRENIA BY MARIJUANA, ALCOHOL, AND OTHER DRUG USE DISORDERS. Mary Slaughter*, Mendel Singer, Coreen Farris (Case Western Reserve University)

Many studies have found associations between marijuana use and lower age of onset and persistent psychotic symptoms among persons with schizophrenia. Few studies however have examined marijuana use disorder and the course of schizophrenia, particularly in regards to hospitalizations. This study uses individually linked California Health Care Cost and Utilization Project (CA HCUP) state in-patient databases (SID) to examine time to readmission by indicators for recent marijuana use disorder (MUD). We also examined time to readmission by alcohol use disorder (AUD) and other drug use disorder (OUD). Predictors for readmission were examined using a stratified, recurrent-event, Cox Proportional Hazard model. Our sample consisted of 4,578 individuals with a primary diagnosis for schizophrenia in 2005 and who were likely experiencing their first hospitalization due to schizophrenia. Readmissions were assessed from 2005 to 2011. Over the roughly 6-year follow-up, 1718 (37.5%) individuals never readmit. We found having MUD within 90 days of a schizophrenia related admission was not associated with an increased hazard for readmission, whereas AUD and OUD were. Those who had evidence of AUD within 90 days of a schizophrenia related admission had an increased risk for 1st readmission (hazard ratio (HR) 1.17, 95% CI 1.10 to 1.23), and for a 6th or greater readmission (HR 1.16, 95% CI 1.08 to 1.25). AUD was not significantly associated with a 2nd to 5th readmission. Those who had evidence of OUD within 90 days of a schizophrenia related admission had an increased risk for 1st readmission (HR 1.15, 95% CI 1.10 to 1.19), 2nd to 5th readmission (HR 1.15, 95% CI 1.08 to 1.22), and for a 6th or greater readmission (HR 1.09 1.02 to 1.18). Alcohol and other drug use disorders can increase readmission risk in patients with schizophrenia, whereas marijuana use disorders do not appear to be associated with an increased risk for readmission.

1078-S/P

BARRIERS AND MOTIVES IN QUITTING SMOKING AMONG YOUNG ADULTS: THE ROLE OF SOCIOECONOMIC STATUS. Samantha Carlson*, Lindsey Fabian, Rachel Widome, Jean Forster (University of Minnesota School of Public Health, Division of Epidemiology and Community Health)

Objective: The high smoking prevalence among low-SES populations may be partially due to greater barriers to quitting for these populations. We aimed to explore how self-reported barriers to quitting and reasons for making a quit attempt varied by SES among young adult smokers. Additionally, we sought to examine how barriers to quitting related longitudinally to eventual reasons given for making a quit attempt. **Methods:** This analysis used two waves of survey data from the Minnesota Adolescent Community Cohort (MACC) study. In 2007/08, participants who smoked were asked to report barriers to quitting, and in 2012/13, smokers who had tried to quit were asked to give reasons for their most recent quit attempt. Differences by SES (parents' highest education completed) were assessed using chi square tests. Odds ratios with 95% confidence intervals were calculated for the relationships between 2007/08 barriers and 2012/13 reasons for making a quit attempt in participants who were smokers in both waves. **Results:** The participants were 21 ± 1.6 years old in 2007/08 (n=691) and 26 ± 1.7 years old in 2012/13 (n=323). In 2007/08, lower SES participants were more likely to cite cost of programs (p=0.013), risk of gaining weight (p=0.002), and all my friends smoke (p=0.001) as barriers to quitting. In 2012/13, cost of tobacco (p=0.031) and because of my kids (p=0.004) were given more often as reasons for a quit attempt by low-SES participants. Of the smokers in both waves (n=216), those who reported "cost of classes/programs" as a barrier in 2007/08 had higher odds of reporting "cost of tobacco" as a motive for quitting in 2012/13 (OR=2.79; 95% CI: 1.23, 6.32). **Conclusion:** The stark disparity in smoking prevalence by SES may be fueled by differing barriers to quitting, and alleviation of social barriers may invite quit attempts.

1079

AUSTRALIAN ALCOHOL-RELATED SERIOUS ROAD TRAFFIC INJURIES BETWEEN 2000 AND 2010: UNDERSTANDING THE FORGOTTEN HOURS. Jason Ferris*, Jessica Killian, Belinda Lloyd (The University of Queensland)

Millions of people die or are injured on the world's roads every year and drink-driving continues to be a major risk factor for road traffic crashes. In Victoria, Australia, 22% of serious road injuries (SRIs) involve a blood alcohol concentration (BAC) equal to or above the legal driving limit of 0.05%. Using police and hospital data to determine alcohol involvement in SRIs is not reliable, with researchers using proxy measures such as high alcohol hours (HAH). This paper examines patterns of alcohol-related SRIs based on reported BAC versus the surrogate HAH measure. Trends over a 10 year period (2000-2010) were examined, comparing four different SRI rates (low alcohol hours (LAH), LAH with positive BAC, HAH, HAH with positive BAC). SRI data was drawn from the Road Networks Database of VicRoads containing information on all reported road crashes in Victoria. For the 10 year period there were 52,286 driver-related SRIs. Of the incidents where a driver's reading was recorded, 44% had a recorded BAC exceeding the legal limit of 0.05% and a further 23% had a BAC below the legal limit. During the period over 17,000 (or 34%) SRIs occurred during HAH. Where a BAC had been recorded during HAH, almost 60% exceeded the legal limit and a further 20% had some positive recording of BAC. Where SRI drivers had a recorded BAC during LAH, 58% had a positive BAC (31% with a BAC over the legal limit). Whilst it is likely that an SRI occurring during HAH will be associated with a positive BAC (80%), of which 60% will be above the legal limit, almost 60% of SRIs during LAH had a positive BAC, with 31% above the legal limit. There was no significant change in overall alcohol-related SRI rates between 2000 and 2010, suggesting that policies and procedures implemented to decrease drink-driving have not reduced alcohol-related SRI rates. Further, given the significant proportion of SRIs involving positive BAC during LAH, routine BAC testing in SRIs during these times should be adopted.

1080

CLANDESTINE METHAMPHETAMINE LABORATORIES: THE ROLE OF THE "PSEUDO-RUNNER". Jason Ferris*, Madonna Devaney (The University of Queensland)

Introduction: The jurisdiction of Queensland, Australia is considered the Australian 'production capital' for methamphetamine. "Pseudo-running" occurs when one person or several people purchase legal amounts of pseudoephedrine from pharmacies and aggregate the purchases to create a batch of methamphetamine. For the first time, in Australia, this study presents Queensland estimates of the number of: pseudo-runners, pseudoephedrine-based medication transactions, pharmacies visited and distanced travelled: providing a geo-spatial analysis of the Queensland pseudo-runner. Design and **Methods:** Suspected pseudo-runners were analyzed using de-identified data from pharmacy mandatory recording of pseudoephedrine based medication transactions: from 2005 to 2013. Pseudo-runners were identified based on a conservative annual transaction history of 21 or more per individual. Standard descriptive statistics, a time series analysis using Joinpoint regression software and ArcGIS were undertaken. **Results:** There were 3149 individuals suspected of pseudo- running in Queensland across the period. The maximum number of pharmacies visited in any one year ranged between 19 and 132. Using geo-spatial analysis, one pseudo-runner undertook 11 transactions in one day at 9 pharmacies (two accessed twice) covering a distance of 153kms (95 miles). **Discussion:** One of the reasons for the increased numbers of clandestine methamphetamine laboratories in Queensland (and elsewhere) is that methamphetamine is relatively cheap and easy to make, the ingredients needed for production are commonly available and laboratories can be moved easily and set up in other locations. This research helps to provide new and important evidence on the role of pharmacies, pharmacists and pseudo-runners in the diversion of pseudoephedrine-based medication to clan labs. This research will provide much needed evidence to help inform pharmaceutical regulations for pseudoephedrine-based medications.

1081

ALCOHOL-RELATED ASSAULTS IN QUEENSLAND, AUSTRALIA: 2004 – 2014. Jason Ferris*, Madonna Devaney (The University of Queensland)

Introduction: Until now, alcohol-related assault data from Queensland, Australia was not available. This paper provides a review and analysis of alcohol-related assaults, domestic violence-related (DVR) assaults and assaults on police. **Methods:** The research draws on data from Queensland Police Services (QPS). The data spans 2004 to 2014 aggregated to quarterly periods. Joinpoint Regression software was used to model the assault rates and quantify significant deviations in trends. Data are adjusted to account for population. **Results:** Over the series there were 191,221 assaults: 67,574 were alcohol-related. Typically the 4th and the 1st quarters of any year had the highest alcohol-related assault rates: at least 10% higher than other quarters. Prior to quarter 3 2007 approximately 40% of all assaults were alcohol-related. Following this, alcohol-related assaults fell by 0.88% per quarter. There were 23,114 DVR assaults; 11,274 were alcohol-related. Prior to 2009 the rate of alcohol-related DVR assaults was stable (~48%). Following 2009 the DVR alcohol-related assaults decreased by 1.06% per quarter. There were 18,367 assaults on police; 12,388 were alcohol-related. Over the series between 60-80% of assaults on police were alcohol-related. Prior to 2010 the alcohol-related assaults on police increased by 1% per quarter; followed by a 2% decreased per quarter until 2013 after which time the rate was stable.**Conclusions:** Results show some reduction in alcohol-related assaults across each data series in recent times. Alcohol related assaults in Queensland have decreased by 10 percent in the past 10 years with approximately a 1 percent decrease in the quarterly trend since 2006.

L01

PESTICIDE EXPOSURE AND BLADDER CANCER RISK AMONG U.S. FARMERS. Stella Koutros*, Debra T. Silverman, Michael C.R. Alavanja, Gabriella Andreotti, Catherine C. Lerro, Sonya Heltshe, Charles F. Lynch, Dale P. Sandler, Aaron Blair, Laura E. Beane Freeman (U.S. National Cancer Institute)

Objectives: Occupational exposures are a leading cause of bladder cancer, second only to smoking. A small number of studies have suggested a link between pesticide exposures among agricultural populations and bladder cancer. Thus, we used data from the Agricultural Health Study, a large prospective cohort study which includes 57,310 pesticide applicators with detailed information on pesticide use, to evaluate the association between pesticides and bladder cancer. **Methods**: We used Poisson regression to calculate rate ratios (RRs) and 95% confidence intervals (CIs) to estimate the association between each of 65 pesticides and 321 incident bladder cancer cases which accrued over the course of follow-up (1993-2011), adjusting for lifestyle, demographic and non-pesticide farm-related exposures, including those previously linked to bladder cancer. Additional analyses stratified by smoking status (never, former, current) were also conducted. **Results:** We observed associations with bladder cancer risk for two aromatic amine pesticides, the imidazolinone herbicides imazethapyr and imazaquin. Ever use of imazaquin (RR= 1.50, 95% CI: 1.01, 2.23) was significantly associated with bladder cancer while the excess risk among users of imazethapyr was statistically significant among never smokers (RR in highest quartile vs. nonexposed = 3.03, 95% CI: 1.46, 6.29, p-interaction=0.005). We also observed increased risks overall and among never smokers for use of several chlorinated pesticides including chlorophenoxy herbicides and organochlorine insecticides. **Conclusions:** Increased risks of bladder cancer were observed for the imidazolinone herbicides imazethapyr and imazaquin. The relationship between bladder cancer and imazethapyr, as well as for several other pesticides, was stronger among never smokers suggesting that possible risk factors for bladder cancer may be more readily detectable in those unexposed to potent risk factors, like tobacco smoke.

L02

ENVIRONMENTAL CHEMICALS, HEAVY METALS EXPOSURE, AND RISK OF PANCREATIC CANCER. Samuel O. Antwi*, Elizabeth C. Eckert, Corinna V. Sabaque, Emma R. Leof, Kieran M. Hawthorne, William R. Bamlet, Ann L. Oberg, Gloria M. Petersen (Division of Epidemiology, Health Sciences Research, Mayo Clinic, Rochester, MN)

Background: Exposure to various chemicals and heavy metals has been associated with risk of different cancers; however, data on whether such exposures may increase the risk for pancreatic cancer are limited and inconclusive. We compared self-reported exposures to chemicals and heavy metals in a case-control study of pancreatic cancer. **Methods:** The design was a clinic-based, case-control study of data collected from 2000-2014 at Mayo Clinic in Rochester, MN. Cases were rapidly ascertained patients diagnosed with pancreatic ductal adenocarcinoma (n=2092). Controls were age-, race- and sex-matched cancer-free patients in primary care clinics (n=2353). Cases and controls completed validated, identical risk factor questionnaires, which included yes/no questions about regular exposure to pesticides, asbestos, benzene, chlorinated hydrocarbons, chromium and nickel. Unconditional logistic regression was used to estimate odds ratio (OR) and 95% confidence intervals (CI) comparing those who affirmed exposure to each of the chemicals/heavy metals to those who reported no regular exposure, adjusting for age, sex, smoking, diabetes, body mass index, and education. **Results:** Self-reported regular exposure to pesticides was associated with increased odds of pancreatic cancer (OR=1.20, 95% CI: 1.01-1.43). Similarly, regular exposure to asbestos (OR=1.53, 95% CI: 1.23-1.91), benzene (OR=1.68, 95% CI: 1.21-2.32), and chlorinated hydrocarbons (OR=1.64, 95% CI: 1.33-2.03) were associated with higher odds of pancreatic cancer. However, neither nickel (OR=1.55, 95% CI: 0.95-2.52) nor chromium (OR=1.43, 95% CI: 0.89-2.27) exposure was associated with pancreatic cancer risk. **Conclusion:** These findings add to the limited data suggesting that exposure to pesticides, asbestos, benzene, and chlorinated hydrocarbons may increase the risk for pancreatic cancer. They further support the importance of implementing strategies that reduce exposure to these substances.

L03

FACILITATING HEALTH CHECKUPS FOR SOCIOECONOMICALLY VULNERABLE INDIVIDUALS BY PROMOTING AFFECTIVE DECISION-MAKING: A QUASI-EXPERIMENTAL STUDY AT PACHINKO (JAPANESE PINBALL) PARLORS. Naoki Kondo*, Yoshiki Ishikawa (The University of Tokyo)

Background: To reduce health disparities, intervention strategies that are targeted to individuals with poor socioeconomic status (SES) are necessary. Poor SESs induce chronic psychosocial stress and alter personal choices such that they tend to be affective/emotional rather than reflective/rational. This in turn may interfere with health-seeking behavior, such as getting health checkups. Given this theory, we hypothesized that certain affective solicitation techniques that "nudge" people to have health checkups, compared to the techniques that elicit individuals' rational choice, may be more effective for individuals with poor SES. **Methods:** We used the operation data including 8485 customers who took instant health checkup services (e.g., measuring weight and height, blood glucose, and other biomarkers of cardiovascular risks) provided by Carepro, Inc. Between 2011 and 2013, the firm operated 320 health checkup sessions at 110 Pachinko (Japanese pinball) parlors. In 63 sessions, the firm used young women wearing nurse uniforms to solicit customers. We used Poisson regression to estimate the prevalence ratios (PR) of customers with poor SES within each session using the women wearing nurse uniforms (intervention) against regular sessions (control). Poor SES was defined as unemployment or participation in National Health Insurance Services (NHIS), the public insurance program that mainly targets self-employees and those not working. We adjusted for within-session clustering, employing session random-effects. **Results:** Even after adjusting for age, the time since the last checkup, and cardiovascular risk biomarkers (cholesterol, triglycerides, and glucose), among men the PR for being NHIS holders was 1.44 (95%CI: 1.20-1.73) times higher in intervention sessions vs. in control sessions. Among women the PR for women was 1.19 (1.00-1.43). The PR for unemployed was 1.11 (95%CI: 0.87-1.42) in men and 1.87 (95%CI: 1.27-2.74) in women. **Conclusion:** Health communication techniques triggering affect.

L04

SOCIAL DISPARITIES IN DIETARY HABITS AMONG WOMEN: GEOGRAPHIC RESEARCH ON WELLBEING (GROW) STUDY. Catherine Cubbin*, May C. Wang, Katherine Heck, Marilyn Winkleby (University of Texas at Austin)

Background: While socioeconomic status (SES) and race/ethnicity have been observed to influence diet, relationships between individual-level SES, race/ethnicity, acculturation, and neighborhood-level SES are complex and multifaceted. We sought to answer whether 1) race/ethnicity, individual SES, and neighborhood SES have independent effects on adult women's consumption of fruits and vegetables; 2) SES modifies the effects of race/ethnicity on consumption; and 3) nativity modifies the effect of Latina ethnicity on consumption. **Methods:** Data included 2,669 surveys of ethnically diverse women in the population-based Geographic Research on Wellbeing (GROW) Study conducted in California in 2012-2013. Consumption was assessed as: 1) not consuming fruits and vegetables daily, and 2) not having fruits and vegetables in the home frequently. Other variables included age, marital status, race/ethnicity, country of birth, educational attainment, family income, and longitudinal neighborhood poverty (based on latent class growth models). A series of weighted logistic regression models accounting for the complex sample design was constructed. **Results:** In crude models, significant variation in consumption was observed across race/ethnicity, individual SES, and neighborhood SES. In adjusted models, race/ethnicity, educational attainment, and income were independently associated with consumption, but not neighborhood poverty. Little evidence for interactions between race/ethnicity and individual or neighborhood SES was found; similar patterns were observed for immigrant and U.S.-born Latinas. **Conclusion:** Because race/ethnicity, education and income influence where people live, longitudinal neighborhood poverty may mediate the relationship between race/ethnicity, individual SES and diet. Our findings suggest a need for macro-level interventions that make fruits and vegetables more accessible to low-income families, and have implications for food assistance programs.

L05

ACUTE PESTICIDE POISONING IN MOROCCO: RISK FACTORS AND OUTCOME. Safaa El Khaddam*, Hinde Hami, Moncef Idrissi, Rachida Soulaymani-Bencheikh, Abdelrhani Mokhtari, Abdelmajid Soulaymani (Laboratory of Genetics and Biometry, Faculty of Science, Ibn Tofail University, Kenitra, Morocco)

Background: Pesticide poisoning has become a major public health problem worldwide. It constitutes an important cause of morbidity and mortality. The aim of this study is to determine the epidemiological profile of acute pesticide poisoning and associated risk factors in the Tadla-Azilal region in Morocco. **Methods:** This is a retrospective study of pesticide poisoning cases reported between January 2000 and December 2008 to the Moroccan Poison Control Center. **Results:** During the period of study, 1 027 pesticide poisoning cases were reported in the Tadla-Azilal region whose 82.2% were due to organophosphates. Most victims were teenagers and adults (24.8% and 56.4%, respectively). Nearly 64% of the patients were from rural areas, with a specific lethality of 4.9%. Pesticides were used as a method of suicide in 55.9% of cases. According to the results, age, circumstances of poisoning and types of pesticides were significant risk factors influencing patients' health status. The risk of death due to poisoning was significantly higher among adults (OR=2.36; 95% CI=1.13-4.92). The patients intentionally poisoned were 4 times more likely to die than those accidentally poisoned (OR=4.06; 95% CI=1.84-8.96). Moreover, the patients poisoned by insecticides increase their risk of dying by 3 times (OR=2.81; 95% CI=1.86-9.31). Among the 994 patients for whom the outcome was known, 39 of them died, with lethality rate of 3.9%. For other cases, the outcome was favorable with or without sequelae. **Conclusions:** Preventive measures should be taken to rationalize pesticide use, which pose a real public health problem, not only for users, but also for the general population.

L06

ASSESSMENT OF TOXIC AND ESSENTIAL METALS IN THE PLACENTA AND RELATIONSHIP TO PREECLAMPSIA IN A PREGNANCY COHORT. Jessica E. Laine*, Wanda Bodnar, Pete Cable, Kim Boggess, Rebecca C. Fry (Department of Epidemiology, Gillings School of Global Public Health, University of North Carolina, Chapel Hill, North Carolina, USA)

Exposure to toxic metals such as cadmium (Cd) is ubiquitous and can occur via air, food, water, and cigarette smoke. Vulnerable populations such as pregnant women and their unborn children are susceptible as Cd is a transplacental toxicant and exposure to Cd during pregnancy has been associated with several adverse health outcomes, including lower birthweight, and preeclampsia (PE). Additionally, there are known interactions between Cd and essential metals such as selenium (Se) and zinc (Zn), where essential metals can influence uptake, transport, and toxicity of Cd. The major aims of this study were to assess placental levels of Cd, Se, and Zn using a pregnancy cohort of 194 women representing women across the southeast US and to examine associations of metal levels with the odds of PE and interactions with essential metals. Logistic regressions accessing odd ratios (OR) for PE with exposure to Cd controlling for confounders, as well as interactive models with essential metals (Se, Zn), were performed. Mean placental Cd levels were 3.6 parts per billion (ppb), (range of 0.52-14.5 ppb). The odds of PE were 1.2 (95% Confidence Interval (CI) of 1.0, 1.5) times the odds of not having PE with a one-unit change in exposure to Cd. Examining the interaction of Se with Cd-associated PE, the OR of PE was 1.4 (95% CI of 1.1, 1.8) with a one-unit change in exposure to Cd at levels below the median value of Se (246ppb), and an OR of 1.1 (95% CI of 1.0, 1.5) with a one-unit change in exposure to Cd at levels above the median value of Se (246ppb). Examining the interaction of Cd-associated PE with Zn, the OR of PE was 1.3 (95% CI of 0.9, 1.7) with a one-unit change in exposure to Cd at levels below the median value of Zn (8669 ppb) and an OR of 1.2 (95% CI of 0.9, 1.4) with a one-unit change in exposure to Cd at levels above the median value of Zn (8669 ppb). These data suggest that essential metals may play an important role in reducing the odds of Cd-associated preeclampsia.

L07

MATERNAL SMOKING DURING PREGNANCY AND BIRTH WEIGHT AND BMI TRAJECTORY OF THE OFFSPRING: AN INTERGENERATION COHORT. Ming Ding*, Jorge Chavarro(Harvard School of Public Health)

Scarce evidence has been provided on the associations of maternal smoking during pregnancy with birth weight and BMI trajectory of the offspring across three generations. We investigated associations of maternal smoking during pregnancy with birth weight, risks of overweight and obesity, and BMI trajectory among 41,333 participants in Nurses' Health Study II (NHS II) and 8,606 of their offspring who are participants in Grown Up Today Study 2 (GUTS2). We further investigated these associations across three generations among 6,583 participants in GUTS2. Data on smoking during pregnancy were reported by the mothers, and anthropometric data were provided by the participants. Our results showed that maternal smoking during pregnancy was associated with lower birth weight (P for trend < 0.001), higher risk of ever overweight (P for trend < 0.001), and higher body mass index (BMI) in adolescence and adulthood. For grandmothers' who smoked more than 14 cigarettes per day through three trimesters of pregnancy, comparing to never smokers, birth weight of the offspring was 0.16 lb (95% CI: 0.03, 0.28; P for trend = 0.01) higher; BMI was higher through adolescence (P = 0.004); odds ratio of ever overweight was 1.30 (95% CI: 1.06, 1.60; P for trend = 0.01). The associations appeared not to be mediated by mothers' smoking during pregnancy or mothers' latest BMI before pregnancy. Our conclusion was that maternal smoking during pregnancy was associated with lower birth weight and higher risk of overweight in the offspring. However, grandmothers' smoking during pregnancy was associated with higher birth weight and higher risk of overweight.

L08-S/P

IDENTIFICATION OF A LONG WORK HOURS CUT POINT FOR PREDICTING ELEVATED RISK OF POOR SELF-REPORTED GENERAL HEALTH. Sadie Conway*, Lisa Pompeii, Robert Roberts, Jack Follis, David Gimeno (University of Texas Health Science Center at Houston)

Background: A growing body of evidence has demonstrated that long work hours (LWH) is associated with numerous adverse health outcomes. The existing definitions of LWH, however, are heterogeneous and not health risk-based, and no previous study has identified the LWH cut point that best predicts the risk of poor health. The objective of this study was to derive a statistically optimized LWH cut point associated with poor self-reported general health (SRGH) status. **Methods:** A retrospective analysis of 25 years (1986-2011) of repeated work hour measures on a representative sample of 2,206 U.S. workers from the Panel Study of Income Dynamics. A comprehensive set of potential work hour cut points from 36 to 65 work hours per week (WH/w) over a minimum of 10 years was tested to examine the effect of each specific WH/w exposure threshold on SRGH. A statistically optimized LWH cut point was identified through a series of univariate tests of model fit, calibration, and discrimination.**Results:** Our analyses indicate that the LWH threshold for the increased risk of poor SRGH in U.S. workers is an average of ≥52 WH/w over a minimum of 10 years. The dichotomized exposure level of 52 WH/w or greater, on average, over a minimum of 10 years was identified as the optimized cut point in terms of model fit, calibration, and discrimination. Approximately 13 percent of participants were classified as exposed to 52 WH/w, and they had a higher risk of poor SRGH (RR = 1.28; 95% CI = 1.06−1.53) than participants exposed to lower LWH levels.**Conclusion:** To our knowledge, this is the first study to identify a statistically optimized LWH threshold beyond which the risk of poor general health increases. This provides a health-risk based alternative to past and current arbitrarily defined definitions of LWH. Further research is necessary to determine the utility and predictive power of this LWH cut point on other health outcomes.

L09-S/P

LEVELS AND DETERMINANTS OF DDT AND DDE EXPOSURE IN THE VHEMBE COHORT. Fraser Gaspar*, Jonathan Chevrier, Riana Bornman, Madelein Crause, Vhuli Obida, Dana Barr, Brenda Eskenazi (Center for Environmental Research and Children's Health)

Although indoor residual spraying (IRS) is an effective tool for malaria control, the use of IRS has contributed to high insecticide exposure in sprayed communities and raised concerns about possible unintended health effects. In rural South Africa where IRS occurs, the Venda Health Examination of Mothers, Babies and their Environment (VHEMBE) birth cohort study was initiated in 2012 to characterize prenatal exposure to IRS insecticides and its impacts on child growth and development. In this study, we describe the VHEMBE cohort and dichlorodiphenyl-trichloroethane (DDT) and dichlorodiphenyl-dichloroethylene (DDE) serum concentrations measured in VHEMBE mothers when they presented for delivery at a rural hospital. In addition, we applied targeted maximum likelihood estimation (TMLE) procedures to understand the change in marginal p,p'-DDT and p,p'-DDE body burden given seven hypothetical exposure interventions. A total of 751 mothers completed a baseline questionnaire and provided a serum sample. The majority of mothers enrolled in the VHEMBE cohort study were between 18 and 24 years of age (50.2%), completed at least grade 12 education (68.3%), lived below the South African poverty line of $40 per household member per month (58.3%), and were multiparous (56.8%). p,p'-DDT and p,p'-DDE serum concentrations were above the limit of quantification (LOQ) in 90.7 and 97.2% of the blood samples, respectively, while o,p'-DDT and o,p'-DDE serum concentrations were above the LOQ in 43.3 and 17.2% of the blood samples, respectively. Median (inter-quartile range) p,p'-DDT and p,p'-DDE serum concentrations were 56.8 (19.6-261.1) and 76.5 (27.9-271.5) ng/g-lipid, respectively. Of the seven interventions tested, three significantly reduced DDT and DDE exposures. If all VHEMBE mothers never lived in a DDT sprayed home, they would have 69.4% (95% CI: -76.3, -60.4) and 67.1% (95% CI: -73.6, -58.9) lower marginal p,p'-DDT and p,p'-DDE serum concentrations, respectively, than if all mothers ever lived in a DDT

L10-S/P

NOSOCOMIAL INFECTIONS: LEVELS OF AWARENESS AND PREVENTION IN DEVELOPING COUNTRIES. Chidinma Okafor* (Armstrong State University)

Nosocomial Infections: Levels of Awareness and Prevention in Developing Countries This presentation intends to analyze how nosocomial infections are ravaging developing countries in this era, including levels of recognition, and possible methods of prevention for these countries. As hospitals in developed countries are raising awareness and advocating for avoidance methods against this epidemic, some of their peer countries are lagging behind in this intervention. Hospital patients and staff alike are susceptible to nosocomial infections through exposure to surgical sites, respiratory tracts, urinary tracts, catheter sites, skin and soft tissue, sinusitis, eyes, and improper handling of hospital waste products.This exposition discusses the following key questions: Are all hospitals in developing countries burdened with this problem? Why are these hospitals oblivious to these predicaments? How can this matter be tackled? Should the governments of these countries get involved? What are the necessary infrastructures needed to approach this dilemma? How can awareness programs be raised through international and local non-governmental organizations? To address these concerns, this study will include a descriptive synthesis of thorough interviews of medical practitioners based in these countries, published reports, archives and newspapers. The learning objectives of this write-up are to (1) identify nosocomial infections and its burden on underdeveloped countries, and (2) formulate protective measures which will aid these countries to diminish this public health issue. Future research might look at the interventions of international organizations in addressing this issue from the grass root level in collaboration with the Ministry of Health of these countries.

L11-S/P

ADVANTAGES OF HEALTH PROMOTION OVER DRUG DEPENDENCY: EVIDENCE BASED SUPPORT. Chidinma Okafor* (Armstrong State University)

Advantages of Health Promotion over Drug Dependency: Evidence Based Support This presentation intends to profile the benefits of health promotion intervention over constant dependency on drugs as supported by evidence based research. The world is advancing in equipping people with the power to improve their health through health behavior interventions, such as regular exercise, eating a balanced diet, vaccinations, and health education through social networks, internet, television commercials, and health professionals; however, it is also advancing the excess availability of drugs for every ailment. The advantages of relying on health promotion for a better health outcome outweigh the gains of drug reliance, according to current literature. This exposition explores the following key questions via a systematic review of credible research and authenticated facts: How can health promotion reduce drug reliance? Do all ailments need medications? Are there any alternative methods of treatments apart from drug administration? What are the side effects of excessive drug ingestions? How can the government allocate more resources and efforts to public health? Can drug dependency be reverted? Should television commercials focus more on health education than on drug marketing? The learning objectives of this write up is to: A) identify the side effects of excessive drug reliance, including morbidity and mortality prevalence; B) analyze health behavior interventions for chronic diseases; and C) describe alternative medication therapies, such as acupuncture. Future research might look at cutting edge techniques which will promote public health over the excessive manufacturing of drugs.

L12-S/P

BMI CHANGE AND RISK OF BREAST CANCER: NATIONAL HEALTH AND NUTRITION EXAMINATION SURVEY (NHANES) 2005-2010. Wambui G. Gathirua-Mwangi,*, Terrell W. Zollinger, Mwangi J. Murage, Kamnesh Pradhan, Victoria L. Champion (Indiana University)

Objective: Breast cancer is the second leading cause of cancer mortality among women in the developed world. This study assessed the association between occurrence of breast cancer and Body Mass Index (BMI) change from age 25 to age closest to breast cancer diagnosis while exploring the modifying effects of demographic variables. **Methods:** The National Health and Nutrition Examination Survey data were used. Women included were ≥50 years, not pregnant and without a diagnosis of any cancer but breast. The total sample included 2,895 women (172 cases and 2,723 controls with no cancer diagnosis). Multivariate logistic regression was used to estimate the OR and 95% CI's and interaction evaluated by including an interaction term in the model. **Results:** Women whose BMI increased from normal/ overweight to obese compared to those who remained at a normal BMI were found to have a 2 times higher odds (OR=2.1; 95% CI: 1.11-3.79) of developing breast cancer. A more pronounced association was observed in non-Hispanic Black women (OR=6.6) and a significant association observed when they increased from normal to overweight (OR=4.2). **Conclusions:** Becoming obese after age 25 is associated with increased risk of breast cancer in women 50 years with Black women being at greatest risk.

L13-S/P

THE ASSOCIATION BETWEEN MATERNITY INSURANCE, RESIDENCE STATUS AND SELECTED PERINATAL OUTCOMES AMONG CHINESE WOMEN. Jing Zhang* (Miss)

Objectives: To investigate single and joint impact of maternity insurance and maternal residence on birth outcomes in a Chinese population. **Methods:** a perinatal cohort study was conducted in the Beichen District of the city of Tanjin, China. 2364 pregnancy women from this district were invited to participate this study at around 12-week gestation when they registered for receiving prenatal care services. After cleaning for missing information for related variables, a total of 2309 women with singleton birth were included in this analysis. **Results:** 1190 (51.5%) women reported having maternity insurance and 629 (27.2%) were rural residents. The abnormal birth outcomes were birth defects (n=48) including congenital heart defects (n=32). Maternal insurance and residence were not related to extreme birth weight (small for gestational age and large for gestational age). Compared to women who lived in urban areas with maternity insurance, the odds of infant defects was much higher for women who lived in rural areas with maternity insurance (Odds ratio (OR, 95% CI): 6.01 (1.43,25.21) $p<0.05$) after adjustment for the related covariates. **Conclusion:** compared to Tianjin urban areas, its rural areas had a much higher prevalence of infant mortality and birth defects. It suggests that more effort is needed to reduce infant mortality and defects in rural areas through improving women's health during their pregnancy.

L14-S/P

ALPHA-LINOLENIC ACID AND RISK OF AGE-RELATED MACULAR DEGENERATION: A PROSPECTIVE STUDY DURING TWO DECADES OF FOLLOW-UP. Juan Wu* (Department of Nutrition, Harvard T.H. Chan School of Public Health)

Purpose: Marine-sourced long-chain omega-3 fatty acids (n-3) have been associated with lower risk of age-related macular degeneration (AMD) in many observational studies. Alpha-linolenic acid (ALA) is the primary n-3 consumed in typical western diet and a small amount is endogenously converted to long-chain n-3. Thus, we aimed to investigate the association between long-term intake of ALA and risk of AMD. **Methods:** This prospective study included 76,649 female participants in the Nurses' Health Study in 1984. We calculated the intake of ALA from validated food frequency questionnaires collected every four years. By 2012, we confirmed 1,224 intermediate and 1,023 advanced AMD cases (96% wet AMD). Multivariate Cox proportional hazards model was used to estimate the RRs and 95% CIs. **Results:** After adjusting for age, BMI, smoking and other suspected risk factors of AMD, cumulative averaged intake of ALA was positively associated with intermediate AMD (comparing extreme quintiles, multivariate RR = 1.32, 95% CI = 1.10 to 1.58; p trend < .001); the RR persisted after further adjustment for correlated dietary risk factors including DHA, linoleic acid, saturated fat and trans fat (RR = 1.30, 95% CI = 1.04 to 1.64; p trend = 0.02). Mayonnaise-type salad dressing, the leading contributor to both the intake and plasma level of ALA in this cohort, was associated with a 28% (95% CI = 1.06 to 1.55) increased risk of intermediate AMD comparing the highest quintile of intake to the lowest. We detected a small amount of understudied trans ALA isomers (0.05% of total fatty acids) in red blood cells among a subsample of women (n = 408) and mayonnaise also significantly predicted one of the trans ALA isomers ($p < .001$). Intake of ALA was not significantly associated with advanced AMD. **Conclusion:** ALA does not appear to protect against AMD and may increase the risk of intermediate AMD. Whether trans ALA is responsible for the positive association deserves further investigation.

L15

SECONDHAND SMOKE EXPOSURE AND MARKERS OF INFLAMMATION: THE MULTI-ETHNIC STUDY OF ATHEROSCLEROSIS. Hoda Magid*, Ana Navas-Acien, Michael Blaha, Moyses Szklo, Gregory Burke, Joseph Polack, Miranda Jones, Mahmoud Al-Rifai (Department of Epidemiology, Johns Hopkins Bloomberg School of Public Health)

Few studies have evaluated the association between secondhand smoke (SHS) and subclinical cardiovascular disease (CVD) among ethnically diverse populations. This study assessed the impact of SHS on three domains of subclinical CVD (inflammation, atherosclerosis, and peripheral arterial disease) among 5,032 non-smoking adults 45-84 years without prior CVD participating in the Multi-Ethnic Study of Atherosclerosis (MESA) from 2000 to 2002. SHS exposure was dete mined by self-report, and urinarycotinine in a subset. The multi adjusted geometric mean ratios (95% confidence interval) for high sensitivity C-reactive protein comparing 407 participants withSHS ≥12 hours/week vs 3,035 unexposed were 1.26 (1.12, 1.41) and 1.14 (1.02, 1.26) before andafter adjustment for body mass index. The corresponding ratios for interleukin-6 were 1.11 (1.04, 1.18) and 1.05 (0.98, 1.11), and for internal carotid intima media thicknessthey were 1.04 (1.00, 1.09) and 1.04 (0.99, 1.08). Fibrinogen and coronary artery calcium were not associated with SHS. The prevalence of peripheral arterial disease (ABI≤0.9 or ABI≥1.4) was associated with detectable urinary cotinine (Odds ratio: 2.0l; 95%confidence interval: 1.13, 3.90) but not with self-reported SHS. Despite limited exposureassessment, this study supports the association of SHS exposure with subclinical inflammation, internal cIMT, and peripheral arterial disease.

L16

A QUANTITATIVE METHOD TO IDENTIFY TARGETS FOR REDUCING HEALTH DISPARITIES: AN APPLIED EXAMPLE. John W. Jackson*, Tyler J. VanderWeele (Harvard T.H. School of Public Health, Department of Epidemiology)

BACKGROUND Researchers are often interested in how much certain mediating variables (e.g. high school test scores) explain health disparities, and usually compare inequality estimates before and after adjusting for a mediating variable. Recent work in the potential outcomes framework has highlighted the need to adjust for mediator-outcome confounders (e.g. socioeconomic status in childhood [early SES]) in such analyses. While adjustment is necessary, control for confounders in this way gives estimates that entail a co-intervention to equalize these risk factors across groups and may not reflect the intended intervention. **METHODS** We demonstrate a generalization of decomposition methods used in economics and demography that allow one to validly quantify the extent to which inequalities might be reduced after intervening upon a mediating variable (test scores) but not a confounder (early SES). We revisit analyses in the 1979 National Longitudinal Survey of Youth that examine how racial inequalities in wages, unemployment, incarceration, and self-reported health might change upon equalizing differences in test scores. We compare results from (a) analyses that estimate the inequality reduction due to equalizing test scores with and without control for measures of early SES versus (b) analyses that decompose the observed inequality into the portion that would be reduced by intervening on early SES alone, test scores alone, or both early SES and test scores, and also the residual inequality in each case. **RESULTS** Across outcomes, failing to control for early SES yielded inaccurate estimates of how much inequalities would decrease. Of the observed inequality, intervening on early SES alone accounted 28% for wages, 14% for unemployment, 38% for incarceration, and 100% for health. Intervening on test scores would reduce the inequality (respectively) by an additional 46%, 44%, 39%, and 0%. **CONCLUSIONS** These methods may be used to help target opportunities to reduce disparities.

L17

POLYCHLORINATED BIPHENYLS AND THEIR ASSOCIATION WITH SURVIVAL FOLLOWING BREAST CANCER. , Humberto Parada*, Mary S Wolff, Lawrence S Engel, Sybil M Eng, Nikhil K Khankari, Susan L Teitelbaum, Alfred I Neugut, Marilie D Gammon (University of North Carolina at Chapel Hill, Department of Epidemiology)

Polychlorinated biphenyls (PCBs) have a promulgated role in influencing breast carcinogenesis due to their ubiquity, persistence, lipophilicity, and their potential to induce estrogenic and anti-estrogenic effects and to induce cytochrome P450 isozymes. Whether individual PCB congeners, or biologically based groupings influence survival following breast cancer is unknown. A population-based cohort of women diagnosed with first primary invasive or in situ breast cancer in 1996-1997 with blood-measured PCBs (n=627) collected within 3 months of diagnosis was followed for vital status through 2011. After 5 and 15 years, respectively, we identified 54 and 187 deaths, of which 36 and 74 were breast cancer-related. We estimated hazard ratios (HRs) and 95% confidence intervals (CI) using lipid-adjusted PCB concentrations in Cox Regression. Five years after diagnosis, the highest tertile of estrogenic congener PCB#174 was associated with more than two-fold increase in all-cause (HR=2.22, 95%CI 1.14-4.30) and breast cancer-specific (HR=3.15, 95%CI 1.23-8.09) mortality. At 15 years, the highest tertile of PCB#174 remained associated with breast cancer-specific mortality (HR=1.88, 95%CI 1.05-3.36). At 5 years, the highest tertile of estrogenic PCB#177 was also positively associated with all-cause mortality (HR=2.12, 95%CI 1.05-4.30). PCBs #180 and #183, CYP1A1/CYP2B inducers, showed similarly elevated hazards of breast cancer-specific mortality. At 15 years, the highest tertiles of the sum of anti-estrogenic congeners in Wolff Group 2A and individual congener PCB#118 were inversely associated with all-cause mortality (HR= 0.60, 95%CI 0.41-0.89 and HR=0.63, 95%CI 0.43 -0.92, respectively). In this first population-based study of American women of PCBs and survival, PCBs were associated with survival in biologically plausible directions. These associations suggest that investigation of associations with other, structurally similar, chemicals may be warranted.

L18

NOVEL SENSITIVITY ANALYSIS FOR UNCONTROLLED CONFOUNDING IN G-METHODS. Onyebuchi A. Arah*(Department of Epidemiology, UCLA Fielding School of Public Health, Los Angeles, CA, United States)

Uncontrolled confounding remains one of the most important validity threats in epidemiology. For over half a century, various methods have been developed for handling uncontrolled confounding in the health sciences. The more general and flexible the method, the more complex its application became, leading to overly simplified uses under restrictive, if not implausible, assumptions. This study introduces and demonstrates a novel regression -based approach to sensitivity analysis of uncontrolled confounding in generalized linear models. The approach is quite flexible and general enough and can be used for general outcome distributions and link functions. Following its formalization, the new approach is illustrated in simulated and real data settings using examples from social epidemiology. The required bias parameters are (i) the conditional association between the unmeasured confounder and the outcome, and (ii) the expectation or probability of the confounder given the exposure and pre-adjusted confounders or covariates. Both parameters can be added to the data as new variables or data columns and be used in combination with conditional linear, loglinear and logistic regression models, sequential g-estimation of the parameters of structural nested models, and g-computation respectively. Applications are provided without and with Monte Carlo simulations that convert the expectation of the confounder given the exposure and pre-adjusted confounders or covariates into a variable. Further results show how to simplify the specification of the models for the bias parameters to achieve bias adjustment of the exposure regression coefficient without necessarily simultaneously adjusting the covariate regression coefficients. Illustrative user-friendly software codes are also provided.

L19-S/P

ACUTE HIGH-DOSE AND CHRONIC LIFETIME EXPOSURE TO ALCOHOL CONSUMPTION AND DIFFERENTIATED THYROID CANCER. Yunji Hwang* (Seoul National University)

Background: This study evaluated the effects of acute high-dose and chronic lifetime exposure to alcohol and exposure patterns on the development of differentiated thyroid cancer (DTC). **Methods:** The Thyroid Cancer Longitudinal Study (T-CALOS) included 2,258 DTC patients (449 men and 1,809 women) and 22,580 healthy participants (4,490 men and 18,090 women) who were individually matched by age, gender, and enrollment year. In-person interviews were conducted with a structured questionnaire to obtain epidemiologic data. Clinicopathologic features of patients were obtained by chart reviews. Odds ratios (ORs) and 95% confidential intervals (95%CI) were estimated using conditional regression models. **Results:** While light or moderate drinking behavior was related to a reduced risk of DTC, acute heavy alcohol consumption (151 g or more per event or on a single occasion) was associated with an increased risk in men (OR=2.22, 95%CI=1.27-3.87) and women (OR=3.61, 95%CI=1.52-8.58) compared with never-drinkers. The consumption of alcohol for 31 or more years was a significant risk factor for DTC for both men (31-40 years: OR=1.58, 95%CI=1.10-2.28; 41+ years: OR=3.46, 95%CI=2.06-5.80) and women (31-40 years: OR=2.18, 95%CI=1.62-2.92; 41+ years: OR=2.71, 95%CI=1.36-5.05) compared with never-drinkers. The consumption of a large amount of alcohol on a single occasion was also a significant risk factor, even after restricting DTC outcomes to tumor size, lymph node metastasis, extrathyroidal extension and TNM stage. **Conclusion:** The findings of this study suggest that threshold effects of acute high-dose alcohol consumption and long-term alcohol consumption are linked to an increased risk of DTC.

L20

A SYSTEMATIC REVIEW AND META-ANALYSIS OF LUNG CANCER RISK ASSOCIATED WITH NITROGEN DIOXIDE AND TRAFFIC EXPOSURE. Ghassan B Hamra*, Francine Laden, Aaron Cohen, Ole Raaschou-Nielsen, Michael Brauer, Dana Loomis(Drexel University School of Public Health)

Background and objective: Exposure to traffic-related air pollutants is an important public health issue. A recent meta-analysis of measured particulate matter shows strong evidence of lung carcinogenicity. Particulate matter is a component of traffic related air pollution, but is also a product of other anthropogenic and natural processes. Nitrogen oxides are also emitted by road traffic and have been used as indicators of traffic-related air pollution in epidemiologic research. Here, we present a systematic review and meta-analysis of research examining the relationship of measures of nitrogen oxides and of various measures of traffic related air pollution exposure with lung cancer risk. **Methods:** We conducted random effects meta-analyses of studies examining exposure to NO2 and NOx exposure and lung cancer incidence and mortality. We identified 20 studies that met our inclusion criteria and provided information necessary to estimate the change in lung cancer risk per 10 µg/m3 increase in exposure to measured NO2. Further, we qualitatively assess the evidence of association between distance to roadways and traffic volume associated with lung cancer risk. **Results:** The meta -relative risk (95% CI) for lung cancer associated with a 10 µg/m3 increase in exposure to NO2 was 1.04 (1.01, 1.08). The meta-relative risk for lung cancer associated with a 10µg/m3 increase in NOx was similar and slightly more precise, 1.03 (1.01, 1.05). The NO2 meta-relative risk was robust to different confounding adjustment sets as well as the exposure assessment techniques utilized. Trim-and-fill analyses suggest that if publication bias exists the overall meta-estimate is biased away from the null. Forest plots for measures of traffic volume and distance to roadways largely suggest a modest increase in lung cancer risk. **Conclusion:** We found consistent evidence of a relationship between NO2 and NOx, as proxies for traffic sourced air pollution exposure, with lung cancer. Studies of lung cancer risk related to residen

L21

NON-STEROIDAL ANTI-INFLAMMATORY DRUG (NSAID) USE AND RISK OF HEPATOCELLULAR CARCINOMA AND INTRAHEPATIC CHOLANGIOCARCINOMA: THE LIVER CANCER POOLING PROJECT. Jessica L. Petrick* (Division of Cancer Epidemiology and Genetics, National Cancer Institute, Bethesda, MD)

Chronic inflammation is a feature which underlies the pathogenesis of both hepatocellular carcinoma (HCC) and intrahepatic cholangiocarcinoma (ICC), the two most common types of liver cancer. NSAIDs, including aspirin and ibuprofen, modulate the inflammatory response by inhibiting cyclooxygenase enzymatic pathways and down-regulating pro-inflammatory cytokines. As liver cancer is rare, few studies have been able to examine the association between NSAID use and HCC, and none have investigated ICC. Therefore, we harmonized and pooled data on 882,727 individuals (HCC=594, ICC=197) from eight US-based prospective cohort studies within the Liver Cancer Pooling Project. Cox proportional hazards regression was used to estimate multivariable-adjusted hazard ratios (HRs) and 95% confidence intervals (CIs). Aspirin and ibuprofen were modeled as current use versus non-use. Aspirin was further evaluated by frequency, duration, and dosage. To account for the potential influence of non-aspirin NSAIDs, we also restricted the analysis to non-users of non-aspirin NSAIDs. To assess confounding by contraindication of aspirin due to underlying chronic liver disease, we conducted a lag analysis, excluding cases diagnosed within the first five years of follow-up. Aspirin use was inversely associated with HCC risk (HR=0.68, 95% CI=0.57–0.82), which persisted when restricted to non-users of non-aspirin NSAIDs and in the lag analysis. The association between aspirin use and HCC risk was stronger for daily use, longer duration of use, and lower dosage. Aspirin use was associated with a reduced ICC risk in men (HR=0.65, 95% CI=0.41–1.01) but not women (HR=1.27, 95% CI=0.82–1.97, p-interaction=0.03). Ibuprofen use was not associated with HCC or ICC risk. The observed inverse association between aspirin and liver cancer risk provides the strongest indirect evidence to date that aspirin may provide for an efficacious intervention for HCC and possibly ICC.

L22

UNDERSTANDING DISCREPANCIES BETWEEN OBSERVATIONAL AND EXPERIMENTAL STUDIES: THE INELUCTABLE ROLE OF CONTEXT. Gregory H Cohen*, Sandro Galea(Boston University, School of Public Health, Department of Epidemiology)

Observational and experimental studies often point us in opposite directions. Hormone replacement therapy (HRT) for coronary heart disease (CHD) prevention, and beta-carotene for lung cancer prevention are prime examples. In both cases, what was thought protective (observational findings) was later found harmful (experimental findings). Technically, these discrepancies are largely due to "unmeasured" confounding. For example, the Nurses' Health Study (NHS), which found HRT protective, was conducted among nurses, a relatively homogenous and healthy group. By contrast, the Women's Health Initiative (WHI), a randomized controlled trial (RCT) with a general population sample, found a harmful effect. The discrepancy between the NHS and WHI studies is now generally attributed to population differences in time-since-menopause relative to HRT initiation. Taking another example, a case-control study found that high serum beta-carotene was associated with reduced lung cancer risk. In contrast, the CARET RCT, conducted in a high-risk group, found that beta-carotene supplements increased lung cancer risk. Discrepancies in this example appear attributable to the observational study context, specifically confounding by indication. Although the technical explanations for differences between these two examples diverge, at core, the differences between these observational and experimental findings rest on contextual differences shaping the observed populations. Ultimately, our science aims to isolate causes of population health, with the goal of intervening. However, as these two examples and many others illustrate, the role of context is a pervasive influence on our scientific observations and an ineluctable influence on inference that can be drawn from our studies. Context can well be in the form of lifecourse stage or lived circumstances. This agitates for a more explicit focus on external validity in epidemiologic studies, together with our current focus on internal validity.

L23

GROUP AND INDIVIDUAL PRENATAL CARE ON GESTATIONAL DIABETES MELLITUS: THE SOUTH CAROLINA CENTERINGPREGNANCY EXPANSION PROJECT. Liwei Chen*, Emily Heberlein, Sarah Covington-Kolb, Amy H. Picklesimer(Clemson University)

Centering Pregnancy group prenatal care (CPNC), a patient-centered model of integrating medical checkups with social support and education in a group setting, has shown promise in reducing preterm birth. However, the impact of CPNC on gestational diabetes mellitus (GDM) has not been investigated. This retrospective cohort study included pregnant women who received prenatal care from 7 obstetric practices participated in the South Carolina (SC) CenteringPregnancy Expansion Project. Using SC birth certificate data linked with Medicaid claims, we compared the incidence of GDM in women who chose CPNC and had a live birth between August, 2013 and September, 2014 to women from the same practices receiving standard individual prenatal care (IPNC). We applied multivariate regressions to estimate the ORs and 95% CI with controlling for demographic and clinical risk factors. The crude rate of GDM was 6.42% in IPNC (N=6,807) and 4.14% in CPNC (N=604) (P=0.03). Compared to women in IPNC, women in CPNC were less likely to develop GDM (OR=0.53; 95% CI: 0.34 –0.81; P=0.003) after adjusted for age, race, education, marital status, parity, time of entering and adequacy of prenatal care. The OR only slightly changed and remained significant (OR=0.58; 95% CI: 0.38–0.89; P=0.012) after additional controlling for pre-pregnancy BMI category, gestational weight gain, and gestational age. In conclusion, approximately 40% lower risk of GDM was observed in pregnant women who received CPNC as compared with women receiving IPNC, suggesting that CenteringPregnancy has clinically significant benefits on reducing the occurrence of GDM.

L24

ECOLOGIC TRENDS IN RESPIRATORY VIRUS DETECTION DURING TWO YEARS OF HIVE STUDY SURVEILLANCE. Ryan E Malosh*, Suzanne E Ohmit, Rafael Meza, Marisa C Eisenberg, Arnold S Monto (University of Michigan School of Public Health)

Background: Previous studies describing seasonal trends in respiratory viral incidence have proposed a phenomenon termed 'viral interference', where circulation of one respiratory virus affects circulation of other respiratory viruses. We used data from years one and three of the Household Influenza Vaccine Effectiveness (HIVE) Study to evaluate viral interference and the correlation between weekly incidences of respiratory viruses. **Methods:** We estimated the association between weekly time-series data for the incidence of rhinovirus, coronavirus, influenza, and respiratory syncytial virus (RSV) using the cross-correlation function (CCF) method. We examined CCF plots to identify lags with significant correlations and performed Granger causality tests to determine if incidence of one respiratory virus predicted incidence of another. **Results:** We observed significant cross-correlation between coronavirus and the other three viruses and between influenza and RSV in both years, though lag times differed. We found no correlation between rhinovirus and RSV. In year one Granger causality tests indicated that coronavirus predicted influenza (p=0.004), RSV (p=0.006) and rhinovirus (p=0.045) and suggested a potential feedback loop between influenza and RSV. Granger test results were less clear in year three. **Discussion:** Understanding the seasonal patterns of respiratory viruses may help guide prevention strategies. We advanced this understanding using an innovative statistical methods that are generally applied to economic data to investigate correlations among trends in viral incidence. We found evidence that viral incidences were ecologically correlated, but that the associations, which are like a result of a multifactorial process, varied with respect to the timing of each outbreak and across study years. Future work will build on these findings by including longer time series to look at season to season correlations.

L25

A COMPARISON OF AGE AT TIME OF DEATH FROM SUICIDE AMONG VETERANS AND OTHER AMERICANS. Claire Hoffmire*, Robert Bossarte (Department of Veterans Affairs Center of Excellence for Suicide Prevention)

Background: On average, male Veterans who die from suicide are older than non-Veteran adult male suicide decedents. Although not surprising given the high rates of suicide among older men in the general U.S. population and the fact this sub-population is over-represented in the U.S. Veteran population, the distribution of age at death from suicide has yet to be explicitly compared between Veterans and non-Veterans. **Methods:** State death records were compiled for all suicides reported by 15 states (1999–2009) participating in the VA study on Suicide Mortality and Veteran Status. The distribution of age at time of death was compared between adult Veterans and non-Veterans overall and by gender. **Results:** Clear differences in the distribution of age at suicide were noted between Veterans and adults without a history of military service. The average age at death from suicide was 54.2 years among Veterans compared to 46.1 years among non-Veterans, but the Veteran population appears to be bimodal while that for non-Veterans is approximately normal. The first peak among Veterans aligned closely with the average age of suicide for non-Veterans and a unique, second period of risk for Veterans peaked at approximately 76 years of age. Consistent findings were noted among males, while Veteran females experienced a unimodal distribution mirroring that of non-Veteran females. **Conclusions:** Average age is not an appropriate measure for describing age at suicide among Veterans. While deaths during the middle years (35 to 55) account for a large number of suicides among both groups, a high proportion of suicides also occur among older Veterans 70 to 85 years of age. Prevention programs should take these novel findings into account, in addition to known age differences in Veteran suicide rates, when planning and targeting prevention programs.

L26

VALIDATION OF THE USE OF ICD-9 AND E-CODES TO ACCURATELY IDENTIFY ABUSED CHILDREN. Crystal Silva*, David M Notrica, Gevork Harootunian, Rebecca Ragar (Phoenix Children's Hospital)

Background: Administrative-level data is frequently used in epidemiologic research of child abuse even though the inability of ICD and E-codes to capture abuse is well documented. No study has quantified the false-negative rate of administrative data in identifying child abuse. **Purpose:** Determine the accuracy of ICD-9 and E-codes in identifying child abuse in an administrative data set. **Methods:** Retrospective review of child abuse patients (as determined by forensics specialists) at a children's hospital between January 2010 and December 2011. Patients were matched to state administrative data for same service date. STATA 13.1 was used to compare ICD-9 codes (995.50-995.55, 995.59) and CDC cause matrix assault E-codes (52 codes) for abuse in the administrative data to determine the false-negative rate. Common codes were further examined. **Results:** 215 patients met inclusion criteria. Administrative data for 88 (41%) patients included an ICD-9 (n=74, 34%) or E-code (n=87, 40%) for abuse. Most common ICD-9 and E-codes among children identified abused were child physical abuse (n=68, 77%), assault by unspecified means (n=59, 67%), child abuse by unspecified persons (n=50, 57%), and retinal hemorrhage (n=15, 17%). Of the 127 (59%) patients without abuse codes, the most common codes were accident in home (n=71, 56%), injury by unspecified means (n=34; 27%), contusion of scalp/neck (n=25; 20%), and closed vault fracture of skull without intracranial injury (n=11, 9%).**Conclusion:** Administrative data alone is inaccurate in identifying child abuse. In this study, the false-negative rate was 59%. Moreover, since these patients have thorough inpatient workups by forensics specialists in a pediatric hospital, the expected false-negative rates in settings without forensics specialists may be even higher. Further exploration of patient characteristics coupled with codes may improve the capture of child abuse in administrative datasets.

L27

AMBIENT ASBESTOS AND LONG-TERM TRENDS IN PLEURAL MESOTHELIOMA INCIDENCE BETWEEN URBAN AND RURAL AREAS IN THE UNITED STATES. Kara Keeton*(Cardno ChemRisk)

Estimated ambient asbestos (AA) concentrations in the U.S. have been at least an order of magnitude higher in urban (0.003 f/cc) v. rural (0.000003 f/cc) areas over the past 40 years. While many published studies have indicated that AA exposures are not associated with a significantly increased incidence of pleural mesothelioma (PM), others have postulated that an increased PM risk exists with exposure to as little as a single asbestos fiber. Thus, this study examined incidence rates (IRs) of PM in urban and rural areas to determine the impact that variations in AA concentrations had on disease risk, particularly in populations with a lack of historical occupational asbestos exposure (i.e., females). Gender-specific urban and rural trends were compared in the following manner: 1) Annual age-adjusted PM IRs from 1973 to 2011 were obtained from the Surveillance Epidemiology and End Results (SEER) 9, 13, and 18 databases; 2) IRs were stratified by urban v. rural areas in SEER*Stat; and 3) Standardized rate ratios and associated CIs were computed. For males, PM IRs over time were generally higher in urban (7-25 cases per 1,000,000) v. rural (2-17 cases per 1,000,000) areas. In contrast, female urban and rural PM IRs were similar and remained relatively flat over time, ranging from approximately 2 to 4 cases per 1,000,000. Male urban PM IRs were statistically significantly elevated compared to rural rates in 23 of the 39 years examined, whereas female urban rates were elevated in only 3 of the 39 years. Using the available registry data, this analysis demonstrated that females had no discernible difference between urban and rural PM rates, while male trends between the two were quite pronounced (presumably due to occupational exposure). These results suggest that differences in the ambient asbestos concentrations between urban and rural areas ranging over an order of magnitude or more do not appear to influence the risk of pleural mesothelioma in the U.S. over time.

L28

OCCUPATIONAL SEDENTARY BEHAVIOR AND THE RISK OF ORAL AND PHARYNGEAL CANCER: RESULTS FROM AN ITALIAN CASE-CONTROL STUDY. Marisa A Bittoni*, Christine L Sardo, Francesca Bravi, Randall Harris, Carlo La Vecchia(The Ohio State University)

Introduction: Many occupations are characterized by prolonged periods of sitting or low energy expenditure, which has been linked to several types of cancer. It is unclear whether a relationship exists for oral/pharyngeal cancer. This study assessed the relationship between work-related sedentary behavior at various age levels and the risk of oral/pharyngeal cancer. **Methods:** A case-control study was conducted in Italy between 1997 and 2009. Data were analyzed from 347 incident, histologically confirmed oral/pharyngeal cancer cases and 992 hospital controls with information on occupational physical activity. Sedentary work was defined by positions such as office clerk, mechanic and student. Multivariate odds ratios (ORs) and corresponding 95% confidence intervals (CIs) were obtained after controlling for potential confounding factors. **Results:** Multivariate logistic regression analyses revealed ORs (95% CIs) for oral/pharyngeal cancer and sedentary versus non-sedentary behavior of 1.85 (1.26, 2.72), 1.22 (0.8, 1.80), 1.63 (1.10, 2.43), and 1.49 (1.03, 2.14) for the ages of 12, 15-19, 30-39 and 50-59 years, respectively, controlling for gender, age, education, body mass index and smoking. Therefore, a significantly increased odds of obtaining oral cancer was observed for sedentary activity at all age levels except the 15-19 year age group. Smokers and males had over 2.5 times the odds of developing oral/pharyngeal cancer. **Discussion:** The results of this study showed an increased odds of developing oral cancer for those engaged in work-related sedentary behavior even after controlling for major risk factors, such as smoking. Additional research in various populations and efforts to determine possible mechanisms of action are warranted.

L29

ENVIRONMENTAL POLLUTANTS AND BREAST CANCER INCIDENCE IN THE UNITED STATES. Juhua Luo* Michael Hendryx (Indiana University)

Background: There are growing public concerns about community health risks from exposure to environmental contaminants. Breast cancer is the most common type of invasive cancer among US women. Environmental pollutants have been suggested to play a role in the development of breast cancer. However, few nationwide studies have evaluated environmental pollutants in relationship to population breast cancer incidence. **Methods:** We used the Toxics Release Inventory (TRI) database (1990-1999) and Surveillance, Epidemiology, and End Results (SEER) data (2000-2010) to conduct an ecological study of the association between environmental pollutants and breast cancer incidence at the county level. We used multiple linear regression to assess the association of age-adjusted breast cancer incidence with the quantities of total, air and water releases of carcinogens, metals, and persistent bioaccumulative toxic chemicals after controlling for potential confounders (smoking, obesity, and other socioeconomic factors). **Results:** Among a total of 612 countries covered by SEER registries, we observed that the risk of breast cancer incidence was significantly associated with total releases of carcinogens and metals, and with releases of carcinogens and metals to air but not to water. A significant dose-response relationship was also observed for the total amount of carcinogen and metal releases and for the amount of carcinogen and metal release to air. We did not observe an association between breast cancer incidence and persistent bioaccumulative toxic releases. Further analysis specific to premenopausal or postmenopausal breast cancer revealed similar findings as for overall breast cancer. **Conclusion:** Our results suggest that exposure to higher air releases of carcinogens and metals may increase the risk of breast cancer incidence. Our findings add to the evidence for taking prudent efforts to limit the release of pollutants into the environment.

L30

MALTREATMENT IN CHILDHOOD WAS ASSOCIATED WITH NUMBER OF REMAINING TEETH AMONG OLDER JAPANESE; A LIFE-COURSE STUDY OF THE JAGES PROJECT. Yusuke Matsuyama*, Takeo Fujiwara, Jun Aida, Naoki Kondo, Tatsuo Yamamoto, Katsunori Kondo, Ken Osaka (JAGES group) (Department of International and Community Oral Health, Tohoku University Graduate School of Dentistry)

In a life course perspective, social and physical exposures in early life have long-term effects on later health and disease. Maltreatment in childhood might be a social factor associated with chronic diseases, including dental health. Some previous studies suggested that maltreatment in childhood could damage the inhibitory or immune system, and might affect one's health status later in life. As for oral health, high paternal discipline has been reported to be associated with bad periodontal status in middle-aged Brazilians. However, studies that focused on the association between maltreatment in early life and dental status in older people are limited. Thus, we aimed to investigate the association between maltreatment experience in childhood and the number of remaining teeth in older Japanese individuals. In 2013, self-report questionnaires were mailed to 38,724 community-dwelling individuals aged 65 years or older in Japan, of whom 67.7% responded. We used the data of 25,189 respondents who answered the item on the number of remaining teeth. We ascertained maltreatment if respondents had experienced any physical abuse, psychological abuse, and neglect until the age of 18 years. The number of remaining teeth was categorized as follows: "20 or more teeth," "10–19 teeth," "5–9 teeth," "1–4 teeth," or "no teeth." Using multivariate ordered logistic regression analyses, we investigated the association between maltreatment and fewer teeth, with consideration for age, sex, and socioeconomic status, including childhood poverty, education, occupation, and current income, throughout the respondents' life course. Among the respondents, 14.8% had experienced maltreatment. After considering all the covariates, the respondents with maltreatment in childhood significantly had fewer teeth (OR =1.15; 95% CI: 1.07–1.23). This study showed that maltreatment in childhood could be independently associated with dental status in older adults.

L31

ASSESSING MODEL UNCERTAINTY USING HEXAVALENT CHROMIUM AND LUNG CANCER MORTALITY FROM AN OCCUPATIONAL COHORT IN MARYLAND AS AN EXAMPLE. Larissa Pardo*, Leonid Kopylev, Glinda Cooper, Thomas Bateson (American Schools and Programs of Public Health (ASPPH)/U.S. Environmental Protection Agency (EPA))

Introduction: The National Research Council recommended quantitative evaluation of uncertainty in effect estimates for risk assessment. This analysis considers uncertainty across model forms and model parameterizations with hexavalent chromium [Cr(VI)] and lung cancer mortality as an example. The objective is to characterize model uncertainty by evaluating estimates across published epidemiologic studies of the same cohort. **Methods:** This analysis was based on 5 studies analyzing a cohort of 2,357 workers employed from 1950-74 in a chromate production plant in Maryland. Cox and Poisson models were the only model forms considered by study authors to assess the effect of Cr(VI) on lung cancer mortality. All models adjusted for smoking and included a 5-year exposure lag, however other latency periods and model covariates such as age and race were considered. Published effect estimates were standardized to the same units and normalized by their variances to produce a standardized metric to compare variability within and between model forms. A total of 5 similarly parameterized analyses were considered across model form, and 16 analyses with alternative parameterizations were considered within model form (10 Cox; 6 Poisson). **Results:** Across Cox and Poisson model forms, adjusted cumulative exposure coefficients (betas) for 5 similar analyses ranged from 2.47 to 4.33 (mean=2.97, $\sigma 2$=0.63). Within the 10 Cox models, coefficients ranged from 2.53 to 4.42 (mean=3.29, $\sigma 2$=0.52). Within the 6 Poisson models, coefficients ranged from 2.30 to 3.29 (mean=2.70, $\sigma 2$=0.15). **Discussion:** The variability in results was greater between models than within models, with variability of Cox estimates greater than Poisson estimates in this analysis. Characterizing epidemiologic model uncertainty for risk assessment remains an important but challenging task. **Disclaimer:** The views expressed in this abstract are those of the authors and do not represent USEPA opinions and/or policy.

L32

BIRTH SETTINGS AND THE VALIDATION OF NEONATAL SEIZURES RECORDED IN BIRTH CERTIFICATES COMPARED TO MEDICAID CLAIMS DATA AND HOSPITAL DISCHARGE ABSTRACTS IN SOUTH CAROLINA, 1996-2013. Qing Li*, Roger Newman, Russell Kirby, Stephen Kinsman, Dorothea Jenkins, Heather Kirby, John Vena (Departments of Obstetrics and Gynecology and Public Health Sciences, Medical University of South Carolina)

Objective: Neonatal seizures have been recorded more frequently among home births compared to hospital births. However, available studies relied on birth certificates alone, which under-record neonatal seizures. We designed this study to access hard-to-obtain comparison data and evaluate the recording of neonatal seizures across birth settings in birth certificates. **Study Design:** We conducted a population-based study of the linked live birth, discharge abstracts, and Medicaid claims data from 1996 to 2013 in South Carolina. Either discharge abstracts or Medicaid claims data had to be available, and were searched for ICD-9 codes 779.0 (convulsions in newborn) and 345.X (epilepsy) and 780.3 (convulsions) among neonates with hospital stay within 28 days. The sensitivity (Sen), positive predictive value (PPV), and the kappa statistic of birth certificates were evaluated against these records as gold standards. **Results:** Among 550,239 births from 2004 to 2013, birth certificates had a sensitivity of 7% and a PPV of 66% (34% false positives) in recording neonatal seizures. The kappa statistic 0.12 indicated slight agreement between birth certificates and the joined source. Using data from 1996 to 2003, certificates from 398,104 births had Sen 5%, PPV 33%, and Kappa 0.09 for neonatal seizures, which was worse than more recent data. Among 660 intended home births and 920 home births in two periods, one neonatal seizure was recorded in birth certificate; 4 or 6 seizures were recorded in the joined source; and both sensitivity and PPV were 0; the kappa statistic -0.002 indicated the agreement worse than expected by chance. **Conclusion:** South Carolina birth certificates substantially under-reported neonatal seizures among births and especially home births. Though small sizes of seizures were recorded among available home births, study findings suggest that birth certificates are not an accurate source and should not be used for measuring early neonatal neurological dysfunction.

L33

POSTTRAUMATIC STRESS DISORDER SYMPTOM FACTOR EXPRESSION HETEROGENEITY AMONG HAITIAN EARTHQUAKE SURVIVORS. Sabrina Hermosilla*, Bruce Link, Magdalena Cerdá, Alastair Ager, Moise Desvarieux, Sandro Galea (Columbia University)

On January 12th, 2010, a powerful earthquake struck Haiti, resulting in more than 300,000 injuries and one million homeless. There is growing evidence of symptom factor expression heterogeneity associated with posttraumatic stress disorder (PTSD) persistence and symptom expression trajectory, however little is known about pre-, peri-, and post-event factors influence on symptom expression. We conducted a population-based survey of randomly selected Haitian survivors, ~20 miles from epicenter, 2-3 months post-earthquake. Using multiple linear regressions, we modeled pre-, peri-, and post-earthquake factor associations with mean PTSD symptom cluster (arousal, intrusion, and avoidance) endorsement. We interviewed 1,312 (99.0% response) individuals with complete information on 1,211 (arousal), 1,209 (intrusion), and 1,222 (avoidance). Pre-earthquake factors-sex (β=0.12), number of children (β=0.02), family/friend mental illness (β=0.11), and >5 potentially traumatic events (PTE) (β=0.10)-were significantly associated with mean PTSD-arousal endorsement. Significant associations with mean PTSD-intrusion factor endorsement were spread across pre- age (β=0.04), sex (β=0.09), friend/family mental illness (β=0.07), and >5 PTEs (β=0.07), peri- trapped (β=0.09) and increasing friends/family killed/injured in earthquake (1-5:β=0.07; 6-10: β=0.08; >10: β=0.12)-and post-disaster-uninhabitable residence (β=0.04), camp residence (β=0.07), and insufficient money (β=0.06)-exposures. Post-earthquake factors-uninhabitable residence (β=0.08), family/friend mental illness (β=0.16), and low social support (β=0.10)–were highly associated with mean PTSD-avoidance endorsement. Mean PTSD symptom factor endorsement is heterogeneous across pre-, peri-, and post-earthquake factors, consistent with dimensional theoretical foundations. Multidimensional modeling of PTSD factors provides valuable insight into the psychopathology of PTSD without additional data collection and should be widely adopted.

L34-S/P

FOUR-YEAR CHANGE IN CUMULATIVE BIOLOGICAL RISK: DOES RACE/ETHNICITY MATTER? Uchechi A. Mitchell*, Jennifer A. Ailshire, Eileen M. Crimmins (Davis School of Gerontology, University of Southern California)

Much like physical and mental health, cumulative biological risk is systematically patterned by sociodemographic characteristics such as race/ethnicity. The current study examines race difference in biological risk among older adults and assesses whether race/ethnicity influences change in risk. We use longitudinal data from the nationally representative Health and Retirement Study. Biomarker assessments were conducted for two half samples of the cohort in 2006/2008 and 2010/2012. Non-Hispanic whites are compared to non-Hispanic blacks and Hispanics; individuals of other racial/ethnic backgrounds were excluded from the sample due to small sample sizes. Change in cumulative biological risk is assessed as the change in the number of biological and physical indicators at clinically high cut-points. Measures assessed include: total cholesterol, high-density lipoprotein, hemoglobin A1c, C-reactive protein, pulse pressure, heart rate, and waist circumference. Linear regression models were used for baseline assessments of race differences in biological risk and for analyses of change. All models control for age and gender; change analyses also control for baseline risk levels. Approximately 5,600 individuals have complete biological and demographic data for the 2006/2008 and 2010/2012 HRS surveys. Nearly 80% of the sample is white, 11% is black and 9% is Hispanic. Women comprise 60% of the sample and the average age is 67. Initial regression analyses at baseline suggest that blacks and Hispanics have higher cumulative biological risk than whites after adjusting for age and gender. Analyses of change in biological risk adjusting for baseline levels show that, on average, blacks experience the greatest increases in cumulative biological risk followed by Hispanics and whites. Our findings suggest that racial minorities are at greater risk for physiological dysregulation and disease, as indicated by greater increases in biological risk over time.

L35-S/P

SOCIO-DEMOGRAPHIC CORRELATES OF CHILDHOOD OBESITY PREVALENCE DISPARITIES AMONG OKLAHOMA STATE WIC PROGRAM ENROLLEES BETWEEN 2005 AND 2013. Arthur H. Owora*, Ashley Weedn, David Thompson (Oklahoma University Health Sciences Center)

Background: Active surveillance of obesity is integral to the adaptation of existing public health interventions to ensure disease risk and burden is appropriately addressed. The objective of this study was to examine the relationship between childhood obesity and socio-demographic correlates such as age, gender and race/ethnicity among Oklahoma State WIC enrollees between 2005 and 2013. **Methods:** A cross-sectional study design was used. Obesity was defined as a body mass index (BMI) at or above the 95th percentile of sex-specific CDC BMI-for-age growth charts. Logistic regression was used to examine the relationship between childhood obesity and socio-demographic correlates such as age, gender and race/ethnicity over time. **Results:** For the period 2005-2013 (N=326,813), 13.5% (95%CI: 13.4-13.6) of the children two to four years old were obese and 16.8% (95%CI: 16.7-16.9) were overweight. The obesity prevalence varied over time depending on a child's gender, age and race/ethnicity ($p<0.1$). Overall, there were periodic trends (i.e. temporal interruptions of the general trend of secular variation) in the obesity prevalence across race/ethnicity, age group and gender strata. The highest and lowest prevalence estimates were observed among American Indians in 2009 (18.8%; 95%CI: 15.4-22.2) and African Americans in 2011 (9.8%; 95%CI: 6.9-12.7) respectively. The obesity prevalence increased with older age and was higher among male (13.0% to 15.2%; $p<.01$) than female (12.0% to 14.1%; $p<.01$) children. American Indian, Hispanic and male children had higher prevalence than other race/ethnicity groups and female children over time holding all other factors constant. **Conclusions:** Childhood disparities in obesity prevalence have persisted among low income families in Oklahoma disproportionately affecting male, Hispanic and American Indian children. Targeted public health intervention efforts need to be tailored to address root causes of these disparities in order to reduce future burden of illness.

L36-S/P

POISONED PARADISE. Charlotte Herzele*, (University of Texas-Austin)

The Hawaiian Islands are known for beautiful blue oceans and skies and lush green vegetation. Tropical fruits, pineapples, in particular, are often associated with the islands. Agriculture is a major source of income and agribusiness rules. Sadly, the use of pesticides, herbicides, and insecticides has polluted the groundwater and much of the land. This paper will describe effects of some of the pesticides, organophosphates, and one used by Maui Land & Pineapple, Nemacur, on the land and its inhabitants. In addition, the fight against agricultural experimentation with genetically modified organisms will be discussed. Weighing the need to grow food against the destruction brought about by the indiscriminate use of pesticides will always be a conundrum; however, there are proven ways, using modern technology and employing integrated pest management, to grow food profitably while maintaining the pristine beauty of the islands. Hawaiians are becoming increasingly aware of the cost of big business and are beginning to strike back. This paper is a description of some of the ways that agribusiness has poisoned the islands, including what appears to be cooperation with and by the EPA, and the reaction of some of the Hawaiian people to the degradation of their habitat. Drinking water is polluted, land in poisoned, and, in some ways, may never recover, and pollution flows into the ocean where the once famous coral is now being destroyed. The hope is for the realization that we cannot take a beautiful place for granted. Human beings are custodians of the land and using it for a profit without weighing the consequences will, in the end, hurt everyone. Keywords: Maui Land & Pineapple, Nemacur, agribusiness

L37-S/P

REGULAR EXERCISE AND RISK OF COLORECTAL CANCER: A CASE-CONTROL STUDY. Hyeongtaek Woo*, Aesun Shin, Jeeyoo Lee, Jeongseon Kim, Ji Won Park, Jae Hwan Oh(Department of Preventive Medicine, Seoul National University College of Medicine, Seoul, Republic of Korea)

Background: Colorectal cancer is the third most common cancer in Korea and the burden of colorectal cancer is rapidly increasing recently. Physical activity has been proposed as a protective factor for colorectal cancer. We aimed to assess the association between regular exercise and risk of colorectal cancer in terms of duration and intensity. **Methods:** A total of 1,070 colorectal cancer cases and 2,775 controls were recruited from the National Cancer Center, Korea between August 2010 and June 2013. Time spent for regular exercise and intensity of activities were compared between cases and controls. Odds ratios and 95% confidence intervals (CIs) were calculated with adjustment for age and sex. **Results:** A total of 241 out of 1,070 colorectal cancer patients (31.9%) engaged in regular exercises, whereas 1,565 out of 2,775 for controls (56.4%) did (P-value<0.01). Odds ratios for colorectal cancer across average time of exercise were 0.28 (95% CI: 0.21-0.36) and 0.37 (95% CI: 0.32-0.44) (p-value for trend: <0.01) for 1≤ min/week ≤ 149, 150≤ min/week respectively, compared to no exercise group. Odds ratios for colorectal cancer across intensity of exercise were 0.22 (95% CI: 0.17-0.27) and 0.48 (95% CI: 0.40-0.58) for light to moderate activity and vigorous activity respectively, compared to no exercise group. **Conclusion:** In this study, lower risk for colorectal cancer was observed among those who did regular exercise and risk reduction was more prominent among light to moderate exercise group.

L38-S/P

RACIAL/ETHNIC DISPARITIES IN COLORECTAL CANCER STAGE AT DIAGNOSIS: AN ANALYSIS OF OKLAHOMA CENTRAL CANCER REGISTRY DATA. Kaitlin McGrew*, Janis Campbell, Jennifer Peck, Sara Vesely Department of Biostatistics & Epidemiology, University of Oklahoma College of Public Health)

Introduction: Colorectal cancer (CRC) is the second leading cause of death in men and women. Probability of survival is highly dependent upon stage at diagnosis, which highlights the importance of screening. Racial disparities in CRC mortality in Oklahoma are higher than the US average. Social and economic factors affect healthcare access and screening patterns and therefore the risk of being diagnosed with CRC at a later stage. We hypothesized that race/ethnicity is not associated with CRC stage at diagnosis after adjusting for socioeconomic variables that could partially explain this association. **Methods:** Cases of CRC captured in the Oklahoma Central Cancer Registry database and diagnosed between 2001 and 2008 were included. SEER Summary Staging was referenced to classify cases as "early" (in situ and localized; n=6,214) and "late" (distant; n=2,665). Cases with a SEER stage at diagnosis of regional or unknown were excluded. Log binomial regression was performed to quantify the association between race/ethnicity and stage at CRC diagnosis adjusting for age, gender, type of primary insurance, marital status, and census tract-level measures of poverty and education. **Results:** Compared to non-Hispanic white, identifying as African American (AA), American Indian/Alaska Native (AIAN), or Hispanic was associated with an increased risk of late-stage diagnosis. After controlling for selected variables, identifying as AA or Hispanic was no longer associated with stage at diagnosis, but identifying as AIAN remained associated with an increased risk of late-stage diagnosis (RR=1.14; 95% CI: 1.02, 1.27). **Conclusion:** Racial disparities in colorectal cancer stage at diagnosis were partially explained by differences in social and economic factors. Further analyses adjusting for additional socioeconomic measures may increase our understanding of the disparities in CRC diagnosis and survival for the AIAN population in Oklahoma.

L39-S/P

IDENTIFYING MENSTRUAL SYMPTOM PATTERNS IN YOUNG WOMEN USING FACTOR ANALYSIS. Felicia A. Quintana-Zinn*, Brian W. Whitcomb, Carol Bigelow, Serena C. Houghton, Elizabeth R. Bertone-Johnson (Department of Biostatistics and Epidemiology, University of Massachusetts Amherst, Amherst, MA, USA)

Approximately 80% of reproductive age women experience physical or emotional symptoms prior to onset of menses. Of these women, approximately 20% experience symptoms severe enough to interfere with social functioning and life activities and thereby meet criteria for premenstrual syndrome (PMS). More than 100 different symptoms are associated with PMS, the most common of which include breast tenderness, headache, anger, and depression. Symptom groupings tend to be stable within an individual but can vary distinctly between women. Potential differences in the etiology of symptoms suggest that PMS should not be considered a single condition in research or clinical studies, but rather may represent distinct entities that group by symptom patterns. The primary goal of this study was to identify symptom patterns using factor analysis. Analysis included: 1) a cohort of healthy women aged 18-30 (n = 414); and 2) the subgroup of women meeting established criteria for PMS (n=80). All participants provided information on the occurrence and severity of 26 menstrual symptoms by validated questionnaire. Four distinct symptom patterns emerged: Emotional (e.g. emotional hypersensitivity, mood swings, irritability); Psychological/ Cognitive (e.g. depression, anxiety/nervousness, insomnia); Physical (e.g. lower back pain, abdominal cramping, breast tenderness); and Consumption (e.g. food cravings, increased/decreased appetite). These 4 patterns explained 58.4% of the variance in the full cohort and 48.6% in the PMS subset. Cronbach's alpha levels demonstrating reliability were high in both the full cohort (0.71 – 0.90) and in the PMS subset (0.69-0.80). These symptom patterns were consistent with those identified in prior studies in diverse populations. These observations suggest that distinct subtypes of PMS may exist, and should be considered when recommending treatments and evaluating risk factors.

L40

SYNERGY BETWEEN CIRCULATING ANDROGENS AND ESTRADIOL IN RELATION TO THE RISK OF UTERINE FIBROIDS: STUDY OF WOMEN'S HEALTH ACROSS THE NATION (SWAN). Jason Y.Y. Wong* (Stanford University School of Medicine)

Background: Uterine fibroids are benign growths of the uterus that develop from the myometrium. They are a considerable reproductive health burden for women, often leading to abnormal bleeding, decreased fertility, and pregnancy complications. Although estrogen has been implicated in the risk of fibroids, the role of androgens has not been established. **Aims:** The aim was to assess the longitudinal relations of circulating androgens (bioavailable testosterone (T), dehydroepiandrosterone sulfate (DHEAS)) and bioavailable estradiol (E2), and their joint effects to the risk of developing fibroids in women undergoing the menopausal transition. **Methods:** This was a longitudinal study of 2594 women aged 42-52 years and pre- or early perimenopausal at baseline in the Study of Women's Health Across the Nation (SWAN) cohort. They were followed for 13 years with nearly annual assessments of serum sex hormones, and anthropometric, lifestyle, and medical information. Hormones were dichotomized at the median and lagged by 1 year. Combinations of high vs. low levels of T & E2 were examined. Cox regression models were used to estimate the hazard ratio [HR (95% CI)] for incident fibroids, controlling for age, race/ethnicity, menopausal status, body mass index, exogenous hormone use, smoking status, passive smoke exposure, parity, age at first birth, study site, and timing of blood draw. **Results:** Compared to women with low T levels, those with high T had 1.47 (95% CI: 1.15-1.88) times the adjusted risk of fibroids. Women with high E2 had 1.48 (95% CI: 1.16-1.87) times the adjusted risk of fibroids. Women with both high T and E2 had 2.18 (95% CI: 1.63-2.93) times the adjusted risk of fibroids compared to women with low T and E2. No associations were observed with DHEAS. **Conclusions:** Higher levels of testosterone and estradiol are associated with greater risk of fibroids, conditionally independent of each other. Further, they may act in synergy to increase risk of fibroids more than each alone.

L41-S/P

DEVELOPING A PROGNOSTIC MODEL FOR SIGNIFICANT LIVER FIBROSIS IN HIV-HEPATITIS C (HCV) CO-INFECTED INDIVIDUALS FROM THE CANADIAN CO-INFECTION COHORT STUDY. Nasheed Moqueet*, Cynthia Kanagaratham, Danuta Radzioch, Sahar Saeed, Robert W. Platt, Marina B. Klein(McGill University, Department of Epidemiology, Biostatisics, & Occupational Health)

BACKGROUND: Liver fibrosis, which can lead to fatal liver failure, advances faster in HIV-HCV co-infection due to higher inflammation. Immune markers could provide a non-invasive prognostic tool to target HCV therapy to those most at risk. **METHOD:**A prospective case-cohort study was nested in the Canadian Co-infection Cohort (n=1119). From the eligible population (n=679), a random subcohort (n=171) and all cases (AST-to-platelet ratio index (APRI) ≥1.5) were drawn. Pro-fibrotic markers (IL8, MIP1α & β, MCP1,TNFα, RANTES, sICAM1, sVCAM1, CXCL9, CXCL11, TGFβ1, hsCRP, sCD14) were measured from first available visit in the subcohort and cases. We used Cox proportional hazards with Barlow weights. Discrimination and calibration were compared between Model 1 (clinical factors only) and Model 2 (Model 1 plus selected immune markers) for predicting 3-year risk of liver fibrosis. Discrimination was estimated with weighted Harrell's C index; calibration with the Hosmer-Lemeshow statistic and Gronnesby-Borgan test. Models were internally validated with bootstrapping. **RESULTS:**130 individuals developed significant fibrosis over 1339 years at risk, rate (95% CI)=10 per 100 person-years (8.3-12.2). Model 1 included sex, alcohol use, HIV viral load, antiretroviral interruption, baseline APRI, HCV genotype, and age (restricted cubic spline with 3 knots). Model 2 included model 1 factors and 6 immune markers:IL8, sICAM1, TGFβ1, RANTES, hsCRP, and sCD14. The C indexes (95% CI) for model 1 vs. model 2 were 0.670 (0.595, 0.746) and 0.703 (0.628, 0.778), respectively. Both models were well-calibrated. **CONCLUSION:** Including immune markers IL8, sICAM1, TGFβ1, RANTES, hsCRP, sCD14 allows better prediction of the 3-year risk of liver fibrosis over clinical factors alone. While the improvement was small, the model with the immune markers fit better. Whether this improvement justifies marker measurement costs in the context of expensive HCV therapy requires cost-benefit analyses.

L42-S/P

DETECTION BIAS IN THE PRENATAL DIAGNOSIS OF MALFORMATIONS AMONG SSRI EXPOSED WOMEN. Anna M. Modest*, Martha M. Werler, Carla Von Bennekom, Allen A. Mitchell(Department of Epidemiology, Boston University School of Public Health, Boston, MA)

Background: Selective serotonin reuptake inhibitors (SSRIs) in pregnancy have been inconsistently associated with birth defects, particularly cardiac defects. If exposure to SSRIs prompted efforts to identify defects through rigorous prenatal ultrasound (US) screening, detection bias may account for positive associations. **Objectives:** Determine whether SSRI exposure in pregnancy is associated with higher proportions of structural defects being identified by US. **Methods:** For 1998-2014, we studied all mothers of babies with malformations from the Slone Birth Defects Study, a case-control study of malformed and non-malformed infants in North America. Women were interviewed within 6 months after delivery about medication use, illnesses, and prenatal care. Those who received fertility treatment, had seizures, diabetes, multiple births, exposure to teratogenic medications or unknown SSRI exposure status were excluded. Since information on negative ultrasounds was not available, we compared, among SSRI-exposed and unexposed pregnancies, the proportions of structural malformations that were identified by US. Log-binomial regression was used to estimate the RR and 95% CI. **Results:** Among 15,458 mothers of malformed infants, 619 (4.0%) were exposed to an SSRI. For all defects, after adjustment for maternal age, race, center of birth, and year of baby's birth, prenatal diagnosis was not associated with SSRI exposure (aRR 1.0, 95% CI 0.93-1.1). When defects were grouped according to organ system, no associations were observed. Of particular interest, the aRR for cardiac defects was 1.0 (0.89-1.1). No association was observed when SSRI use was stratified according to use in the first trimester or later in pregnancy. **Conclusion:** We saw no evidence that US-detected defects were more common among SSRI-exposed babies, suggesting that detection bias resulting from SSRI exposure was unlikely to explain observed associations.

L43-S/P

USING THE PARAMETRIC G-FORMULA TO ESTIMATE THE POTENTIAL EFFECTS OF INTERVENING ON RISK FACTORS OF INCREASED ADIPOSITY IN A LONGITUDINAL COHORT OF PRESCHOOL-AGED CHILDREN IN LOS ANGELES. Roch A. Nianogo*, May C. Wang, Aolin Wang, Tabashir Sadegh-Nobari, Catherine Crespi, Shannon E. Whaley, Onyebuchi A. Arah (Department of Epidemiology, Fielding School of Public Health, University of California, LA (UCLA)

Excessive weight gain in children can alter their health trajectory over the life course putting them at risk for further long-term health conditions. While a number of observational studies have focused on ascertaining the effects of potential risk factors on children's increased adiposity, for practical and ethical reasons, few randomized trials have actually examined the effect of alleviating such risk factors at such an early age. We used the parametric g-formula to quantify the standardized population mean weight-for-height Z-scores (WHZ) under hypothetical lifestyle interventions. We used data from the Special Supplemental Nutrition Program for Women, Infants and Children (WIC). Survey data obtained in 2008 were linked to WIC administrative data to follow a cohort of 1820 low-income preschool-aged children in Los Angeles County from 2008 to 2010. We estimated the mean WHZ under six hypothetical interventions: (1) breastfeeding for at least six months, (2) watching TV for at most one hour/day, (3) eating at least five fruits and vegetables a day, (4) playing in the playground every day, (5) eliminating sugar-sweetened beverage consumption, (6) eliminating fast-food consumption. The mean WHZ at the end-follow-up was 0.72 (95%CI: 0.67 to 0.77) under no intervention and 0.57 (95%CI: 0.35, 0.79) when all interventions were imposed. The most effective intervention in this study was breastfeeding for at least six months (population mean difference: -0.13, 95%CI: -0.22, -0.02). Interestingly, children simultaneously exposed to the first three selected interventions had as much, if not higher, reduction in mean WHZ (-0.16, 95% CI: -0.29 to -0.04) compared to children exposed to all interventions considered in this study (-0.14, 95% CI: -0.35 to 0.07). Under certain assumptions, this study emphasizes once more the relative benefit of promoting breastfeeding alone and in combination with other interventions as effective strategies for preventing obesity later in life.

L44-S/P

DIETARY FATTY ACID INTAKES AND TIME TO PREGNANCY. Katherine L Tucker*, ,Lauren Wise, Shilpa Saklani, Vibeke K Knudsen, Ellen M Mikkelsen, Amelia Wesselink, Kristen Hahn, Kenneth Rothman, Elizabeth Hatch (University of Massachusetts Lowell)

A 2007 study of female nurses reported that trans-fat intake, but not intake of other fats, was associated with increased risk of ovulatory infertility. We evaluated the relation of total, saturated (SAT), monounsaturated (MONO), polyunsaturated (POLY) and trans fatty acid intakes to fecundability in two preconception cohort studies: Snart Foraeldre (SF) in Denmark and Pregnancy Study Online (PRESTO) in North America. In both cohorts, female pregnancy planners completed a validated food frequency questionnaire at baseline. Intake of fatty acids was calculated and expressed as percent of total energy intake. Outcome data were updated every 8 weeks for up to 12 months or until clinically-recognized pregnancy, whichever came first. Fecundability ratios (FR) and 95% CIs were estimated using proportional probabilities models, adjusted for age, parity, last birth control method, education, household income, marital status, BMI, physical activity, smoking, and total energy intake and, in PRESTO only, race/ethnicity. Models were run adjusting for total fat (to interpret relative proportion of each FA group) and adjusting for remaining FA (to interpret increases in each type of FA, holding the rest constant). Among 986 PRESTO participants, there was no association across quintiles of total fat intake. Higher intakes of MONO and POLY fats tended to be associated with higher fecundability, while higher SAT fat tended to be associated with lower fecundability, but confidence intervals for these were wide. There were no clear associations with omega-3 or omega-6 fatty acids. Higher intake of trans fat was associated with lower fecundability in fully adjusted models. Relative to <1.3% energy intake, FRs for quartiles with median intakes of 1.4, 1.7 and 2.2% were, respectively, 0.81 (CI: 0.66-0.99), 0.66 (CI: 0.44-0.99), and 0.54 (CI: 0.30-0.98) adjusting total fat; and were similar adjusting remaining fat. Among 904 SF participants, FRs for trans fat intake quartiles with median 0.5, 0.6 and 0.8% energy

L45

A PROSPECTIVE STUDY OF DIET QUALITY AND ENDOMETRIAL CANCER INCIDENCE. Marcelle Dougan*, Susan Hankinson, Immaculata De Vivo, Robert Glynn, Walter Willett, Karin Michels (Harvard Chan School of Public Health)

Background: As free-living populations do not consume specific foods in isolation but as part of a complex diet, examining dietary patterns may provide new insights on dietary influences on endometrial cancer (EC) risk. **Design:** Using responses from food frequency questionnaires completed approximately every four years by 55547 participants of the Nurses' Health Study (1984 – 2010) and 97508 participants of the Nurses' Health Study II (1991 – 2009), we derived the "Western" (higher intakes of red meat and processed foods) and "prudent" (higher in fruits, vegetables, and white meat) patterns, the alternative Healthy Eating Index (aHEI-2010) (higher in fruits and vegetables and lower in refined starch and sugar-sweetened beverages), the Dietary Approaches to Stop Hypertension (DASH) diet, and the estrogen pattern (derived to correlate with estrone sulfate and estradiol). The most recent and cumulative average food scores were assessed. Cox proportional hazards models were used to estimate HRs of EC, comparing the top and bottom quintiles of intake. **Results:** A total of 853 EC cases were diagnosed during follow-up. After adjusting for variables including body mass index and hormone use, the prudent pattern and the DASH score, averaged over follow-up, were marginally but positively associated with EC risk; the HR was 1.31 (95% CI 1.02-1.70, ptrend =0.05) for the prudent pattern and 1.20 (0.96-1.51, ptrend = 0.03) for the DASH diet. These positive associations appear to be due to cruciferous vegetable consumption. The most recent estrogen pattern food score was modestly associated with EC risk; HR: 1.34 (95% CI 1.00-1.79, ptrend = 0.09). The aHEI-2010 score and the "Western" pattern were unrelated to EC risk. **Conclusion:** In this prospective cohort study, modest positive associations were observed with the estrogen pattern, "prudent" pattern, and DASH diet. More prospective studies are needed to better understand the association with cruciferous vegetables.

L46

USING AN INTERNET-BASED MEASURE OF AREA RACISM TO PREDICT BIRTH OUTCOMES AMONG BLACKS. David H. Chae*, Michael R. Kramer, Mark L. Hatzenbuehler, Seth I. Stephens-Davidowitz, Rodman Turpin, Sean Clouston (University of Maryland, College Park)

Social epidemiologic studies suggest that racism contributes to racial disparities in health, including adverse birth outcomes among Blacks in the US. Racist experiences during pregnancy may increase the risk of preterm birth and low birth weight, outcomes that are influenced by maternal stress via psychobiological pathways. Research supporting these associations at the individual-level often relies on self-reported experiences of discrimination, but few studies have examined area-based racism and population patterns in birth outcomes. In this study we estimate the relationship between a previously developed area-based measure of racism, derived from the proportion of Google search queries containing the "N-word" from 2004-2007, and birth outcomes among Blacks from 2005-2008 compiled by the National Center for Health Statistics. Area racism was measured at the geographic scale of the designated market area (DMA) (n=196). Adjusting for maternal age, area-level demographic (% Black, % urban) and socioeconomic characteristics (% of Blacks in poverty, % of Blacks with up to a high school education), each 1-standard deviation increase in the Google search index containing the "N-word" was associated with a greater risk of preterm birth (RR=1.06, 95% CI=1.02, 1.09) and low birth weight (RR=1.05, 95% CI=1.03, 1.08). Controlling for White birth outcomes in the same area, area racism remained significantly associated with black preterm birth (RR=1.02, 95% CI=1.00, 1.05) and low birth weight (RR=1.02, 95% CI=1.00, 1.04). This study illustrates the utility of Internet-based measures and big data to monitor racism and assess its impact on health outcomes at the population-level. We contribute to research on the deleterious consequences of racism for birth outcomes among Blacks.

L47

BEREAVEMENT DURING EARLY LIFE AND TYPE 1 DIABETES: FINDINGS FROM A DANISH NATIONAL REGISTER STUDY. Jasveer Virk* (UCLA)

Background: Death of a close family member such as a parent or sibling can cause prolonged stress and changes in the family structure that may have extensive effects on a young child, particularly on the developing immune system that responds to perturbations in glucocorticoids. The aim of this paper is to examine the risk of hospitalization for type 1 diabetes following bereavement due to death of a first-degree family member in early life. **Methods:** We used data from the Danish Civil Registration System (CRS) to identify singleton births in Denmark born January 1st 1980 through December 31st 2008, N=1,939,259 and their next of kin. We categorized children as exposed to bereavement if they lost a mother, father or sibling from age 5 years onwards, the remaining children were considered unexposed in our cohort. Cohort members were followed from birth until first diagnosis of diabetes, death, emigration, or December 31st 2008. We estimated incidence rate ratios (IRRs) from birth using log-linear Poisson regression models with person-years as an offset variable. **Results:** On average children were followed up for 16.6 years (± 8.2 years). Age of bereavement exposure was positively associated with an increase in the rate of type 1 diabetes among individuals exposed to bereavement, we detected the greatest increase among children 10-18 years of age experiencing bereavement due to loss of a father (adjusted IRR: 1.37, 95%CL: 1.08, 1.75). **Conclusion**: We found some evidence to indicate an increase in the rate of type 1 diabetes among children and adolescents exposed to bereavement, especially when onset of exposure was after 10 years of age.

L48

POSTTRAUMATIC STRESS DISORDER AND TRAJECTORIES OF SEDENTARY BEHAVIORS AMONG WOMEN IN THE NURSES HEALTH STUDY II. Ashley Winning*, Paola Gilsanz, Qixuan Chen, Andrea Roberts, Jennifer Sumner, Eric Rimm, Karestan Koenen, Laura Kubzansky (Harvard T.H. Chan School of Public Health)

Posttraumatic stress disorder (PTSD) is associated with sedentary behavior, which is a risk factor for cardiovascular disease; however, much existing research is cross-sectional. Using data from the Nurses' Health Study II (N= 50347) with measurements in 1991, 1997, 2001, 2005 and 2009, we assessed whether PTSD was associated with subsequent increases in TV viewing and decreases in physical activity over time. We used linear mixed models to assess behavioral trajectories among women reporting trauma/ PTSD onset prior to 1991, and linear spline models to assess behavioral change pre- and post-onset of PTSD among women reporting onset after 1991. Compared to women without trauma exposure, TV viewing increased more steeply among women with trauma exposure and 0 PTSD symptoms (b=.16, SE=.03, p=<.0001), 1-3 symptoms (b=.31, SE=.04, p=<.0001), 4-5 symptoms (b=.38, SE=.05, p=<.0001), and 6-7 symptoms (b=.54, SE=.06, p=<.0001). A similar dose-response pattern was observed for decreases in physical activity. Among women reporting onset after 1991, no between-group differences in physical activity z-scores were observed prior to onset; after onset, women with at least 6 PTSD symptoms had a steeper decline (b=-.07, SE=.02, p=.002) than trauma-exposed women without PTSD. Sedentary behavior may be a pathway through which PTSD influences cardiovascular disease among women.

L49

VERTICAL TRANSMISSION OF SALMONELLA TYPHIMURIUM: A CASE STUDY. Courtney Kirkland*, Tabeth Jiri, Ellen Rudowski (New Jersey Department of Health)

Introduction: Salmonella enterica serovar Typhimurium (S. Typhimurium) is one of the five most commonly reported serotypes causing illness in the United States and known to cause a variety of human infections associated with contaminated food or water. Infection can cause gastroenteritis, which could be more severe in infants, the elderly, immunocompromised and pregnant women. Salmonella species can complicate pregnancies resulting in abortions or premature labor. Previous recommendations have been made to screen pregnant women with diarrhea illness for salmonella, to prevent further complications with delivery. We report an unusual case of maternal salmonellosis with subsequent neonatal infection due to S. Typhimurium. **Methods:** The New Jersey Department of Health investigated a report from the local health department. A medical chart review and patient interview was conducted. **Case:** A 19 year old primigravida presented to the emergency room with low grade fever, chills, nausea, green vaginal discharge and cramping. The case did not report any symptoms of gastroenteritis. Pathology results showed acute chorioamnionitis; ultimately revealed to be due to S. Typhimurium. The baby was delivered via emergency C-section 4 months prematurely with respiratory distress syndrome. While no maternal exposure sources were implicated, possible risk factors included recent consumption of eggs and contact with a pet dog. **Conclusion:** Salmonella infections can complicate pregnancies resulting in adverse birth outcomes such as miscarriages, still births and pre-term labor. Pregnant women are susceptible to foodborne infections; however, symptoms can be mistaken for hormonal changes and never attributed to a foodborne illness. Investigation findings reinforce the importance of screening pregnant women for Salmonella. Further research is warranted to identify and characterize the burden of disease and exposures for salmonellosis related to neonatal infections in the United States.

L50

DISPARITIES IN PERINATAL AND POSTNEONATAL MORTALITY IN FIRST NATIONS, INUIT VS. NON-ABORIGINAL POPULATIONS IN QUEBEC 1996-2010. Zhong Cheng Luo*(University of Montreal)

There is a lack of recent data on disparities in perinatal and infant mortality in Aboriginal vs. non-Aboriginal populations in Canada. The present study was aimed to describe recent trends in perinatal and infant mortality in First Nations, Inuit vs non-Aboriginal singleton births in Quebec 1996-2010. First Nations and Inuit births were identified by mother tongue and place of residence (postal code and municipality name) on birth registrations. The study cohort included 20,200 First Nations, 4300 Inuit and 233,000 non-Aboriginal singleton births. Comparing First Nations to non-Aboriginal births, the RRs were 1.42 in 1996-2000, 1.20 in 2001-2005 and 1.50 in 2006 -2010 for perinatal mortality, and 3.38, 3.09 and 4.38 for postneonatal mortality, respectively. Comparing Inuit to non-Aboriginal births, the RRs were 2.97 in 1996-2000, 2.09 in 2001-2005 and 2.29 in 2006-2010 for perinatal mortality, and 7.00, 9.99 and 12.68 for postneonatal mortality, respectively. We observed persistent disparities in perinatal mortality, and alarmingly widening disparities in postneonatal mortality in First Nations and Inuit vs. non-Aboriginal populations in Quebec 1996-2010, crying for attention to improvements in infant health and socioeconomic conditions in Aboriginal communities.

L51

EXPLORING PTSD CONSTRUCT VALIDITY – TESTING THE PTSD FACTOR MODEL STABILITY AMONG 1,169 EARTHQUAKE SURVIVORS. Sabrina Hermosilla*, Bruce Link, Moise Desvarieux, Alastair Ager, Magdalena Cerdá, Sandro Galea (Columbia University)

Background: On January 12th, 2010, a powerful earthquake struck Port-au-Prince, Haiti, resulting in more than 300,000 injuries, 600,000 displaced, and over one-million homeless. As a relatively new disorder with evolving diagnostic criteria, few studies have explored the discriminant validity of posttraumatic stress disorder (PTSD). **Methods:** We used exploratory factor analysis (EFA) to assess the factor stability of the DSM-IV-TR (arousal, intrusion, avoidance) defined PTSD factor structure when major depressive disorder (MDD) items were introduced, in a Haitian post-earthquake population-based study. **Results:** 1,169 respondents (88.0% of those approached) had complete data for all PTSD and MDD items. Out of the original 26 items originally included in the EFA, the final 6-factor model retained 25 of them. The model fit the data well with a root-mean-square error of approximation (RMSEA)=0.021 (90% CI:0.016, 0.026), comparative fit index (CFI)=0.987, Tucker Lewis Index (TLI)=0.976, $\chi 2$=253.427, 165 degrees of freedom, $p<0.001$ (for model), and standardized root-mean-square residual (SRMR)=0.04. This fit the data better than the PTSD-only validated model ($\chi 2$=593.257, 116 degrees of freedom; RMSEA=0.056; CFI=0.927; TLI=0.915). PTSD-specific items did not load on the original PTSD factors or with the original items (new factors included items from 0-3 different original PTSD factors), in the presence of MDD items. Factor reliability was moderate, ranging from 0.2585-0.6342 (Kuder-Richardson 20), and not highly correlated, ranging from 0.001-0.463. **Conclusions:** Using EFA in a post-disaster Haitian sample, PTSD dimensionality is not stable in the presence of MDD items, thus challenging the construct validity of PTSD. Future work interrogating PTSD and MDD under the new DSM-5 framework, with more post-disaster populations is required to fully understand the utility of the identified six-factor structure.

L52

PERCEPTIONS OF RACIAL INEQUALITY IN HEALTH CARE. Cameron Estrich* (University of Illinois at Chicago)

Objective: The purpose of this analysis is to evaluate the relationship between race/ethnicity, perceptions of racism within the health care system, and health. **Methods:** Data from the 2012 and 2013 Behavioral Risk Factor Surveillance System surveys (n=27,782) was analyzed for differences in health and health care comfort by race/ethnicity. **Results:** 71.5% reported that in the past 12 months they had the same health care experience as people of other races. However, the proportion who believed this varied significantly by race and ethnicity. Compared to non-Hispanic Whites, Asians had lower odds of reporting they had a worse experience than other races (OR: 0.13, 95% CI: 0.02, 0.90). All other racial and ethnic categories had higher odds of reporting that they had a worse experience: OR 3.15 (95% CI: 1.63, 6.08) for Blacks, 1.31 (95% CI 0.79, 2.18) for Hispanics, 5.74 (95% CI: 0.96, 34.39) for Native Hawaiians/Pacific Islanders, and 3.84 (95% CI: 2.09, 7.06) for American Indians/Alaska Natives. Those who felt their care was worse due to their race had lower odds of good health (OR: 0.33, 95% CI: 0.23, 0.47) and with delay in medical care (OR: 2.42, 95% CI: 1.25, 4.66). Racial/ethnic minorities also had higher odds of experiencing physical symptoms or emotional upset because of recent racial discrimination. Compared to Whites, the odds of experiencing physical or emotional symptoms due to racial treatment were 3.43 (95% CI: 2.12, 5.56) for Blacks, 3.86 (95% CI: 2.89, 5.15) for Hispanics, 1.61 (95% CI: 0.62, 4.19) for Asians, 14.15 (95% CI: 3.34, 60.03) for Native Hawaiians/Pacific Islanders, and 4.82 (95% CI: 3.10, 7.50) for American Indians/Alaskan Natives. **Conclusions:** Consistent with earlier studies, perception of racial discrimination varies by race/ethnicity and is associated with health experiences. These results may partially explain racial/ethnic health disparities in the United States.

L53

SPOUSAL EDUCATION GAPS AND INTIMATE PARTNER VIOLENCE IN BANGLADESH. Lisa Bates*, Theresa Osypuk(Columbia University School of Public Health, Dept of Epidemiology)

Intimate partner violence (IPV) is associated with a range of adverse physical and psychological consequences for women. In Bangladesh, IPV is highly prevalent (estimated lifetime prevalence is 67%). However, dramatic changes in women's status are underway with significant implications for the inequitable gender regimes and normative environments that sustain IPV. As a result of concerted efforts by the government and donors over the past decades to extend access to education and reduce gender disparities, a long standing and pronounced gender gap in educational attainment has been reversed; by 2004, girls had not only "caught up" with boys but were ahead at every grade level through the end of secondary school. These dramatic changes have important implications for women's status, marriage markets, and gendered power dynamics within marriage. This paper reports results from a multilevel analysis of the individual and contextual factors associated with women's risk of experiencing IPV based on a nationally representative sample and two waves of data collected in 2013 and 2014 in rural Bangladesh. We hypothesized that a woman's status relative to others in her community may influence her risk of IPV. Here we focus on two dimensions of relative difference – the gap between a woman's educational attainment and a) that of her husband and b) the norm of her community. We find that a woman's educational attainment is protective against IPV, but if it exceeds that of her husband by a gap of 4-12 years she is at increased risk (OR =1.55, 95% CI 1.12-2.14) relative to women with no gap or with less education than their husbands. Multilevel results suggest that older women's education is protective for younger women's risk of IPV and that the protective effect of women's individual level education on IPV risk is diminished in villages where older women have less education. Results reveal potentially critical negative externalities of policies to improve gender equity.

L54-S/P

NITRATE AND TOTAL TRIHALOMETHANES IN DRINKING WATER AND RISK OF KIDNEY CANCER IN THE IOWA WOMEN'S HEALTH STUDY COHORT. Rena R. Jones*, Peter J. Weyer, Maki Inoue-Choi, Kim Robien, Mary H. Ward (Occupational and Environmental Epidemiology Branch, Division of Cancer Epidemiology and Genetics, National Cancer Institute, National Institutes of Health, Bethesda, MD)

Background: Nitrate is a water contaminant common to agricultural areas, and N-nitroso compounds formed endogenously after nitrate/nitrite ingestion are known animal carcinogens. A prior analysis of the association between nitrate in public water supplies (PWS) and kidney cancer risk among Iowa Women's Health Study participants had only 58 kidney cancer cases and did not assess total trihalomethanes (THM), another water contaminant containing the suspected renal carcinogen chloroform. **Methods:** We used 40 years of historical nitrate-nitrogen (NO3-N) and modeled THM data to compute long-term average levels and number of years exceeding one-half the maximum contaminant level (5ppm NO3-N;40ppb THM). Dietary nitrate/nitrite intakes were estimated from a food frequency questionnaire. We computed hazard ratios (HR) and 95% confidence intervals (CI) with Cox models adjusted for age, body mass index, smoking, and mutually adjusted for THM or NO3-N. We assessed interactions between nitrate, THM, and the N-nitroso inhibitor vitamin C via stratification (< or ≥ median levels). **Results:** We identified 122 kidney cancers (1986-2010) among 15,577 women reporting PWS use >10 years in 1989. We observed no association with mean NO3-N (HRQ4vsQ1=1.18;CI=0.70-1.99;Ptrend=0.47) in THM-adjusted models. However, risk was non-significantly higher for women exposed to ≥4 years at levels >5ppm compared to those with no exposure at these levels (HR=1.52;CI=0.95-2.43;Ptrend=0.11). We observed higher NO3-N-associated risks among current or former smokers (Phet=0.07). We found no independent or interactive effects for THM. Analyses of dietary nitrate and nitrite showed no associations with kidney cancer. Vitamin C intake did not modify any of the observed associations. **Conclusions:** We observed a marginally higher risk of kidney cancer associated with PWS nitrate >5 ppm. Although limited by a small number of cases, our findings suggest that these associations may be stronger among smokers.

L55-S/P

COMPARISON OF THE INFLAMMATORY PREDICTIVE ABILITY OF TWO DIETARY INDICES: AN EMPIRICALLY-DERIVED AND A LITERATURE-DERIVED INDEX OF DIETARY INFLAMMATORY POTENTIAL. Fred K. Tabung*, Stephanie A. Smith-Warner, Jorge E. Chavarro, Kana Wu, Lorelei A. Mucci, Frank B. Hu, Andrew T. Chan, Walter Willett, Edward Giovannucci (Department ofNutrition, Harvard T.H. Chan School of Public Health; Department of Epidemiology)

Introduction: Inflammation plays a central role in the pathogenesis of most chronic diseases and some dietary patterns modulate inflammation. We empirically developed and validated a dietary inflammatory index (EDII) comprised of food groups, and compared its inflammatory predictive ability with that of a previously validated literature-based index of dietary inflammatory potential (LDII) comprised of nutrients. **Methods:** Using reduced rank regression (RRR) models in the Nurses' Health Study (n=4,928), the EDII was defined as the dietary pattern most predictive of three inflammatory biomarkers: high sensitivity C-reactive protein (hsCRP), interleukin-6 (IL6) and tumor necrosis factor alpha receptor 2 (TNFRα2); it is comprised of 12 food groups. We then validated the EDII in an independent sample (n=2,129) in the Health Professionals Follow-up Study (HPFS), by applying the EDII in multivariable-adjusted linear regression models to predict concentrations of hsCRP, IL6, TNFRα2 and adiponectin as construct validators. We applied also the LDII to predict concentrations of the same biomarkers in HPFS and qualitatively compared effect sizes. **Results:** In HPFS, the EDII and LDII were uncorrelated with each other (ρ=0.01, p=0.51). Yet each index was positively associated with hsCRP, IL6 and TNFRα2 with similar effect sizes, and only the EDII was inversely associated with adiponectin. Comparing quintile 5 to 1, the relative concentrations (95%CI) of IL6 were: EDII 1.15 (1.05, 1.26), LDII: 1.19 (1.07, 1.32); hsCRP: EDII: 1.26 (1.11, 1.44), LDII: 1.27 (1.09, 1.47); TNFRα2: EDII: 1.05 (1.02, 1.08), LDII: 1.08 (1.04, 1.12); and adiponectin: EDII: 0.86 (0.81, 0.93), LDII: 1.02 (0.95, 1.10). **Conclusion:** The construct validity of the EDII and LDII indicates their utility for assessing the inflammatory potential of diet; because these appear to provide independent information, a composite index may be more useful in assessing dietary inflammatory potential than either index separately.

L56-S/P

URINARY PHTHALATE METABOLITES AND OVULATORY POTENTIAL AMONG WOMEN SEEKING INFERTILITY TREATMENT. Carmen Messerlian*, Irene Souter, Paige Williams, Yu-Han Chiu, Russ Hauser (Harvard T.H. Chan School of Public Health)

Phthalates are a ubiquitous group of environmental chemicals with extensive application and use in the manufacturing of plastics. Widespread human exposure to phthalates occurs through use of everyday household items, cosmetics, personal care products, pharmaceuticals, children's toys, and food and beverage packaging. Several phthalates are endocrine disruptors and interfere with hormonal signaling that can adversely affect human reproduction and development. In vitro mouse studies show that Di(2-ethylhexyl) phthalate (DEHP) and its primary metabolite, Mono(2-ethylhexyl) phthalate (MEHP), inhibit antral follicle growth and interfere with estrogen synthesis and metabolism. We examined the association between urinary phthalate metabolites and antral follicle count (AFC) using prospective data from 215 female participants in the Environment and Reproduction Health Study (EARTH) at the Massachusetts General Hospital Fertility Center. The CDC laboratory measured 11 urinary phthalate metabolites. We estimated the geometric mean for all urine samples provided prior to unstimulated day 3 AFC assessment (N=215). We used poisson regression, adjusting for age, body mass index and smoking. We observed a decrease in mean AFC across quartiles of DEHP (as the molar sum of four metabolites). Compared with women in the first quartile of DEHP, women in the second quartile had a 23% (95%CI: -29%, -16%) decrease in mean AFC. The absolute mean AFC in the first and second quartile was: 14 follicles (95%CI: 13-15) vs. 11 follicles (95%CI: 10-12). For MEHP, we found an 18%, 27%, and 16% decrease in mean AFC for quartiles two, three and four, respectively, compared with quartile one. We observed similar trends for the other three DEHP metabolites, with a plateau effect in the third quartile. These results suggest that urinary levels of DEHP metabolites are associated with a decrease in ovulatory potential among women seeking infertility treatment.

L57-S/P

FIXED VERSUS RANDOM EFFECTS MODELS FOR LONGITUDINAL DATA ANALYSIS OF CONFOUNDING IN ECOLOGICAL TIME SERIES: A SIMULATION STUDY. Usama Bilal*, Thomas A. Glass (Johns Hopkins Bloomberg School of Public Health)

Background: Analysis of ecological panel data in the econometrics literature has usually been conducted using fixed effects (FE) models due to their capacity to deal with time-fixed confounding. Random-effects (RE) models are more common in the epidemiologic literature. Group-level centering of covariates can be a useful technique to eliminate time-fixed confounding in RE models. Objective: To study if group-level centering of covariates in random-effects models eliminates time-fixed confounding under several scenarios. **Methods:** We conducted a simulation study comparing fixed-effects and random effect models (with and without group-level centering of covariates). We generated continuous exposures and outcomes with varying levels of correlation. A time-fixed continuous confounder was created, with varying levels of correlation with exposure and outcome as well as data missing at random. We simulated 1000 datasets for each scenario and computed percent bias, mean squared error and coverage. **Results:** Under no confounding, all models showed no bias (Average Percent Bias for all three models <0.001%). Increased levels of confounding resulted in increased differences in the level of bias. In the scenario with strongest confounding, FE and Centered RE showed good performance compared to RE (Averaged Percent Bias for FE: <0.001%, Centered RE: <0.001%, RE: 12.9%). The group-mean centered RE model showed similar accuracy to FE models (Mean Squared Error for FE=0.0189, Centered RE=0.0189, RE=0.020). Coverage at the 95% level was worse among RE models (43.6%) and better among both FE and Centered RE models (95.0% for both). **Discussion:** Random-effects models with group-level centering of covariates shares the advantages of fixed-effects models (deals with time-fixed confounding) while keeping the advantages of random-effect models and showing accuracy similar to fixed-effect models. Studies of ecological time trends in epidemiology should consider the use of this class of models.

L58-S/P

NATIVITY DIFFERENCES IN AGE PATTERNS OF ALLOSTATIC LOAD IN HISPANIC ADULTS: THE HISPANIC COMMUNITY HEALTH STUDY/ STUDY OF LATINOS. Christian R Salazar*, Garrett Strizich, Teresa Seeman, Carmen Isasi, Linda Gallo Maines, Larissa Aviles-Santa, Jianwen Cai, Frank Penedo, William Arguelles, Anne Sanders, Richard Lipton, Robert Kaplan (Albert Einstein College of Medicine)

Allostatic load (AL) is a model of cumulative physiological dysregulation from lifetime exposure to chronic stress that has been understudied in US Hispanics. To examine whether migration and duration of residence within and outside the US are associated with AL, we investigated AL accumulation patterns among age, sex, and nativity subgroups in the Hispanic Community Health Study/ Study of Latinos. We studied 15,830 Hispanic participants aged 18-74 years old, 77% of whom were born outside the US. We developed an index of AL based upon values from 16 physiological markers that spanned the cardiometabolic, parasympathetic, and inflammatory systems. We computed mean standardized AL scores using log-linear models across age categories (18-39, 40-54, 55-74), stratified by sex and nativity status. Foreign-born participants were further stratified by years of residence in the US and age at migration using median value cut-points. In persons younger than 55 years, after control for socioeconomic and behavioral factors, AL was highest among US born individuals, intermediate in foreign-born Hispanics with longer duration (≥10 years) in the US, and lowest among those with shorter duration in the US (<10 years) (P <0.0001 for increasing trend). Similarly, AL increased among the foreign-born with earlier age at immigration. These associations of AL with nativity and time since migration were not found among individuals aged 55 years or older. In specific groups including those of Dominican, Cuban, Mexican, and Puerto Rican background, a similar association was found between AL and nativity and duration of US residence. Our findings support a "healthy immigrant" effect that is no longer apparent at older ages. More research is needed to understand risk and resilience factors that drive these nativity differences in age patterns of AL in Hispanics.

L59-S/P P

ERSONAL CARE PRODUCT USE AND BREAST CANCER IN THE NIEHS SISTER STUDY. Kyla Taylor*, Donna Baird, Melissa Troester (NIEHS/UNC-Chapel Hill)

Objective: Describe patterns of personal care product use among women in the United States and estimate the associations between these patterns and two modifiers of breast cancer risk: race and menopausal status. **Background:** Endocrine disrupting chemicals commonly used in personal care products (e.g., parabens and phthalates) may affect breast cancer risk, but information on patterns of personal care product use is sparse. **Methods:** Data was used from the NIEHS Sister Study, a cohort study of 50,000 women who had a sister diagnosed with breast cancer, but were cancer-free themselves at time of enrollment. Participants completed an extensive questionnaire that captured the frequency of their current use of 48 types of personal care products. Latent class analysis was used to identify patterns of use for three product groups: beauty, hair, and skincare. **Results:** Based on fit statistics and parsimony, three latent classes were identified as optimal for both the beauty and hair product groups; the skincare product group had four classes. The distribution in each class differed from that of the sample population (white women: 91%; African American women: 9%; postmenopausal women: 65% and pre-menopausal women: 35%). Postmenopausal women were more likely than premenopausal women to be infrequent users of beauty products (73%). Race was a strong driver of classes among hair products; African American women made up 72% of pomade and hair straightener users. **Discussion:** Latent class analysis of personal care product use is a data reduction tool that identified meaningful, mutually exclusive groups of women with similar and distinct product use patterns. These categories can be used as exposure variables for analysis of breast cancer risk. Significance. If patterns of personal care product use are associated with certain breast cancer risk factors, results from this study may help inform prevention strategies that could have important public health implications.

L60-S/P

INFLUENCE OF RACE AND GENDER ON CONDOM USE IN HIGH SCHOOL STUDENTS IN THE SOUTHERN STATES OF THE UNITED STATES. Malendie Gaines*, Megan Quinn, Liang Wang, Charlotte Powers (East Tennessee State University)

Southern adolescents are among the most affected groups in the United States (US) for human immunodeficiency virus (HIV) infections. The prevalence of unprotected sex is higher in white adolescents compared to minority adolescents despite racial disparities of HIV infection in the US. In addition, females are at an increased risk for unprotected sex compared to males. The objective of this study was to evaluate condom use is US high school (HS) students in southern states. Weighted data were obtained from the 2011 and 2013 National Youth Risk Behavior Survey (N=28,793). Condom use was defined as respondents using a condom at last sexual intercourse. Descriptive statistics, chi-squared analyses, simple, and multiple logistic regression were used to examine the influence of race and gender on condom use among southern HS students using SAS software. Bivariate analyses illustrates that compared to white females, minority males were more likely to use condoms (OR-1.79; CI-1.66-1.92). Multivariate analyses show that compared to white females, minority males and white males were more likely to use condoms (OR-2.04; CI-1.87-2.23, OR-1.74; CI-1.61-1.87, respectively). In addition, students who had a body weight perception of "overweight" (OR-2.23; CI-2.08-2.38) increased the odds of condom use compared to body weight perception of "about the right weight". Gender and race along with psychosocial factors were associated with condom use in HS students in the southern states. These results can be utilized to target HIV prevention activities to key affected populations.

L61-S/P

ALL-CAUSE 30-DAY READMISSION RATES AND ENROLMENT IN MULTIDISCIPLINARY TEAM-BASED PRIMARY CARE PRACTICES IN QUEBEC, CANADA. Bruno D. Riverin*, Ashley I. Naimi, Patricia Li, Erin C. Strumpf (Department of Epidemiology, Biostatistics and Occupational Health, McGill University)

Readmissions after hospital discharge are costly to the health care system. Enrolment in a multidisciplinary team-based primary care practice designed to improve care coordination and timely access to a primary care provider (PCP) may reduce 30-day readmission rates. We sought 1) to estimate the effect of enrolment status in multidisciplinary team-based PC practices in Quebec, Canada on PCP follow-up rates within 30 days of discharge and 2) to estimate the controlled direct effect (CDE) of enrolment on 30-day readmission rates unexplained by differential rates of PCP follow-up. Using administrative data on chronically ill patients with at least one hospital admission for any cause between 2003 and 2009 (N=235 217), we used extended Cox regression to model the effect of enrolment with a multidisciplinary team-based primary care practice on PCP follow-up rates. For CDE, we built marginal structural Cox models using inverse probability of treatment weighting and piecewise Poisson regression to estimate mediator (PCP follow-up) weights at specific follow-up time intervals. Covariates included patient demographics, measures of morbidity, specialist care follow-up, length of stay, intensity of hospital resource use and calendar year, all at index admission. A total of 16 084 (6.8%) patients were readmitted to the hospital within 30 days of discharge. Patients enrolled had significantly lower rates of PCP follow-up within 30 days of discharge (adjusted HR 0.93; 95% CI: 0.87-0.98). The CDE for equal timing of PCP follow-up across exposure groups yielded a HR of 1.05 (95% CI: 1.00-1.12). Counter to what we expected, patients enrolled in multidisciplinary team-based primary care models were less likely to access PCP follow-up care and have higher rates of 30-day readmissions. Our findings suggest that even if multidisciplinary team-based primary care practices improved access to follow-up care to the level of non-reformed practices, they would still have equal or slightly worse rates of readmission.

L62-S/P

IDENTIFYING RISK FACTORS ASSOCIATED WITH SMEAR POSITIVITY OF PULMONARY TUBERCULOSIS IN KAZAKHSTAN. Paul You*, Sabrina Hermosilla, Angela Aifah, Zhaksybay Zhumadilov, Tleukhan Abildayev, Assel Terlikbayeva, Meruert Darisheva, Talgat Muminov, Nabila El-Bassel, Neil Schluger (Columbia University Mailman School of Public Health)

Pulmonary tuberculosis (TB) remains one of the world's deadliest communicable diseases. Diagnostics play a critical role in reducing the burden of TB. Though new diagnostics tests have been introduced in Kazakhstan, sputum smear microscopy is still the cornerstone of TB diagnosis with relatively low sensitivity. Little is known about factors associated with smear positivity in Kazakhstan, a high TB burdened country. TB index cases were recruited from 4 distinct regions of Kazakhstan. We assessed the participant's demographic, environmental, behavioral and social characteristics through a standardized survey and health-related factors through medical records. Multivariable logistic regression was used to analyze factors associated with smear positivity. 562 TB-confirmed index cases were surveyed. The study population was 55% male with an age range from 18 to 83 years old. 193 (35%) participants tested smear positive with 14 (2.5%) participants having invalid results. In the final adjusted model, sex (aOR = 1.5, $p < 0.01$), incarceration (aOR = 3.7, $p = 0.02$), alcohol dependence (aOR = 2.4, $p = 0.03$), diabetes (aOR = 6.8, $p < 0.01$), and access to a doctor (aOR = 2.8, $p < 0.01$) were found to be associated with increased rates of smear positivity. Increase in BMI (aOR = 0.915, $p < 0.01$) was found to slightly decrease odds of smear positivity. Other determinants included in the model, but not found to be significant, were nationality, smoking, drug use, HCV, and site location. In our study, the observed smear positive rate was low. The lack of association of known tuberculosis risk factors with the smear negative cases raises the issues of over-diagnosis of TB among those patients. New diagnostic tests with high specificity and sensitivity, such as the GeneXpert, should be used in tandem with sputum smear microscopy to improve detection rates. More research is needed on smear negative TB patients and factors associated with smear conversion.

L63-S/P

RELIABILITY OF PLASMA LIPOPOLYSACCHARIDE-BINDING PROTEIN (LBP) FROM REPEATED MEASURES IN HEALTHY INDIVIDUALS. Jessica Citronberg* (University of Washington)

Background: Plasma lipopolysaccharide-binding protein (LBP), a measure of lipopolysaccharide exposure, may serve as a marker of chronic inflammation; however no studies have examined the temporal reliability of the biomarker in a healthy population. We examined the temporal reliability of LBP measured in archived samples from participants in two studies. **Methods:** In Study 1, 60 healthy participants (30 men and 30 women, aged 60-72 years) were recruited to have blood drawn at two time points: baseline and follow-up (either 3, 6, or 9 months) and evenly distributed as much as possible by time interval. In Study 2, we tested 24 individuals (8 men and 16 women, aged 20 to 40 years) with blood drawn 3-4 times over a 7-month period. We measured LBP in archived plasma by ELISA (Cell Sciences, Canton, MA) to evaluate within-person reproducibility over time. Samples were run in duplicate, and the median duplicate intraassay coefficients of variation (CV) was 4.1%. Test-retest reliability was estimated by calculating the intraclass correlation coefficient (ICC). **Results:** Plasma LBP concentrations showed low to moderate reliability in both Study 1 (ICC: 0.60, 95% CI: 0.43 to 0.75) and Study 2 (ICC: 0.46, 95% CI: 0.26 to 0.69). Restricting the follow-up period improved reliability. In Study 1, the test-retest reliability of LBP over a three month period was 0.68 (95% CI: 0.41 to 0.87). In Study 2, the ICC of samples taken ≤7 days apart was 0.61 (95% CI: 0.29 to 0.86). **Conclusions:** Plasma LBP concentrations demonstrated low to moderate test-retest reliability in healthy individuals with reliability appearing to improve over a shorter follow-up period. Results suggest that LBP may serve as a reliable marker in short-term studies; however, multiple samples may be needed in longitudinal studies to obtain more stable estimates. This study was supported by grants P01 CA168530 and R25 CA094880.

L64-S/P

BENZENE AND CHILDHOOD ACUTE LEUKEMIA IN OKLAHOMA. Amanda E Janitz*, Janis E Campbell, Sheryl L Magzamen, Anne Pate, Julie A Stoner, Jennifer D Peck (University of Oklahoma College of Public Health)

Background: As a leading cause of childhood mortality, childhood cancer is an important health concern in the US. However, evidence regarding the etiology is lacking despite numerous studies. One environmental risk factor of interest is traffic-related air pollution. Benzene, which is a component of motor vehicle emissions, has been classified as a known carcinogen in adult acute myeloid leukemia (AML). The goal of this study was to determine if children with acute leukemia have a higher odds of exposure to benzene compared to controls. **Methods:** We conducted a case-control study using the Oklahoma Central Cancer Registry as our source for cases diagnosed between 1997 and 2012 (n=307). Controls were selected from birth certificate records and matched to cases on week of birth (n=1,013). Using exposure estimates provided by the 2005 National-Scale Air Toxics Assessment (NATA), we used conditional logistic regression to evaluate whether census tract level benzene was associated with childhood acute leukemia. **Results:** We observed no differences in benzene exposure between cases and controls in the bivariate analysis or after adjusting for confounding factors of urbanization and maternal education. However, in an analysis evaluating leukemia subtypes, the estimates for children with AML (4th Quartile OR: 2.42, 95% CI: 0.98, 5.96) were stronger than among those with ALL (4th Quartile OR: 1.03, 95% CI: 0.67, 1.58) after adjustment for maternal education and urbanization. **Discussion:** While we did not observe an association between benzene and childhood leukemia overall, our results suggest that children with AML may experience increased exposure to benzene during development. Using the NATA estimates to measure benzene allowed us to assess a specific pollutant at the census tract level, which provided an advantage over the use of monitor or point source data. Our study, however, cannot rule out the possibility that benzene may be a marker of other traffic-related exposures.

L65-S/P

IS BIRTHWEIGHT A PREDICTOR OF ATTENTION DISORDERS AND DEPRESSION IN SCHOOL-AGED CHILDREN, 6-17 YEARS? Maulikkumar Natubhai Patel*, Jared Woo, Sahrish Charania, Deanne Barbery-Frey, John Hermann, Ann Davis, Sharon Homan(University of North Texas Health Science Center)

Objective. There is a growing trend of increased diagnoses of mental health problems among school-aged children 6-17. ADHD (Attention Deficit Hyperactivity Disorder)/ADD (Attention Deficit Disorder) and depression account for two of the top four mental health outcomes, affecting 6.8% and 2.1% of children (3-17 years), respectively. Our objective is to determine if there is an association between birthweight and ADHD/ADD, and birthweight and depression, among school-aged children in the United States. Because both low birthweight and macrosomia are associated with physical health problems in later childhood, we considered both low and macrosomial births as potential risk factors. **Methods.** We conducted a cross-sectional study using data from the 2011-2012 National Survey of Children's Health (NSCH), a telephone survey of 95,677 households in the US. Using multiple logistic regression modeling (incorporating survey weights), we estimated the odds ratios associated with low birthweight and macrosomial birth as predictors of ADHD/ADD and for depression among children 6 to 17 years. **Results.** Children with macrosomial birth weight (n = 7549) have a statistically higher odds of having depression when compared to healthy birth weights (n = 48681) (OR = 1.328; 95% CI: 1.002, 1.760). Low birthweight was not statistically associated with childhood depression. There is no statistically significant difference between birth weight and ADHD/ADD. **Conclusion.** The study adds to the body of evidence that birth weight is a probable risk factor for some mental health outcomes in children. Knowing that macrosomia has a negative effect on mental health outcomes such as depression can lead to more caution and awareness of mental health status of school-aged children. Although not statistically significant, the relation of birth weight to ADD/ADHD needs further study.

L66-S/P

PATTERNS OF SPATIAL MOBILITY AND THEIR INFLUENCE ON HIV/STI SEXUAL AND DRUG RISK BEHAVIORS AMONG LATINO MIGRANT WORKERS IN A NEW RECEIVING COMMUNITY OF NEW ORLEANS, LA. Licelot C. Eralte Mercer*, Norine Schmidt, Patricia J Kissinger (Columbia University Mailman School of Public Health)

Background There is little research on spatial mobility's impact on HIV risk behaviors of newly emigrated, transient and unaccompanied Central and South American laborers, especially in new receiving Latino communities of the Deep South. Past studies focused on Mexican migrants under different conditions were inconclusive, and overlooked the confounding effect of ethnic heterogeneity towards the null. We investigated mobility patterns and association with high-risk sexual and substance use behaviors among Latino migrant workers (LMW) in New Orleans. **Methods** A cohort of 124 newly established LMW in post-Hurricane Katrina New Orleans, was assembled by combined venue-based and Respondent Driven Sampling methods. For 27 months, LMW completed monthly in-person/phone mobility surveys, quarterly behavioral surveys, and HIV, Syphilis, Chlamydia, and Gonorrhea tests. Cochran-Armitage test for trends was used to assess association between levels of travel outside New Orleans and HIV-risk behaviors. Generalized estimating equations were used to test association between repeated travel and high-risk HIV behaviors. **Results** LMW were highly mobile immediately after arriving in New Orleans. They frequently traveled locally, nationally, and internationally. A117 men reported circular migration, traveling outside New Orleans at a rate of 4.41 trips per person-year. Travel steadily increased over in the first 18months of US residence (p=0.013). No HIV cases were detected and STI morbidity was low. Mobile men were as likely to engage in risky sexual behaviors as non-mobile men, but those who traveled multiple times per month were more likely to use drugs, OR 1.54(1.03, 2.31), and binge drink OR 1.37(1.04, 1.79). **Conclusion** LMWs in Deep South receiving communities were highly mobile immediately after arriving in the US. There was marginal association of mobility with sexual risk behaviors, and a stronger association with drug and alcohol use among men traveling multiple times per month

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SELF-RATED PHYSICAL HEALTH IN AFRICAN AMERICAN WOMEN CAREGIVERS: DATA FROM THE BLACK WOMEN'S HEALTH STUDY. Yvette C Cozier*, Lisa Fredman, Lynn Rosenberg (Slone Epidemiology Center at Boston University)

Women who care for a spouse (spouse caregivers) and who spend appreciable time doing so report more stress and poorer health than noncaregivers. Few studies have considered health in both spouse caregivers and caregivers of a disabled child (child caregivers) within a single sample. Importantly, few studies have evaluated these associations among African American women. We compared self-rated physical health among spouse and child caregivers to that of noncaregivers in the Black Women's Health Study, a cohort of U.S. black women followed since 1995 by mailed biennial questionnaires. This analysis involved 28,438 women who completed questions in 2011 on time spent caregiving (0, 1-8, or >=9 hours/week) for a disabled/ill spouse/partner or disabled child/grandchild, associated degree of stress and reward, and self-rated physical health (excellent (1) to poor (5)). The median age of participants was 55 years (range=37-86 years); mean self-rated physical health was 2.64 (SD=0.89); 5% were spouse caregivers, 6% were child caregivers and 89% were noncaregivers. Among spouse caregivers, more time providing care was associated with greater stress and fewer rewards; the reverse was seen in child caregivers. In linear regression models adjusted for age, education, and caregiving rewards, both spouse caregivers and child caregivers who spent >= 9 hours/week caregiving and had high stress reported worse health than did noncaregivers (least square means, LSM, = 2.94 and 3.08, respectively, vs. 2.72 in noncaregivers, $p<0.01$). Spouse caregivers who spent minimal time caregiving had worse self-rated health regardless of stress (LSM = 2.86 (low stress), and 2.91 (high stress), $p<0.01$). Although limited by the cross-sectional design, our results indicate that caregiving stress and time spent in these activities can affect self-rated physical health differentially among African American spouse and child caregivers.

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SMOKING RELAPSE AMONG WOMEN ENROLLED IN A COMMUNITY-BASED PERNATAL SMOKING CESSATION PROGRAM: A LONGITUDINAL ANALYSIS OF THE BABY AND ME TOBACCO FREE PROGRAM. Tessa Crume*, Jeffrey Lambert, Martha Jones, Laurie Adams (Colorado School of Public Health, University of Colorado Health Sciences)

An estimated 10% to 17% of women smoke during pregnancy in the U.S.. One in four women quit during pregnancy, however a high proportion (47%-63%) relapse in the first year postpartum. An analysis was conducted on data collected from a community based pre- and post-natal smoking cessation program targeted at low income women in Colorado: the Baby and Me Tobacco Free (BMTF) program. BMTF includes 4 prenatal and 12 postpartum counseling sessions administered through local health departments and WIC offices with carbon monoxide (CO) validation of smoking status at each visit. Duration of abstinence was assessed using a Kaplan-Meier (KM) function defined as the time between the earliest CO result consistent with not smoking [(CO<6 parts per million (ppm)] and the last visit with a CO test result <6ppm. Those who dropped out or were lost to follow-up were assumed to have relapsed after their last smoke-free visit. The program enrolled 5,807 pregnant women between 2008 and 2013. Medicaid was the primary source of insurance for 86.4% of participants and the mean maternal age was 23.7±5.3 years. The mean duration of smoking abstinence was 125.0 ± 7.7 days in the prenatal period and 26.2% relapsed after the baseline enrollment visit. Mean birth weight of infants was 3186 ± 495 grams and the cumulative incidence of low birth weight (<2500 grams) was 7.6% (contrasted to 8.6% in Colorado in 2013). In the postpartum period, 1,426 women returned to the program and their mean smoking abstinence duration was 362.0 ± 14.4 days. Relapse to smoking occurred in 8.3% of women in the first 3 months after delivery. Our results suggest that community based pre- and post-natal smoking cessation programs have significant public health implications including reduced low birth weight and lower postpartum smoking relapse. However, impact cannot be determined as a control group was not available for analysis and large number of participants dropped out after delivery.

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