DOES SOCIAL FACTOR PLAY A PART IN PHYSICAL FRAILTY AND PREDICT MORTALITY IN OLDER ADULTS? RESULTS FROM BEIJING LONGITUDINAL STUDY OF AGING

Lina Ma*, Lina Ma, Zhe Tang, (Xuexia Hospital, Capital Medical University)

Background: Frailty is related to adverse health-related outcomes. However, research into the relationship between social factors and physical frailty (PF) remains limited. This study aimed to determine frailty (SF) status via developing a simple self-reported screening tool, termed the HALFT scale, and to examine the association between social frailty and physical functioning, cognition, depression, and mortality among community-dwelling older adults. Methods: Data were from Beijing Longitudinal Study of Aging (BLSA). 1697 community-dwelling old adults with an 8-year follow-up from BLSA completed the HALFT scale including the five items useful to others. Limited social participation, loneliness, financial difficulty, and not having anyone to talk to. PF was assessed using modified Fried frailty phenotype and frailty index. A Cox proportional hazards model was used to evaluate the effect of covariates on mortality. Results: The prevalence of SF was 7.7%. Participants with PF, dependent physical function, worse balance and chair-stand test, and activities of daily living dependency had a high prevalence of SF. SF was associated with dementia, subjective memory decline, depression, cognitive impairment, and having experienced a recent significant life event. After adjusting for age and gender, the 8-year mortality hazard ratios were 2.5-4.3 and 1.6-2.3, respectively, for those with SF or pre-SF. Each component of SF predicted 8-year mortality. Conclusion: SF is associated with PF and predicts mortality. The HALFT scale could be a useful screening tool for determining SF in older adults. Interventions aimed at preventing or delaying SF are warranted.

ALLOSTATIC LOAD, UNHEALTHY BEHAVIORS, AND DEPRESSIVE SYMPTOMS AMONG OLDER ADULTS IN THE SACRAMENTO AREA LATINO STUDY ON AGING (SALSA)

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Background: Racial/ethnic inequalities may intensify the effect of chronic stress on mental health. Findings from research among minorities have been mixed on whether unhealthy behaviors interact in the relationship between self-reported chronic stress and depression. Research to understand the biological mechanisms in this relationship is sparse. We assessed whether unhealthy behaviors moderated the relationship between allostatic load (AL) and future significant depressive symptoms (SDS) among Latinos. Methods: Data from two waves of the Sacramento Area Latino Study on Aging were analyzed and included two established biomarkers (categorized using clinically-relevant cut points) of AL: cigarette smoking, excessive and binge drinking, obesity, and significant (≥16 out of 20) depressive symptoms at follow-up. Participants included 871 U.S.-born and 908 foreign-born Latinos. Multivariable logistic regression adjusted for age, gender, education, and baseline SDS was used to model AL, an unhealthy behavior index (UBI, range 0-3), and their interaction on follow-up SDS, stratified by nativity. Analyses were conducted using RAS 9.4. Results: Compared to the U.S.-born foreign-born participants were slightly older (70.1 vs. 71.2 years), less educated (42% vs. 80% 6th grade) engaged in more unhealthy behaviors (0.52 vs. 0.60 behaviors), and had higher baseline SDS (20% vs. 31%). Foreign-born participants who had greater AL and UBI had significantly higher odds of future SDS (AL and UBI: 1 OR= 4.16, 95% CI=[1.14,4.87], AL and UBI=2: OR=2.00, 95% CI=[1.83,4.31], and AL and UBI=3: OR=2.75, 95% CI=[1.86,4.41]). Conclusions: By linking the cumulative psychological sequelae of stress and behavior to SDS, our findings support previous research among Latinos using self-reported stress, add to our understanding of these relationships, and can inform clinical decisions to screen and advise older Latinos. Funding (in part): Intramural Research Program, National Institute of Health

THE EFFECT OF MIDDLE LIFE MARRITAL STATUS ON SUBSEQUENT COGNITIVE DECLINE OVER 21 YEARS DISCOVERY FROM ATHEROSCLEROSIS RISK IN COMMUNITY (ARIC) COHORT STUDY

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Background: Previous research has shown that marital status has a protective effect against cognitive decline but evidence from prospective cohort studies is limited. We investigated the association between middle life marital status and subsequent cognitive changes with 21-year follow-up prospective ARIC study cohort. Methods: 14135 community-dwelled adults (mean age= 54.07, SD= 5.73) underwent three wave assessments at visit 2, 8 and 21 years. SDS values were used to indicate greater AL and UBI had a high prevalence of SF. SF was associated with dementia, subjective memory decline, depression, cognitive impairment, and having experienced a recent significant life event. After adjusting for age and gender, the 8-year mortality hazard ratios were 2.5-4.3 and 1.6-2.3, respectively, for those with SF or pre-SF. Each component of SF predicted 8-year mortality. Conclusion: SF is associated with PF and predicts mortality. The HALFT scale could be a useful screening tool for determining SF in older adults. Interventions aimed at preventing or delaying SF are warranted.

CELLULAR RESPONSE TO CHRONIC PSYCHOSOCIAL STRESS: TEN-YEAR LONGITUDINAL CHANGES IN TELOMERE LENGTH IN THE MULTILETHNIC STUDY OF ATHEROSCLEROSIS Helen Meier*, Helen Meier, Mustafa Hanein, Belinda Neal-Thompson, Sharielle Berube, Elizabeth Blackburn, Elisa Egelue, Jie Lin, Teresa Seeman, Alan Diaz-Roux, (University of Wisconsin-Milwaukee)

Previous studies have demonstrated an inverse association between chronic psychosocial stress and leukocyte telomere length (LTL), a potential marker of cellular aging. Due to paucity of longitudinal data, responses of LTL and LTL aging trajectories to changes in chronic stress exposure remain unclear. Using data from Stress I and II ancillary studies of the Multicentric Study of Atherosclerosis, we estimated the 10-year longitudinal (n=1,58) associations of chronic stress with LTL and with LTL aging trajectory, as well as the pooled, cross-sectional association of chronic stress and LTL (n=2,757). We measured chronic stress from both individual and neighborhood-environmental sources. At the individual level, summary scores were calculated from ongoing (6-months) material/social problems rated as moderately/very stressful on the Chronic Burden Scale. Neighborhood-level stress was measured as a summary score of reverse-coded MESA Neighborhood safety, aesthetic quality, and social cohesion scales. Deciles of these scores were employed as categorical variables in analyses. At the neighborhood level, stress was associated with higher LTL. At the individual level, associations of stress and aging trajectories were estimated with fixed effects models in analyses including additional control for time-varying demographics, lagged behaviors, chronic conditions, and for storage duration and baseline LTL. Based on within-person longitudinal changes, high chronic stress, particularly individual-level was associated with shorter LTL than mild stress, consistent with cross-sectional findings. With regards to LTL aging trajectories, our results were suggestive of two patterns: 1) LTL attrition was lower by 0.027 units/year [95% CI: 0.005, 0.051] among those with high vs. low total stress, and 2) LTL attrition was stronger among those exposed to worsening chronic stress [-0.076 units/year, 95% CI: -0.368, 0.215, for total stress].
THE ASSOCIATION BETWEEN FINANCIAL RESOURCES AND HOMEBOUND STATUS AMONG A NATIONAL SAMPLE OF OLDER ADULTS Katherine Ornstein* Katherine Ornstein, Evan Bollens-Lund, M. Maria Glymour, (Department of Geriatrics and Palliative Medicine, Icahn School of Medicine at Mount Sinai)

A large and growing population of individuals with multifaceted, cognitive impairment and functional decline live in the community but are homebound, defined as rarely or never leaving home. Homebound status is associated with decreased access to medical services, poor health outcomes, and increased mortality. The goal of this study was to understand which resources may enable individuals to delay homebound status and remain in the community. We hypothesized that individuals with low financial resources may be especially vulnerable to becoming homebound. Using waves 1-6 of the National Health and Aging Trends Study (NHATS), a nationally representative sample of Medicare beneficiaries, we examined whether baseline income (<$5,000, $5,000-$9,999, $10,000-$19,999, $20,000-$49,999, $50,000+) predicted risk of becoming homebound among initially non-homebound community-dwelling older adults over 5 years. We used Cox Proportional Hazards Models to predict time to homebound status, centering for death, loss to follow-up and nursing home status, adjusting for NHATS analytic weights. Among 7042 community-dwelling non-homebound individuals, 15% of those in the lowest income bracket became homebound vs. only 4% of those in the highest income bracket. In adjusted analyses controlling for clinical characteristics (including dementia status and function) and demographic factors including age, gender, marital status, race, education, Medicaid status, geographic region and caregiving resources, those in the highest income bracket had 45% lower hazard of becoming homebound (95% CI: Hazard Ratio = 0.57 - 0.71). Across income brackets, we found evidence for an inverse dose-response relationship with homebound status. Homebound status is a common, understudied, and adverse outcome for older adults. Our work demonstrates the potential impact of financial resources on how older adults live in the community. Future work will examine the role community and family resources play in becoming homebound.

FRAILTY, INFLAMMATION, AND WAITLIST MORTALITY AMONG PATIENTS WITH END-STAGE RENAL DISEASE Maria McAdams-DeMarco* Maria McAdams-DeMarco, Hao Ying, Alvin Thomas, Patima Warsame, Ashton Shaffer, Christine Haragen, Ravi Vairavathan, Jeremy Waldron, Derry Segev, (JHJ)

Background Among community-dwelling older adults, frailty is associated with heightened markers of inflammation and subsequent mortality. Although frailty is common among ESRD patients, the role of frailty and markers of inflammation in this population remains unclear. We quantified these associations in patients on the kidney transplant waitlist (KT waitlist) and tested whether frailty and/or markers of inflammation improves waitlist mortality risk prediction. Methods: We studied 1975 ESRD patients on the KT waitlist (1/10/2012-2/28/17) in a multicenter cohort study of frailty. Serum inflammatory markers (interleukin-6 (IL-6), soluble tumor necrosis factor-receptor-1 (sTNFR1), and C-reactive protein (CRP)) were analyzed in 605 of these participants; we calculated the inflammatory index score using IL-6 and sTNFR1. We computed the C-statistic of an established registry-based prediction model for waitlist mortality adding frailty and/or inflammation (ISD charge: in kg IL-6, sTNFR1, CRP, or inflammatory index) Results: The registry-based model had moderate predictive ability (c-statistic=0.655). Frailty was associated with increased mortality risk (2.19, 95% CI:1.26-3.79) but did not improve risk prediction (c-statistic=0.646; P=0.05). Like frailty, IL-6 (2.13, 95% CI:1.41-3.22), sTNFR1 (1.70, 95% CI:1.29-2.59), CRP (1.68, 95% CI:1.06-2.67), and the inflammatory index (209 95% CI:3.83-16) were associated with increased mortality risk; unlike frailty, adding IL-6 (c-statistic=0.777; P=0.002), CRP (c-statistic=0.728; P=0.002) or inflammatory index (c-statistic=0.777; P=0.002) substantially improved mortality risk prediction. Conclusions: Frailty and markers of inflammation were associated with increased waitlist mortality risk, but only markers of inflammation significantly improved ESRD risk prediction. These findings help clarify the accelerated aging physiology of ESRD and highlight the need to measure markers of increased frailty/mortality risk.

LONGITUDINAL ASSOCIATIONS BETWEEN HAVING AN ADULT CHILD IN THE US AND COGNITIVE FUNCTION AMONG MEXICAN ADULTS Jacqueline M. Torres* Jacqueline M. Torres, Kara E. Rudolph, Cecilia Surygon, Rebecca Wong, Mary N. Haan, Maria Glymour, (University of California, San Francisco)

Adult child migration may both positively and negatively impact cognition for older adults who remain in places of origin. Possible mechanisms include reduced social engagement and improved socio-economic status. We used longitudinal targeted maximum likelihood estimation (TMLE) to estimate associations between having an adult child in the US and cognitive function for Mexican adults >50 years. TME is doubly robust and can incorporate data-adaptive estimation. Data come from three waves (2001, 2003, 2012) of the Mexican Health and Aging Study (n=1806 with at least one living child at baseline). Respondents completed verbal, visuospatial, and visual scanning domains of the Cattell-Cultural Cognitive Evaluation at baseline; orientation, attentiveness, and verbal fluency domains were added to subsequent waves. We adjust for time-varying confounding caused by prior exposure and attrition. Mean age at baseline was 62 years and at least one child in the US. Mean baseline cognition scores were 35.8 for women and 38.3 for men (range: 0-80). There were no associations between having an adult child in the US and cognition overall. In age-stratified models, women 50-59 years at baseline who had an adult child in the US at all three study waves had worse average cognition scores in the final wave (2012) compared to their counterparts with no adult children in the US over the same time period (marginal risk difference -2.66, 95% CI: -3.12, -2.20). In contrast, women >60 years with at least one adult child in the US at all three study waves had better cognitive scores in the final wave compared to those with no adult children in the US (marginal risk difference 2.13, 95% CI: 0.92, 3.35). Similar but weaker patterns were observed in models for the second (2003) wave. We find preliminary evidence of associations between having an adult child in the US over multiple years and cognition for women >50 years in Mexico, with divergent associations by baseline age.
KIDNEY TRANSPLANT OUTCOMES IN RECIPIENTS WITH COGNITIVE IMPAIRMENT: A NATIONAL REGISTRY AND PROSPECTIVE COHORT STUDY

Abhin G. Thomas, Abhin G. Thomas, Jessica M. Ruck, Ashton A. Shaffer, Christine E. Huguen, Hao Ying, Fatima Wastane, Nadia Chu, Michelle C. Carlson, Allen L. Gross, Silas P. Norman, Dorry L. Segev, Mara McAdams-DeMarco (Johns Hopkins University)

BACKGROUND. Cognitive impairment is common in end-stage renal disease patients and is known to impact adherence to completion of treatment regimens. Given the need for post-transplant immunosuppression, we hypothesized that cognitive impairment may be associated with an increased risk of all-cause graft loss (ACGL) in kidney transplant (KT) recipients. METHODS: Using the Modified Mini-Mental State (3MS) examination, we measured global cognitive function at KT hospital admission in a prospective, multicenter cohort of 864 KT candidates (8/2009-7/2016). We estimated the association between pre-KT cognitive impairment and ACGL using Cox regression and hybrid risk-adjustment regression (HRAR), a statistically efficient method that uses precisely estimated coefficients from the registry population (SRTR N=101,718) into the prospective cohort model. We extrapolate the national prevalence of cognitive impairment in KT recipients using multiple imputation by chained equations. RESULTS. The prevalences of any impairment (3MS<80) and severe impairment (3MS<60) were 10.0% and 2.9%, respectively. We estimated that 11.7% (8.5-14.9%) of KT recipients had pre-KT cognitive impairment. Living donor KT recipients with any impairment had substantially higher ACGL risk than unimpaired recipients (5-year ACGL 45.5% vs. 10.6%; aHR Cox: 5.1 [1.78-16.34], p<0.001; aHR HRAR: 3.2 [1.22-8.88], p=0.02). Similarly, deceased donor KT recipients with severe impairment had higher ACGL risk than recipients without severe impairment (5-year ACGL 53.0% vs 24.2%; aHR Cox: 2.92 [1.13-7.50] p=0.03; aHR HRAR: 2.93 [1.35-6.35], p<0.01). CONCLUSIONS. Given the prevalence and elevated risk among KT recipients, screening for cognitive impairment might be associated with increased risk of ACGL. These findings motivated us to apply a formal causal mediation analysis to estimate the relative contribution of cognitive impairment to the relationship between air pollution and dementia.

EPISTEMOLOGICAL CHARACTERISTICS OF INPATIENTS WITH ALZHEIMER'S DISEASE AND MORTALITY FACTORS: A NATIONWIDE POPULATION-BASED STUDY IN TAIWAN

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There are approximately 1.07% of people with dementia in Taiwan. This study discussed about the epidemiological characteristics of inpatients with Alzheimer's disease and the mortality factors. Data from the file of Inpatient expenditures by admissions and Registry for contracted medical facilities in the National Health Insurance Research Database in 2013 is used in this study. Alzheimer's disease (ICD-9-CM code 290.1) is selected, and exclude the patients under the age of 18. The independent variables included patient characteristics and event characteristics and were analyzed using SPSS 21.0 statistical software. A total of 4,878 patients with Alzheimer's disease were hospitalized, and female have a higher proportion of 52.5% and the average age is 58 years old. Most patients were treated in the district hospitals (51.4%), 87.2% prefer the neurology department, and 16.9% had performed surgery. The average length of admission was 8.7 days and the average hospitalization cost was $1696. The factors influencing the in-hospital mortality in Alzheimer's disease were gender, age, Charlson comorbidity index, hospital accreditation level whether taking the medical treatment in neurology, and the number of days in hospitalization. The risk of hospital mortality in men was 1.39 times that of women, the risk of death at a regional hospital is 1.58 times that of a district hospital, the risk of death increased by 0.8% for each additional year of age, Charlson's comorbidity index increased by 10% for each additional risk of death. The risk of death to a neurologist was 2.04 times higher than that of a non-neurologist, 1.55 times higher than those who did not receive surgery, and 3.6% increase in the number of hospitalized decreased by 2% for each additional day. Alzheimer's patients seeking medical attention in neurology can reduce the risk of hospitalized mortality. It is recommended that men and older patients to seek medical services in neurology as soon as possible.

PREVALENCE OF FRAILTY AMONG KIDNEY TRANSPLANT RECIPIENTS IN THE UNITED STATES

Abhin G. Thomas, Abhin G. Thomas, Ashton A. Shaffer, Hao Ying, Silas P. Norman, Dorry L. Segev, Mara McAdams-DeMarco (Johns Hopkins University)

BACKGROUND. Frailty, a measure of physiologic reserve, increases the risk of delayed graft function, longer length of stay, early hospital readmission, immunosuppression intolerance, and mortality among kidney transplant (KT) recipients. Despite the clinical importance of frailty in predicting KT outcomes, there are no national estimates of the prevalence of frailty among KT recipients. METHODS: The Fried frailty phenotype was prospectively measured in 1,065 KT recipients (2008-2016) in our multicenter cohort. Using SRTR data on 126,376 KT recipients, we projected frailty (2 of 5 components) and intermediate frailty (2 of 5 components) by multiply imputing Fried frailty scores using predictive mean matching and accounting for recipient, donor, transplant, and post-transplant factors. We assessed the quality of our predictive model using the area under the receiver-operator curve (AUC). RESULTS: In complete cases, the model AUC was 0.74. In our multicenter cohort, frailty and intermediate frailty prevalence was 18.4% and 30.0%, respectively, among deceased donor KT (DDKT) recipients and 14.5% and 28.1%, respectively, among living donor KT (LKT) recipients. Projected nationally among DDKT recipients, frailty and intermediate frailty prevalence was 18.6% (95% CI: 14.2-23.4%) and 29.9% (95% CI: 27.5-32.5%), respectively. Projected nationally among LKT recipients, frailty and intermediate frailty prevalence was 12.5% (95% CI: 10.8-14.3%) and 28.4% (95% CI: 23.8-33.0%), respectively. Frailty prevalence did varied by geography (p<0.0001) and increased by age (p<0.0001). CONCLUSION: We project that nearly 20% of US KT recipients 2000-2016 were performed with frail recipients. These recipients might not have been aware of their higher risk for adverse post-KT outcomes. Given the prevalence of frailty, transplant centers should consider assessing frailty during KT evaluation to improve informed consent and perhaps consider pre-hepatication.

THE ROLE OF CARDIOVASCULAR DISEASE IN THE RELATIONSHIP BETWEEN CHRONIC EXPOSURE TO AIR POLLUTION AND DEMENTIA

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Background: Cardiovascular disease is a known determinant of dementia. Epidemiologic studies have also shown that chronic exposure to air pollution may play a role in the development of dementia and cardiovascular disease. This motivated us to apply a formal causal mediation analysis to estimate the relative contribution of cardiovascular disease to the relationship between air pollution and dementia. Methods: A population-based cohort comprised of Canton-born residents of Ontario, Canada who participated in the Canadian Community Health Surveys from 1996-2003 was followed through 2013 or until dementia diagnosis. Chronic exposure to selected ambient air pollutants (e.g., fine particulate matter, PM2.5) and nitrogen dioxide (NO2) was assessed using a 3-year running average with a 5-year lag before dementia diagnosis. Incident cardiovascular disease occurring prior to dementia was evaluated as a potential mediator. We used Poisson regression models, adjusting for individual- and neighborhood-level risk factors (e.g., smoking, physical activity, education, and neighborhood income), to estimate incidence rate ratios (IRR) for every interquartile range increase in exposure to PM2.5 and NO2. We applied the generalized product method to estimate the total direct, indirect effects of air pollution on dementia and the proportion mediated through cardiovascular disease. Results: The risk of dementia was moderately higher among those exposed to NO2 (IRR=1.15, 95% CI:1.03, 1.29) and PM2.5 (IRR=1.16, 95% CI:1.07, 1.24) after adjusting for covariates. We estimate 4.0% and 10.5% of the observed association between NO2 and PM2.5, respectively, and dementia to be mediated through cardiovascular events. Conclusion: These results suggest that some of the association between chronic air pollution and dementia is mediated through its effect on cardiovascular disease. Improving cardiovascular health may prevent dementia in areas with higher exposure to air pollution.
THE ASSOCIATION OF SLEEP WITH METABOLIC PATHWAYS AND METABOLITES EVIDENCE FROM THE DIETARY APPROACHES TO STOP HYPERTENSION (DASH)-SODIUM FEEDING STUDY
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Background: Sleep is increasingly being viewed as an important determinant of health and appears to be associated with cardiovascular disease, diabetes, and several site-specific cancers. Few epidemiologic studies have used data from a feeding study to explore the impact of sleep habits upon metabolic profile. Methods: The Dietary Approaches to Stop Hypertension (DASH)-Sodium feeding trial randomized individuals to either the DASH (low fat, high protein, low-fat dairy and high fruits and vegetables) or control diet for 12 weeks and three levels of sodium intake (30 days each). In a subgroup of 97 participants, we measured the levels of 531 metabolites in serial fasting plasma samples. We assessed the association between each metabolite and sleep using an adjusted linear random effects model. The resulting p-values were combined using Fischer's method to estimate the association strength.

Results: 26 pathways were associated (p <0.05) with sleep mid-point, but only they­

netic contributions to the health and well-being of adolescents but the evidence remains scant and disparate. We used data on a national survey of Canadian students to investigate the associations between chronotype and a wide range of health outcomes and behaviors in youth. Methods: Data were collected in the 2014 Canadian Health Behaviour in School-Aged Children survey (29,635 students; ages 11-18). Chronotype was estimated using the mid-sleep time on weekends, corrected for catch-up sleep. We examined indicators of physical health (frequency of headaches, stomach ache, backache, dizziness, obesity, self-rated health) and health behaviours (smoking, physical activity, consumption of fruits, vegetables, soft drinks, and alcohol). We used school random-effects regressions, adjusted for school duration, school start time, individual, family, and geographic characteristics. Bonferroni correction accounted for multiple testing. Results: The average mid­

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MORE THAN JUST SLEEPING IN: LATE CHRONOTYPES PREDICT VARIOUS HEALTH PROBLEMS IN ADOLESCENTS
Genevieve Gariepy, Frank J. Elgar. (McGill University)

Objective: Recent studies suggest that the timing of sleep, or chronotype, contributes to the health and well-being of adolescents but the evidence remains scant and disparate. We used data on a national survey of Canadian students to investigate the association between chronotype and a wide range of health outcomes and behaviors. Methods: Data were collected in the 2014 Canadian Health Behaviour in School-Aged Children survey (29,635 students; ages 11-18). Chronotype was estimated using the mid-sleep time on weekends, corrected for catch-up sleep. We examined indicators of physical health (frequency of headaches, stomach ache, backache, dizziness, obesity, self-rated health) and health behaviours (smoking, physical activity, consumption of fruits, vegetables, soft drinks, and alcohol). We used school random-effects regressions, adjusted for school duration, school start time, individual, family, and geographic characteristics. Bonferroni correction accounted for multiple testing. Results: The average mid­

SIP 0023

NETWORK ANALYSIS OF WEIGHT LOSS METHODS IN A NATIONALLY REPRESENTATIVE SAMPLE
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Individuals employ many different methods to lose weight; however, it is unknown how these methods are related to one another. We applied a network approach to examine which of 20 weight loss methods were most commonly used together; that is, if a person mentioned both exercise and eating less, these two would be linked in the network. Data came from 2,516 men and 3,987 women aged 16-80 years who had indicated that they had “tried to lose weight in the past year” in the Weight History Questionnaire of the National Health and Nutrition Examination Survey (NHANES) in 2009-2010, 2011-2012 and 2013-2014. Exercise and eating less were the most commonly endorsed weight loss methods (62.7% and 58.5%, respectively). Network structures differed substantially by gender. In women, the strongest associations were observed among fasting, smoking and vomiting/leaving (unhealthy weight loss methods) and among drinking more water, eating more vegetables and fruits, eating less junk food, and eating less sugar (healthy weight loss methods). Other weight loss methods had either direct or indirect connections with each other. In men several weight loss methods, including unhealthy weight loss methods and prescription diet pills, were neither directly nor indirectly related to any other weight loss methods whereas the relationships among healthier weight loss methods displayed a similar pattern to that among women. Our results suggest that individuals tend not to engage in unhealthy weight loss methods simultaneously and that women who engage in an unhealthy weight loss behavior are more likely to engage in additional unhealthy weight loss behaviors. Nationally representative data on these behaviors from individuals who have not tried to lose weight in the past year are needed to determine similar network structures exist among men and women who engage in these behaviors for the purpose of weight control.
Early identification and treatment of Lyme disease, typically presenting as Erythema Migrans (EM), is important to prevent serious complications including arthritis, meningitis, neuritis, and cardiitis. In this analysis, we aimed to identify and categorize cases, as early or delayed, as well as to evaluate risk factors for delayed diagnosis and treatment among patients in an endemic region. Using Geisinger electronic medical records (EMR) and clinical notes from 1,283,488 primary, specialty, emergency, and urgent care patients in the EMR from 2012 through 2017, we identified 8,457 new Lyme cases through ICD-10 codes. Cases were categorized as early or disseminated Lyme through the processing of clinical notes with a free-text pattern-matching algorithm, or, where available, through specific ICD-10 codes. Early disseminated EM had to be evaluated through text in all cases. Lab results, procedures, and medications were used to further describe cases. Risk factors evaluated were age, sex, race, and proportion of utilization of medical assistance (MA) over observed time, a proxy for socioeconomic status (SES). We intended to further evaluate a variety of community factors including SES as well as health system factors such as utilization of urgent care. We were able to extract sufficiently detailed information from clinical notes to categorize 44% of cases as either early or disseminated, while 42% of cases were found to have an ICD-10 code identifying a specific disease stage or complication. Clinical note quality or absence were limiting factors. Combining information allowed us to categorize 66% of cases by stage. Where both were available there was agreement on classification in 93% of cases (chi2 = 849, P<0.0000), MA utilization (F=12.26, P<0.0000), and sex (chi2=7.813, P=0.020) to be significant risk factors for delayed diagnosis and treatment of Lyme.
Background: Colorectal cancer (CRC) has been a serious public health issue nowadays. Epigenetic alterations underlying the pathogenesis of CRC have been reported. It is imperative to develop new biomarkers to predict the occurrence of CRC. The purpose of this present study is to find novel genes having the potential utility of protein methylation status to detect CRC risk. Methods: Integrating three open source databases (Prediction of Clinical Outcomes from Genomic Profiles [PRECOG], MethHC, and gene expression in Human Cancer [MethHC] and University of California Santa Cruz [UCSC] Genome Browser), we selected the most influential genes as candidates. Subsequently, we recruited 134 CRC patients to verify the DNA methylation status of these candidate genes. GLOGO 7 primer analysis software was used to design and analyze PCR primers for adequate conditions. DNA methylation status was performed using Methylation-Specific PCR (MSP-PCR). Results: We used PRECOG to select 763 genes which expression level in tumor tissues was disparate from normal ones, and to evaluate the methylation status of promoter in these genes by MethHC. Moreover, we used UCSC Genome Browser to verify whether the frequency of the CG rich sequence was higher than other regions. Based on the above steps, we found 69 influential genes. Considering cost and time, we randomly selected 5 genes from these 69 influential genes to do MSP-PCR validation. Fortunately, one of the 5 genes named out at first homolog (OAF) can be detected in the biospecimens of CRC patients. The hypermethylation frequency of OAF promoter in tumor tissues was 47.8%, significantly higher than 26.1% in normal ones (chi-square test, p=0.001). Conclusion: Targeting of OAF promoter methylation status may be a biomarker to detect CRC, and this result suggested that the development of technologies and accumulation of data would help us collect more complete and precise biomarkers.

**Breast Cancer Risk in Chronic Users of Phthalate-Containing Medications: A Danish Nationwide Cohort Study**

Thomas P. Ahern, Thomas P. Ahern, Delride P. Crumlin-Fenton, Anne Beetsma, Sinna P. Ulrichsen, Bernard F. Cole, Timothy L. Lash, Peer Cherniack, Henrik Toft Sommer, Rulla M. Tamimi, Peer Danuser (University of Vermont)

Background: Phthalates interfere with hormonal signaling and may affect breast cancer risk. Preclinical evidence implicates some phthalates in breast cancer progression—particularly dibutyl phthalate (DBP), which potentiates the estrogen receptor (ER). Users of phthalate-containing medications represent a highly exposed population for efficient study of phthalate health effects. Methods: We identified all phthalate-containing oral medications marketed in Denmark, recording product codes and the type and name of phthalate per pill. We enrolled a nationwide cohort of women at risk for a first breast and without previous exposure to phthalate-containing drugs in 2005. Using the Danish National Prescription Registry we characterized time-varying, medication-borne phthalate exposure. Incident cancers were ascertained with the Danish Cancer Registry. We fit Cox regression models to estimate associations between cumulative phthalate exposures and breast cancer incidence, adjusting for established risk factors, comedity, and confounders. Results: We identified 481 products from 24 drug classes containing DBP, diethyl phthalate (DEP), cellulose acetate phthalate (CAP), hypromellose phthalate (HPMCP), or polyisobutyl phthalate (PVP). Phthalate was ranged from 3.0-1.23 g per pill. We followed 11.2 million women over 9.9 million person-years, during which 27,111 breast cancers occurred. Fourteen percent of the cohort (n=161,751) was prescribed a phthalate-containing drug. DEP, HPMCP, and PVP were not associated with breast cancer. The highest level of DBP exposure (>10,000 mg; range: 0.1-2.71 mg; median: 0.9 mg) was associated with an 8% increase in breast cancer risk (HRadj=1.09; 95% CI: 0.94, 1.27). The association was stronger for HR+ disease (HRadj=1.18; 95% CI: 1.01, 1.36). No published evidence associates the drugs represented by DBP-containing products (bis(2-ethylhexyl) sebacate, di-n-butyl phthalate, diisobutyl phthalate, diisooctyl phthalate, pentylhexyl phthalate, and di-n-octyl phthalate) with breast cancer risk.

**Substitution of Dietary Protein Sources in Relation to Colorectal Cancer Risk in the NIH-AARP Cohort Study**

Linda M Liao, Linda M Liao, Erika Lofgreen, Arash Etemadi, Barry L. Graubard, Rashid Shih (NCI DCSE)

Previous studies have shown positive associations between red meat intake and colorectal cancer (CRC). However, less is known about the impact of substituting plant for animal protein on CRC risk. In the large prospective National Institutes of Health-AARP cohort study, we evaluated this substitution effect with risk of CRC. Protein intake was assessed at baseline using a food frequency questionnaire. HRs and 95% CIs were estimated using multivariable adjusted hazard ratios from Cox proportional hazards models. We used a substitution model with total protein intake held constant, so that an increase in plant protein was offset by an equal decrease in animal protein. Among 498,625 individuals, we identified 8,995 incident CRCs (3,990 proximal, 2,514 distal, and 2,526 rectal) after a median follow-up of 15 years. The substitution of plant protein for animal protein was associated with a reduced risk of CRC (HR for highest vs lowest quintiles: 0.91; 95% CI: 0.83, 0.99). This reduction in CRC risk appeared to be primarily due to the substitution of plant protein for red meat protein (HR: 0.91; 95% CI: 0.81, 0.97) but not white meat protein (HR: 0.96; 95% CI: 0.88, 1.05) or other animal protein (HR: 0.98; 95% CI: 0.96, 1.03). When further evaluated by source, reduction in CRC risk was limited to the substitution of protein from bread, cereal, and pasta for red meat protein (HR: 0.86; 95% CI: 0.80, 0.93). The association between the substitution of protein from bread, cereal, and pasta for red meat protein was stronger for distal colon (HR: 0.78; 95% CI: 0.67, 0.90) and rectal cancer (HR: 0.79; 95% CI: 0.68, 0.91), but not present for proximal colon (HR: 0.99; 95% CI: 0.88, 1.11). This study shows that substitution of plant protein for animal protein, especially red meat protein, is associated with a reduced risk of CRC and suggests that protein source has an impact on CRC risk.
THE EFFECT OF BETEL-QUID USE DISORDER ON ORAL PRECANCEROUS DISORDER AND ORAL SQUAMOUS CELL CARCINOMA Yueh-Tzu Chiu, Yueh-Tzu Chiu, Chiou-Hung Lee. (Department of Public Health, College of Health Science, Kaohsiung Medical University, Kaohsiung, Taiwan)

Betel-liquid (BQ) is the fourth most commonly consumed psychoactive substance in the world, and abuse and dependence have occurred in subsets of tobacco-free BQ chewers. Oral submucosal fibrosis, epithelial hyperplasia, epithelial dysplasia, and hyperparakeratosis are a group of oral precancerous disorders (OPD) believed to be associated with the development of oral squamous cell carcinoma (OSCC). Although BQ chewing has been recognized a risk factor for oral cancer. The effect of BQ addictive use on OPD and OSCC has not been well understood. We conducted a multicenter case-control study in the Kaohsiung Medical University Hospital and Taichung Veterans General Hospitals in Taiwan. A total of 63 OPD and 156 OSCC pathologically confirmed patients and 261 controls were recruited. A 11 disorder symptom-included questionnaire developed from DSM-5 substance use disorder was used to measure BQ use disorder (BUD) and other covariates. Participants with 0-1, 2-3, 4-5 and ≥6 DSM-5 symptoms were defined no, mild, moderate and severe BUD, respectively. The multivariable logistic regression models were used to assess the effect of BUD on the risk of OPD and OSCC. Adjusting for confounding factors, we found that BQ chewers with mild to moderate BUD had a 10.6-17.1-fold higher OPD risk and a 6.2-10.4-fold elevated OSCC risk than non-chewers. The risk was observed to be 65.0- and 42.4-fold for the two oral disorders among chewers with severe BUD. Our findings highlight the effect of BUD on OPD and OSCC.

Efficacy of Crizotinib, Ceritinib, and Alectinib in the Treatment of ALK-Positive Non-Small Cell Lung Cancer: A Meta-Analysis of Clinical Trials

Tung Hoang* Tung Hoang, Thi-Thuy Phan, Boyoung Park, Setung Kwon Myung. (National Cancer Center, South Korea)

Objectives: This study aimed to evaluate the efficacy of anaplastic lymphoma kinase (ALK-inhibitor) in the treatment of ALK-positive non-small cell lung cancer (NSCLC) by using a meta-analysis of clinical trials. Methods/Materials We searched Pubmed, EMBASE, Cochrane Library, and ClinicalTrials.gov by using key words related with the topic in October 2017. The pooled effect sizes were calculated based on the random-effects model. Also, we performed subgroup analysis by type of ALK inhibitors (crizotinib, ceritinib, and alectinib) and publication bias where 10 or more study groups were available. Results: A total of 18 clinical trials with nine single-arm trial and nine double-arm trials included in the final meta-analysis. The median overall survival (OS), progression free survival (PFS), overall response rate (ORR), disease control rate (DCR), 1-year survival rate, and 2-year survival rate were 19.89 months, 8.58 months, 64%, 81%, 74%, and 62%, respectively. Also, ALK inhibitors performed the significantly superior effect compared to chemotherapy (hazard ratio (HR) for OS: 0.83; HR for PFS: 0.48; rate difference (RD) for ORR: 0.22; and RD for DCR: 0.08). Further, while the risk of disease progression was 53% lower in patients treated with alectinib than those treated with crizotinib (HR for PFS: 0.47; 95% CI: 0.35-0.63), the effect on ORR was still comparable. Conclusion: The current metanalysis of trials showed the significant effect of ALK inhibitors in the treatment of ALK-positive NSCLC. Further randomized controlled trials should be conducted to compare the efficacy of ALK inhibitors each other and with other NSCLC treatments.


Zeinab El-Masri* Zeinab El-Masri, Leah Smith, Frithwill De, Elizabeth Holmes, Robert Nuttall. (Cancer Care Ontario)

Background: The Canadian Population Attributable Risk (COMPARE) study brings together expertise from Canadian researchers and the Canadian Cancer Society (CCS) to estimate the number and proportion of incident cancers in Canada, now and to 2040, that could be prevented through changes in modifiable lifestyle and environmental exposures. The findings have the potential to have a major impact on cancer control and prevention in Canada. Objective: To develop a knowledge translation (KT) strategy to enhance the relevance and uptake of the results (CSS) and the producers of knowledge (researchers) were brought together. Expertise from Canadian researchers and the Canadian Cancer Society (CCS) to estimate the number and proportion of incident cancers in Canada, now and to 2040, that could be prevented through changes in modifiable lifestyle and environmental exposures. The findings have the potential to have a major impact on cancer control and prevention in Canada. Objective: To develop a knowledge translation (KT) strategy to enhance the relevance and uptake of the results (CSS) and the producers of knowledge (researchers) were brought together. The Knowledge translation (KT) strategy was developed through collaboration between the producers, knowledge mobilizers, and users of knowledge, is expected to greatly enhance the impact of COMPARE results on cancer prevention planning and decision-making in Canada.

Non-herbal Tea Consumption and Ovarian Cancer Risk: A Systematic Review and Meta-analysis of Observational Epidemiologic Studies with Indirect Comparison and Dose-response Analysis

Dongyu Zhang* Dongyu Zhang, Alpana Kaur, Yuzhi X, Tengkong W, Nan Li. (University of North Carolina at Chapel Hill)

Background: Ovarian cancer (OC) accounts for 4% of female malignancies worldwide and its prognosis is unfavorable. Currently available epidemiologic data suggest that non-herbal tea consumption may reduce OC risk, but these evidences are inconsistent. Methods: A comprehensive literature search for observational epidemiologic studies reporting associations between non-herbal tea consumption and OC risk was conducted in electronic databases. A random-effects model was used to synthesize effect measures in binary meta-analysis, and adjusted indirect comparison was used to compare if there was a difference in effects between green tea (GT) and black tea (BT). Both linear and non-linear models were used to explore the dose-response relationship. Results: Fourteen studies were included and we obtained an inverse and significant pooled estimate in binary meta-analysis (RR = 0.76, 95% CI 0.61-0.95, P = 0.03). Conclusion: Our results suggest that non-herbal tea consumption may have a protective effect on OC risk.
A MULTIGROUP CONFIRMATORY FACTOR ANALYSIS OF THE EXPANDED PROSTATE CANCER INDEX COMPOSITE SHORT FORM (EPIC-26) IN ENGLISH AND SPANISH SPEAKERS. Ashly C Westrick* Ashly C. Westrick, Maria Carmen Mir, Olaitz Garin Boronat, Montserrat Ferrer Forés, Ferran Ferrer, Manel Castells, Lleida Fumadó, Raymundo R. Balbín, (University of Miami, Miller School of Medicine, Miami, Florida)

Despite being widely used to assess the health-related quality of life (HR-QOL) for men undergoing treatment for localized prostate cancer, little is known about the psychometrics of the Expanded Prostate Cancer Index Composite Short Form (EPIC-26). Using post treatment information, we conducted a multigroup confirmatory factor analysis (MC-FCA). MC-FCA was used to test if the EPIC-26 measurement model was invariant across English and Spanish speakers. A baseline model was used to test whether the two groups have the same factor structure. The metric-invariance model, where factor loadings are set to be equal, tested whether the strength of the association between each item and the corresponding latent factor is equal across groups. The scalar invariance model, setting both the factor loadings and item intercepts to be equal, tested whether individuals with the same underlying level of the construct have equivalent observed item scores. Data were from 638 item from the original EPIC validation cohort and 450 men from the Spanish Multi center Study of Clinically Localized Prostate Cancer”. A change in CFI of greater than 0.01 signified a significant difference between models. The overall model and configural models exhibited reasonable fit (RMSEA = 0.053, SRMR = 0.063; CFI = 0.882) and (RMSEA = 0.077; SRMR = 0.079; CFI = 0.86), respectively indicating that the groups conceptualize the construct (HR-QOL) similarly. The metric model, produced a reasonable fit (RMSEA = 0.058; SRMR = 0.054; CFI = 0.85) but demonstrated significant degradation in fit from the configural model (CFI = 0.031) suggesting that the two groups might be responding to the items in different ways. If measurement invariance is lacking conclusions based on the scale could be ambiguous or erroneous thus impairing clinical care negatively. We found evidence of similar factor structure but did not obtain metric invariance across groups suggesting that the groups are responding to items differently.

0048 S/P


In 2004, the landmark MOSAIC trial reported that FOLFOX (combined) vs. 5FU (single) therapy reduced all-cause mortality among stage II-III colon cancer patients (hazard ratio [HR] = 0.84, 0.71, 1.00), but benefits were confined to stage III and younger (age>70 years) patients. Differential uptake of FOLFOX in clinical practice could impact its population-level effectiveness. We compared the effectiveness of FOLFOX vs. 5FU in a target population of Medicare beneficiaries with colon cancer aged 65-75 years, overall and by calendar year. Analyses were restricted to MOSAIC participants aged 65-75 years (i.e., age>75). Target population data from linked cancer registry and Medicare claims data (2004-2013) included stage II-III cancer patients initiating FOLFOX. We estimated the intention-to-treat effect of FOLFOX vs. 5FU on mortality overall and in year-specific Medicare cohorts by applying inverse odds of sampling weights to the MOSAIC data; weights were derived using age, sex, and cancer stage data. We estimated overall and year-specific HRs and 95% confidence intervals using weighted Cox proportional hazards models. We analyzed 7,800 MOSAIC and 40,222 Medicare patients. In MOSAIC, 40% were 70+ years compared to 58% in Medicare, which varied over time (55-58%). The proportion of stage II patients was lower in Medicare vs. MOSAIC (17% vs. 41%). Among MOSAIC participants, the weighted HR for mortality comparing FOLFOX vs. 5FU was 1.06 (0.82, 1.38). Patients with stage III disease benefitted from the trial (HR=0.62 0.51, 0.73), but lower stage patients did not. We stratified this effect on mortality by year, while lower stage patients did not. We stratified this effect on mortality by year, while lower stage patients did not.

0049 S/P

MORTALITY FROM HEAD AND NECK CANCER IN CHILE 2003-2014 Doris Duenas*, Doris Dunas, Oscar Arteaga, Maria Jose Moshikov, (Facultad de Medicina, Universidad San Sebastian)

Head and neck cancer includes malignant neoplasms from the lips to the larynx. Represent 3.2% of total cancer in the world and affects mainly men. The behavior in Chile is unknown. Goal: To describe mortality from head and neck cancer in Chile and its 15 regions between 2003 and 2014. Methodology Secondary analysis of mortality records. Ecological study considering 15 regions as the unit of analysis. The trend of mortality from head and neck cancer was analyzed considering 4 trinomial from 2003-2014. Differences in age-standardized mortality rates (ASMR) were evaluated in each region. The Chilean population of 2014 was used as a standard (estimate projection). The annual change rate of the ASMR was calculated to evaluate change over time. Results: Deaths from head and neck cancer represent 1.58% of cancer deaths in Chile with 348 (SD 37) deaths per year on average. 75.68% are men and 27.72% were in older adults. The 2003-2014 mortality rate was 2.08 per 100,000 inhabitants, being 3.18x100,000 in men and 1.30x100,000 in women. Rates are higher in the north of the country, Mortality in all regions decreased in time, except in Aricao, Los Lagos, and Los Ríos, neighboring regions of the south of the country. Astoigatani between 2003 and 2005 was the highest of the period with an ASMR of 553 deaths in 100,000 (95% CI 24.8 457). The global change between 2003 and 2014 was -1.46%. Conclusion: Mortality has remained stable, despite slight increases in the south. This group of cancers should be addressed considering an analysis of incidence and survival to assess the complete phenomenon.

0050 S/P

AROMATASE INHIBITOR AND TAMOXIFEN USE AND THE RISK OF VENOUS THROMBOEMBOLISM IN A LARGE POPULATION BASED COHORT STUDY Xiaoxiao Xu*, Xiaoxiao Xu, Rowan T. Chlebowski, Ani Bantic (Dept. of Research & Evaluation, Kaiser Permanente Southern California)

Background Venous thromboembolism (VTE) is the second most common cause of death in hospitalized patients with cancer, and cancer treatments may exacerbate VTE risk. Patients with hormone-receptor positive breast cancer usually receive adjuvant endocrine therapy for five years or longer. Our goal was to examine the long-term effect of aromatase inhibitor (AI) on VTE compared with tamoxifen use among breast cancer survivors. Methods A prospective cohort of insured postmenopausal women who were diagnosed with a first primary hormone-receptor positive breast cancer and free from previous cardiovascular disease or VTE from 1991-2010 were followed through December 2011. Data elements were captured from the comprehensive electronic health records of a large California health plan, Kaiser Permanente. Women who developed deep vein thrombosis (DVT) or pulmonary embolism (PE) were classified as having VTE. We calculated person-year rates of VTE by AI and tamoxifen use. Multivariable Cox proportional hazards models were used to assess the effect of time-dependent endocrine therapy use and VTE risk after accounting for key covariates (tumor characteristics, diabetes, hypertension, and other cardiovascular medication use). Results We identified 625 VTE events during the follow-up. The crude rates were 4.6 per 1000 person-years and 2.8 per 1000 person-years for AI and PE, respectively. Compared with tamoxifen use, AI use was associated with a 36% lower VTE risk (adjusted HR=0.64, 95% CI 0.47, 0.87); as well as reduced risks of DVT and PE as individual outcomes after accounting for the potential detection bias. However, we had insufficient evidence to conclude if longer duration of AI use and reduced VTE risk after accounting for key covariates (tumor characteristics, diabetes, hypertension, and other cardiovascular medication use).
**Tissue Markers Associated with Residual Disease After Debunking Surgery in Ovarian Cancer**


**Background:** Optimal debulking with no macroscopic residual disease is strongly predictive of ovarian cancer survival. However, detailed debulking data is not available in many epidemiologic studies, limiting the ability to conduct survival analyses that account for confounding by or assess independence from debulking status. Though surgical skill is important, evidence suggests debulking status is dependent on tumor biology. Three protein markers (POSTN, CXCL14, and pSmad2/3) were previously reported to predict optimal debulking in high-grade serous (HGS) ovarian cancers with an area under the curve (AUC) of 0.89. Here we evaluate these markers and four others (ADHIB, FABP4, FAP, COL1A1) identified in mRNA expression studies as potential debulking markers in 96 HGS tumors (11.5% suboptimally debulked) from the New England Case Control Study (NEC), a population based case control study of ovarian cancer (1992-2008).

**Methods:** Seven markers of residual disease were measured by immunohistochemistry on tissue microarrays. The IHC signatures were scored by a pathologist (0 to 3 by staining intensity of cancer tissue) or evaluated by the Definitive automated platform (percent of area stained). We used logistic regression to estimate the association between the IHC scores and debulking status. Results: High expression of POSTN in the cancer tissue was associated with 12.6-fold increased odds of having residual disease after debulking surgery and high expression of FABP4 was associated with 1.8-fold increase in the odds of having residual disease after debulking surgery (p < 0.05). A model including POSTN, CXCL14, and pSmad had an AUC of 0.81 and a model including all seven markers had an AUC of 0.82. Conclusion: Our data suggest that IHC markers may be useful in the creation of tissue-based debulking signatures that facilitate survival analysis where debulking status from surgical reports is not available. Efforts to increase sample size and conduct validation are ongoing.

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**Factors Associated with Short-Term Adverse Events and Long-Term Survival After Lung-Cancer Directed Surgeries: An Analysis of New York State Cancer Registry Data Linked with Inpatient Administrative Data**

Bian Liu, Biao Liu, Francis Bocoe, Raji M. Stores.

**Background:** Lung cancer continues to be the leading cause of cancer deaths. We investigated predictors of short-term and overall survival among lung cancer patients using New York State cancer registry data linked with the inpatient claims from the Statewide Planning and Research Cooperative System. We identified 20,003 patients from the linked database (2004-2014), with a primary diagnosis of lung cancer between 2004 and 2013, and had a subsequent lung resection. Factors associated with post-operative adverse events (complications and in-hospital mortality) and overall survival were investigated using logistic model and stepwise Cox proportional hazard model, respectively. The median age at diagnosis was 66 (58-74) years, 28% of the patients had in-hospital complications, and 2% patients died in the hospital. Significant risk factors for increased odds of complications and in-hospital mortality were advanced age at diagnosis (OR= 1.01; 95% CI: 1.01-1.02 and 1.05; 1.04-1.07 per increased year), higher comorbidity index (OR: 1.02; 95% CI: 1.02-1.03 and 1.1; 1.1-1.13) and longer length of stay (OR: 1.12; 95% CI: 1.1-1.14 and 1.04; 1.04-1.05). Comorbidities with in-hospital mortality was also associated with tumor size (OR: 1.27; 95% CI: 1.11-1.47). The median follow-up time since cancer diagnosis was 3 (17-66) years, and 42% of the patients died at the end of the study. Factors statistically associated with worsened long-term survival were advanced age at diagnosis, later stage, larger tumor size, non-lobectomy surgery, increased length of stay, and comorbidities. The linkage of cancer registry and administrative health data provides a highly cost-effective way to investigate survival lung cancer patterns, helping identify main prognostic factors for patients in need of surgical treatment.

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**Prevalence of Financial Burden and Associated Psychological Distress Among Us Adult Cancer Survivors Who Reported Having Health Insurance That Paid for All or Part of Cancer Treatment**

Betty Wilson, Viney K. Chertow, Betsy Wilson, Suresh Bhurta, Saare Jharna.

**Background:** Several studies have well documented the association between financial burden of cancer care and mental health in adult cancer survivors (ACS). The objective of the current study is to study this association in ACS for whom health insurance paid for cancer treatment and are currently not on treatment. Cross-sectional data from the 2010 Behavioral Risk Factor Surveillance System (BRFSS) were used for this study (n = 2,809). Financial burden, the primary response of interest, was binary (Yes / No). Psychological distress (Yes / No) was assessed based on the responses to the eight-item Patient Health Questionnaire (PHQ-8) depression scale. Weighted prevalence estimates of financial burden and psychological distress along with corresponding 95% confidence interval (CI) were computed. Logistic regression was used to examine the association between financial burden and psychological distress among ACS with the results along with corresponding 95% confidence interval (CI) were computed. Logistic regression was used to examine the association between financial burden and psychological distress among ACS with the results along with corresponding 95% confidence interval (CI) were computed. Logistic regression was used to examine the association between financial burden and psychological distress among ACS with the results along with corresponding 95% confidence interval (CI) were computed. Logistic regression was used to examine the association between financial burden and psychological distress among ACS with the results along with corresponding 95% confidence interval (CI) were computed.
THE CHILE BILIARY LONGITUDINAL STUDY (CHILE BILS): A COHORT PROFILE
Emma E. McGee* Emma E. McGee, Vanessa Van De Wyngard, Rae Cook, Ruth M. Pfeiffer, Nicky Mardones, Hector Leaiza, Juan Carlos Roa, Allain Hildesheim, Juan Carlos Araya, Caterina Ferreccio, Jill Keshiod, The Chile BILS Study Group (National Cancer Institute)

Background: Gallbladder cancer is a leading cause of cancer death among women in Chile. Gallstones occur in 90% of Chileans with gallbladder cancer, but only a small proportion of gallstone patients develop cancer. Because gallstone prevalence is high, the Chilian government prioritizes gallstone patients aged 35-49 for cholecystectomy, regardless of symptoms, causing overtreatment of some and undertreatment of others. The aim of this study is to prospectively assess risk factors and early markers for gallbladder dysplasia/cancer (GDC). Methods: In 2016, we began recruiting a cohort of ~6,000 Chilian women aged 50-74 with gallstones identified via ultrasound. We expect to complete recruitment in 2018. Women will be followed for 6 years, with yearly contacts and follow-up visits every other year. We are collecting blood, ultrasound, physical exam, and questionnaire data at baseline and follow-up. We will also collect surgical specimens (e.g. gallbladder tissue) from those who go to surgery. The primary outcome of interest is GDC. Pivotal exposures of interest include ultrasound characteristics, inflammatory markers, and obesity/metabolic syndrome secondary exposures of interest include genomic factors, Salmonella typhi, and aflatoxin. Results: To date, we have recruited 3,361 women. Among 3,011 women with baseline data currently available, the mean age is 60 years (SD 7.0), 47.6% have completed ≥8 years of school, 25.0% are American, 29.5% are overweight, 61.1% are obese, 26.9% have diabetes mellitus, 26.9% report biliary colic in the last year, and 55.3% report gallstones in at least 1 immediate family member. Upon ultrasound examination, 45.4% have ≥1 gallstone, 10.7% have echogenic gallstones, and 4.2% have severe fatty liver.

Conclusions: The largest prospective study of gallstone patients at risk of GDC will improve our understanding of the biology and natural history of GDC, inform GDC prevention, and provide a rich resource for future investigations.

SIP

Ethnic Disparities in the Receipt of Guideline Concordant Treatment in Colorectal Cancer Patients, With Causal Mediation Analysis
Chelsea Obrochta* Chelsea Obrochta, Caroline Thompson, James Murphy, (Doctoral Student, Epidemiology, SDSU/UCSD)

Background: Colorectal cancer (CRC) is the third most commonly diagnosed cancer in the United States. If CRC is diagnosed at an early stage, adherence to guideline concordant care is met, CRC is highly treatable. Despite these proven guidelines, there are ethnic disparities in receipt of guideline concordant treatment (GCT) and timeliness of care, some of which may be attributable to socioeconomic status (SES). We studied the relationship between patient race/ethnicity and receipt of GCT among colorectal cancer patients in California, and used a causal mediation analysis to separate the direct and indirect effects. Methods: 29,428 patients diagnosed with stage I-III colon or rectal cancer (2009-2013) in the California Cancer Registry were included in our study. GCT was defined as initiation of timely treatment, administration of proper treatment(s), and administration of proper treatment(s) in the correct order. Multiple logistic regression models were used to examine the association of race/ethnicity with GCT, and timeliness of care. Lastly, a causal mediation analysis was conducted to disentangle the impact of race/ethnicity and SES. Results: In minimally adjusted models, Hispanics, blacks, and Asians were significantly less likely to receive guideline concordant treatment or indirect effects within 60 days of diagnosis, compared to whites. After further adjustment, some of the effect appears to be attributed to SES. Preliminary causal mediation analysis results revealed that 50.4% of the total effect of overall GCT and 76.7% of the total effect of initiation of treatment within 60 days is explained by race/ethnicity. Conclusion: Ethnic disparities in receipt of GCT and timely treatment exist, independently of SES. Researchers and clinicians should focus their attention to minority communities that need additional health resources, and a continued effort needs to be made to eliminate discrimination and provider bias.
USING MARGINAL STRUCTURAL MODELS TO ESTIMATE EFFECTS OF DIALYSIS MODALITIES ON BLOOD PRESSURE IN ESRD PATIENTS Melissa Soochoo* Melissa Soochoo, Elahi Stejna, Matthew B. Rivara, Kamyrz Kalantar-Zadeh, Rajnish Mehrotra, Orygetchuk A. Arali (UCLA)

Background: Among end-stage renal disease patients, intradialytic hypotension often stems from the inability to tolerate ultrafiltration following dialysis treatment and other cardiovascular related complications. However, there are limited data on the comparative effects of dialysis modalities with longer treatment time or higher frequency on blood pressure. Methods: This cohort study used data on 116,930 incident dialysis patients treated with any of the following modalities: conventional three-weekly in-center hemodialysis (NICHHD) or home hemodialysis (HHD). Using marginal structural models fitted with inverse probability weights to adjust for confounding from fixed and time-varying covariates, we sought to examine the effects of different treatment modalities on time-varying levels of these outcomes: pre-dialysis systolic blood pressure (PreSBP), ultrafiltration rate (UFR) and frequency of intradialytic hypotension (defined as <90 SBP). We used a generalized linear model framework, specifying appropriate distributions and links for each outcome in pooled analysis. We also analyzed the data using conventional covariate-adjusted outcome regression model. Results: Compared to conventional HD patients, NICHHD patients had lower mean PreSBP (30 mm Hg [95% CI 0.1, 5.9] higher), whereas HHD patients had lower mean PreSBP (9.4 mm Hg [95% CI 7.4, 11.3] lower). Both NICHHD and HHD patients had lower mean UFR compared to HD patients (1.78 mL/min/kg [95% CI 1.36, 2.20]) and 2.38 mL/min/kg [95% CI 2.03, 2.73]) to HD. Compared to HD, the relative risks for the effects of NICHHD and HHD on the frequency of intradialytic hypotension were 1.46 [95% CI 0.84, 2.56] and 1.05 [95% CI 0.80, 1.37] respectively. Conclusions: Treatment with dialysis modalities with longer treatment time (NICHHD) or higher frequency (HHD) compared to treatment with HD led to different patterns of pre-dialysis SBP and ultrafiltration rate, but not hypotension frequency.

PERIODONTAL DISEASE, EDENTULISM, AND HYPERTENSION RISK AMONG POSTMENOPAUSAL WOMEN IN THE WOMEN'S HEALTH INITIATIVE OBSERVATIONAL STUDY Joshua H Gordon* Joshua H Gordon, Michael J LaMonte, Robert Gento, Thomas R Cimato, Kathleen M Huyse, Matthew A Allison, Charles P Monton, Jeannine Wachowski-Wendle (University of Buffalo)

An association between periodontal disease and hypertension has been reported in many cross-sectional studies, but prospective evidence supporting this observation is lacking. We evaluated the prospective association of self-reported history of periodontal disease diagnosis and edentulism with hypertension incidence among 35,712 postmenopausal women enrolled in the Women’s Health Initiative Observational Study. Participants were followed annually from initial periodontal assessment (1998-2003) through 2015 for newly reported treated hypertension. Cox proportional hazards regression was used to calculate crude and multivariable adjusted hazard ratios (HR) and 95% confidence intervals (CI) for these associations. Edentulism was significantly associated with incident hypertension in crude (HR: 1.39, 95% CI: 1.28-1.50) and adjusted (HR: 1.20, 95% CI: 1.11-1.29) models. The multivariable association was stronger among younger women (<60 compared to ≥60 years old, interaction P=0.004) and those with systolic blood pressure ≥120 compared to <120 mmHg (interaction P=0.004). No association was observed between history of periodontal disease diagnosis and hypertension. Edentulous postmenopausal women may represent a group at risk of developing future hypertension and may benefit from additional preventative measures or closer blood pressure monitoring. Further studies of edentulism are needed to support these findings and further elucidate the mechanism for the role of edentulism and other periodontal conditions on hypertension risk.


Background: Kidney fibrosis is a final common pathway of CKD progression. However, it is unknown whether the change in plasma galectin-3 levels, a key marker of inflammation and fibrosis, is independently associated with kidney function decline among adults with CKD. Methods: We conducted a case-cohort study including a random subcohort of 1300 individuals from the baseline visit of the CRIC study, an ongoing, multicenter, prospective cohort of men and women with CKD. Participants were followed for the composite outcome of a 50% reduction in estimated glomerular filtration rate (eGFR) or onset of end-stage renal disease (ESRD). Change in galectin-3 (from baseline to Year 2) were calculated among the random subcohort and all non-subcohort cases. Weighted logistic regression model estimated the relationship between two-year changes in galectin-3 and CKD progression after Year 2. Results: After excluding prevalent ESRD cases and those with missing data, 1180 individuals were included. Two-year change in galectin-3 (mean 4.0 ng/mL, SD 8.1) was significantly associated with female gender, greater BMI, higher systolic blood pressure, lower baseline eGFR, and baseline galectin-3 levels lower than 20 ng/mL. Analysis of the association between change in galectin-3 and subsequent loss of kidney function showed that each 5 unit increase in galectin-3 was associated with a 1.54% greater odds (OR: 1.04, 95% CI 1.01, 1.07) of CKD progression, independent of baseline biomarkers of eGFR, urine protein-to-creatinine ratio, NGAL, Na, K, serum phosphate, FGF-23, high sensitivity-CRP, IL-1ra, IL-1b, TNP, high sensitivity troponin T, and NT-proBNP. Similarly, the highest compared to the lowest, quartile of galectin-3 change was observed to have over a two-fold higher odds (OR=2.2, 95% CI 1.29, 3.75) of CKD progression. Conclusions: Change in plasma galectin-3 levels hold promise to become a novel marker of higher risk for CKD progression among diverse populations of adults with CKD.

REPEATED HEART FAILURE HOSPITALIZATIONS IN ADULTS WITH CONGENITAL HEART DISEASE: HOW DOES IT AFFECT MORTALITY AND WHAT PREDICTS IT? Fei Wang* Fei Wang, Alia Liu, Michal Abramowicz, James M Brophy, Liming Gu, Gilles Patsalis, Arielle Mateselli (McGill University)

Background: Heart failure (HF) is associated with multiple hospital admissions in adults with congenital heart disease (CHD). Nevertheless, there is a lack of comprehensive data on the impact of repeated heart failure hospitalizations (HFH) on mortality and predictors for readmission in patients with adult congenital heart disease. Methods: We used a population-based cohort from the Quebec CHD database from 1998 to 2010. A complex extension of Cox regression was adopted to estimate how the current risk of mortality depended on the frequency and timing of past HFHs, while adjusting for potential confounders. A duplication method Cox regression was constructed to identify predictors of readmission considering competing risk of death. Results: The risk of death increased with each additional HFH, with an estimated 44% cumulative incremental risk (HR=1.44, 95% CI 1.29-1.61). Compared with patients with only one HFH, HRs are 2.38 (95% CI 1.31-3.76) for two, 6.03 (95% CI: 3.33-10.93) for three and seven 4.87 (95% CI: 4.13-13.53) for four and more HFHs, respectively. Only readmission occurring within the past 12 months will significantly increase the current risk of death. Significant predictors of mortality included male sex (HR=3.0, 95% CI: 1.11-1.52), chronic kidney disease (HR=1.86, 95% CI: 1.51-2.28), pulmonary hypertension (HR=1.60, 95% CI: 1.36-1.88), coronary artery disease (HR=1.23, 95% CI: 1.04-1.42), atrial arrhythmia (HR=1.21, 95% CI: 1.04-1.42) and previous HF in the past 12 months (HR=1.71, 95% CI: 1.45-2.02). Conclusions: Repeated HFH is a strong predictor of mortality in CHD patients with more recent HFH conferring a higher risk of mortality. This will further aid physicians in targeting high-risk patients for accelerated referral to specialized CHD centers. Identification of predictors for readmission will play a significant role in developing CHD-specific HF management to improve the prognosis of CHD-HFH patients.
NEW BLOOD PRESSURE CLASSIFICATION AND RISK OF PERIPHERAL ARTERY DISEASE IN THE ATHEROSCLEROSIS RISK IN COMMUNITIES (ARIC) STUDY Yifei Lu, Yifei Lu, Shoshun Biliew, Hirofumi Tanaka, Moyes Sokol, Gerardo Heiss, Josef Coresh, Kunihiro Matsushita, (John Hopkins University)

Background: The AHA/ACC 2017 Hypertension Guideline redefined hypertension as blood pressure (BP) ≥130/80 mmHg, but data are sparse regarding this new definition and the risk of peripheral artery disease (PAD). We aim to assess the contribution of BP in developing PAD and its severe form of critical limb ischemia (CLI) in the context of the new guideline. Methods: The study was conducted among 13,666 ARIC participants aged 54-65 years at baseline (1987-1989). Cox proportional hazards models were used to quantify the multivariable-adjusted associations of systolic BP (≥120, 120-129, 130-139, and ≥140) and diastolic BP (≥70, 70-79, 80-89, and ≥90) with incident PAD. PAD was defined as hospitalization with its diagnosis or leg revascularization. Among PAD cases, those with tissue loss were considered as CLI. Results: During a median follow-up of 25.3 years, there were 535 incident PAD cases including 196 CLI cases. We found a marked dose-response relationship between systolic BP and both incident PAD and CLI. Compared to systolic BP <120, systolic BP 130-139, newly defined as hypertension, was associated with a hazard ratio of 1.53 (95% CI: 1.17-1.99) for PAD and 2.52 (1.67-3.79) for CLI. The contribution of this category to CLI was similar to that of systolic BP ≥140. In contrast, the elevated risks of PAD and CLI were only seen in those with diastolic BP ≥90 (adjusted HRs: 1.62 [1.18-2.22], and 1.82 [1.15-2.90], respectively). Large consistent patterns were seen in mosaic and clinical subgroups. Conclusions: Individuals with newly defined hypertension of systolic BP 130-139 are at increased risk of PAD, particularly its severe form CLI, and warrant attention to leg health.

SEX DIFFERENCES IN THE CROSS-SECTIONAL AND LONGITUDINAL ASSOCIATIONS OF ELECTROCARDIOGRAPHIC GLOBAL ELECTRICAL HETEROGENEITY WITH CARDIAC STRUCTURE AND FUNCTION IN THE ATHEROSCLEROSIS RISK IN COMMUNITIES (ARIC) STUDY Larina Terecheshenko, Larina Terecheshenko, Tor Biering, Sorensen, Wendy Post, Scott Selkowitz, Amir A. Shah, Eleyed Soliman, Alfred Baston, Jonathan Waks, Maamtrir Kabir, Jason Thomas, (Oregon Health and Science University)

Introduction: Sudden cardiac death (SCD) incidence is greater in men than women. ECG global electrical heterogeneity (GEH) is associated with SCD. The goal of this study was to describe sex differences in the associations between GEH and cardiac structure/function. Methods: Participants from the Atherosclerosis Risk in Communities study (N=5,114; 58% female; 22% blacks) with resting 12-lead ECGs (visits 1-5) and echocardiographic left ventricular (LV) structure and function at visit 5 were included. GEH was quantified by spatial ventricular gradient (SVG), QRS-T angle, and sum absolute QRS-T integral (SAQST) at each study. Examinations interaction with sex was tested in cross-sectional analyses using linear regression models predicting LV structure and function adjusted for cardiovascular disease (CVD) and its risk factors, and longitudinal analyses using linear generalised estimating equations adjusted for time-updated CVD, risk factors, and biomarkers. Longitudinal GEH changes were compared in men and women stratified by LV dysfunction. Results: Cross-sectional associations of measures of GEH with LV structure/function were stronger in men [LV ejection fraction (EF) -1.48 (-1.78 to -1.19) lower; p = 0.01; SD of QRS-T angle] vs. women [-0.88 (-1.12 to -0.64); p < 0.001]. There were no changes in GEH between sexes in men or women with LV dysfunction at exam 5. However, there was an interaction with sex (P = 0.001) for changes in QRS-T angle, SAQST, SVG magnitude and azimuth in those with normal echocardiograms. Women had increasing SAQST and SVG magnitudes, decreasing QRS-T angle, and posterior rotation of SVG. Men had less SVG changes [square-root transformed SVG azimuth decreased -0.07 (0.12 to -0.02)/median 3y] than women [-0.13 (0.17 to -0.09)/median 3y]. Conclusion: Aging women with normal echocardiograms have a distinct pattern of GEH changes. Further study of GEH is needed to understand the mechanisms of the "female advantage" in SCD risk.


Red meat intake has been found to predict higher risk of coronary heart disease (CHD). However, few studies have evaluated specific substitutions for red meat. We examined the associations of substituting protein-source and other plant foods for red meat with incident CHD among men in the Health Professionals Follow-up Study (HPFS) (1986-2012). Participants received a biennial questionnaire to assess lifestyle factors and disease diagnoses, and a semiquantitative food frequency questionnaire to assess dietary intake every four years. There were 45,239 men after baseline exclusions (chronic diseases, implausible energy intake; age ≥85 years). We used Cox proportional hazards models to evaluate associations between red meat intake and incident CHD. For substitution analysis, we included all substitution foods as continuous variables in the same model, and used the difference in the coefficients of two foods and their covariance to estimate the HR and 95% CI for red meat. After adjusting for age, sex, systolic blood pressure, body mass index, smoking status, odds ratio (95% CI) for thyroid cancer, comparing the lowest versus highest tertile, were estimated as follows: MeB 1.7 (1.2-2.3) and MHP 1.7 (1.0-2.3); and in addition, MeB 2.4 (1.4-4.2), MHP 1.8 (1.1-3.1), and MHP 2.0 (1.3-3.9) for ischemic heart disease and MeB 1.7 (1.0-2.9) and MHP 1.7 (1.0-2.9) for stroke were obtained. Conclusion: Higher fish intake may be associated with thyroid cancer, ischemic heart disease, and stroke in Korean population. Further studies are warranted to determine the association between fish intake and thyroid cancer and cerebrovascular disease. This research was supported by a grant (5S162MD/DF6635) from Ministry of Food and Drug Safety in 2015. Keywords: phthalate, thyroid cancer, ischemic heart disease, stroke.
ASSOCIATION BETWEEN MIDLIFE OBESITY AND KIDNEY FUNCTION TRAJECTORIES: THE ATHEROSCLEROSIS RISK IN COMMUNITIES STUDY Zhi Yu* Zhi Yu, Morgan Grams, Chiadi Ndumele, Lynne Wagenknecht, Eric Boerwinkle, Karl North, Josef Coresh, (Johns Hopkins Bloomberg School of Public Health)

Background Kidney function trajectories are used in the estimation of time to end-stage renal disease (ESRD) and have been associated with cardiovascular disease risk and all-cause mortality. Obesity has been related to increased risk of incident chronic kidney disease (CKD), ESRD, and mortality. However, the effect of midlife obesity on kidney function decline in late life, when the prevalence of kidney diseases is the highest and increasing most rapidly, is not known. Methods Using data from the Atherosclerosis Risk in Communities (ARIC) cohort (visit 1, 2, 4, 5, and 6), we examined the association between midlife overweight and obesity (body mass index (BMI) between 25-30 kg/m² and ≥30 kg/m² at visit 1, respectively) and estimated glomerular filtration rate (eGFR) change over 29 years of follow-up. We included ARIC participants who were diabetes-free and had BMI > 18.5 kg/m² and eGFR > 60 ml/min/1.73 m² at visit 1. We used mixed models with random intercept and random slope to estimate eGFR trajectory differences by BMI, adjusting for age, sex, race, current smoker, high-density lipoprotein cholesterol, systolic blood pressure, hypertension medication use, prevalent coronary heart disease and diabetes, as well as interaction terms of each variable with follow-up time. Results Among the 13,639 participants, those who were overweight or obese had slightly lower baseline eGFR (105 vs 106 ml/min per 1.73 m², p=0.03) and greater eGFR decline over the 29 years of follow-up. We included ARIC participants who were diabetes-free and had BMI > 18.5 kg/m² and eGFR > 60 ml/min/1.73 m² at visit 1. We used mixed models with random intercept and random slope to estimate eGFR trajectory differences by BMI, adjusting for age, sex, race, current smoker, high-density lipoprotein cholesterol, systolic blood pressure, hypertension medication use, prevalent coronary heart disease and diabetes, as well as interaction terms of each variable with follow-up time. Results Among the 13,639 participants, those who were overweight or obese had slightly lower baseline eGFR (105 vs 106 ml/min per 1.73 m², p=0.03) and greater eGFR decline over the 29 years of follow-up than those with BMI < 25 kg/m². After adjusting for risk factors, individuals who were overweight or obese had slightly greater mean annual decline in eGFR (overweight: -0.06 ml/min per 1.73 m²; p=0.03; obese: -0.08 ml/min per 1.73 m², p=0.0002) compared to individuals with BMI < 25 kg/m². Conclusion Midlife BMI is associated with subsequent eGFR decline. Association between obesity and kidney function warrant further exploration.

SURVIVAL ANALYSIS OF HOSPITALIZED OUT-OF-HOSPITAL CARDIAC ARREST PATIENTS: A NATIONWIDE POPULATION-BASED STUDY IN TAIWAN Fu-Huang Lin* Fu-Huang Lin, Daphne Ng Yih, Chung-Yu Lai, Yu-Ching Chou, Guen-Hsiung Wu, Chi-Hsiang Chung, We-Chien Chien, (School of Public Health, National Defense Medical Center, Taipei, Taiwan)

Out-of-Hospital Cardiac Arrest has always been a serious topic in national health issue. In Taiwan, OHCA patients have a survival rate of about 12-17% to discharge. The survival rate of patients has gradually improved with the well development of the medical system in recent years, however there are quite a few studies on this issue. The study analyzed out-of-hospital cardiac arrest patients with the code 427.41 ventricular fibrillation and 427.5 cardiac arrest according to the ICD-9-CM. The dependent variables include one-day survival rate, survival to discharge rate and in-hospital mortality rate. The independent variables included patient characteristics and event characteristics. The research used SPSS 21.0 to analyze data. There were 7986 patients in total who suffered from cardiac arrest before reaching the hospital in 2013 with 60.7% of male and 39.3% of female. There were 1199 ventricular fibrillation patients (250 patients (20.9% )who did not survive after the treatment) and 6787 people with cardiac arrest (2486 patients (36.6% )who did not survive after the treatment). The average age of the patients was 67.61 years (61% of elders over 65 years old, 2.3% of children and 6.3% of youth, respectively). OHCA occurs most in the winter (27.8%), following by spring which 25.4% of the patients. A total of 2218 patients hospitalized during winter and 784 were not survive. Winter has the highest proportion no matter in the rate of the occurrence of OHCA (27.8%), number of hospitalized patients (35.3%) and death (28.6%) compare with other seasons. Something quite surprising is that even though the older OHCA population was the most in hospitalized (61%), however, children have the highest mortality rate (45%) among all the age groups. To decrease the mortality rate of OHCA patients, it is recommended that the Taiwan emergency medical system in Taiwan should put in more effort and take precautions in the high risk population especially during the winter.

S/P indicates work done while a student/postdoc
DIET PREFERENCE TO HAVE MEAT INCREASED THE RISK OF INCIDENT TYPE 2 DIABETES MELLITUS- THE RURAL DEQING COHORT STUDY

Xuemin Ma, Jinyun Li, Xiaodan Wang, Huimin Li, Nana Li, Xiaomin Cao, Xuecai Wang, Jianfu Zhu, Na Wang, Qingwu Jiang, Chaowei Fu, (Fudan University)

Objective: To explore the associations between dietary behavior and type 2 diabetes mellitus (T2DM) among rural adults in Deqing County, Zhejiang Province, China. Methods: A dynamic prospective cohort study was conducted as the Rural Deqing Cohort Study since 2006. Totally, 28,253 diabetes-free subjects were recruited from rural communities during 2006-2014. Information on dietary behavior including diet preference (to have vegetable, meat or balanced diet) and average amount of vegetables and fruit consumption every week was self-reported with a questionnaire at baseline study. The incident T2DM was ascertained by Deqing electronic health records. Cox regression was applied to calculate the crude hazard ratio (HR), adjusted Hazard ratio (aHR) and their 95% confidence intervals (CI). Results: With an average follow-up of 4.2 ± 2.6 years, 309 incident T2DM were identified in November 2015, and the overall incident rate was 3.13 per 1000 person-years. The risk of incident T2DM of subjects preferring to have meat diet significantly raised (aHR=0.7, 95%CI: 0.5-0.9) statistically. After the adjustment for covariates, diet preference to have meat still increased risk of incident T2DM (aHR=2.5, 95%CI: 1.9-3.3) statistically but the latter did not. Conclusion: Diet preference to have meat had increased the incident risk of T2DM among rural Chinese adults, which should be targeted in the future prevention and health care of T2DM. Key words: dietary behavior; type 2 diabetes mellitus; prospective cohort study.

BISPHENOL A EXPOSURE AND DIABETES MELLITUS RISK: A META-ANALYSIS

San Ha Jee*, San Ha Jee, Kwon J Jung, (Yonsei University)

Background: Bisphenol A (BPA) is one of the endocrine disrupter chemicals (EDCs). Although many researches have been conducted, there is still no direct meta-analysis of BPA concentration measured in human samples and diabetes. Objective: In this study, we focused on the relationship between risk of type 2 diabetes and BPA concentration through meta-analysis. Methods: We searched the PubMed and Embase databases using relevant keywords between February, 1997 and September, 2016. A total of 7 papers were aggregated in 5 cross-sectional and 2 case-control studies and then the odds ratio (OR) and its 95% confidence interval (CI) were extracted. The OR and its 95% CI of diabetes associated with BPA were estimated using both fixed-effects model and random-effects model. Results: A total of 29,415 diabetes patients among 6,891 subjects were included using 6 studies of urine BPA level and 1 study of serum BPA level. BPA concentrations in human bio-specimen showed positive association with diabetes risk (OR 1.86, 95% CI 1.20, 2017). In sensitivity analysis, urine BPA concentration was positively associated with diabetes (OR 1.23, 95% CI 0.95, 1.59). Conclusion: This meta-analysis presented that BPA exposure was positively associated with diabetes risk in human. This research was supported by a grant (15162MFDS631) from Ministry of Food and Drug Safety in 2015. Keywords: Bisphenol A; Diabetes Mellitus; Endocrine disrupting chemicals (EDCs); Meta-analysis

THE 5-YEAR RISK OF SEVERE HYPOGLYCEMIA IN PATIENTS WITH TYPE 2 DIABETES

Rachel Zmora*, Rachel Zmora, Sisi Ma, Elizabeth R. Seaquist, Pamela J Schreiner, Lisa S Chou, (University of Minnesota)

Objective: To construct a predictive model to estimate the long-term (5-year) risk of severe hypoglycemia (SH), or hypoglycemia requiring assistance, in patients with type 2 diabetes (T2D). Methods: Data were from the Action to Control Cardiovascular Risk in Diabetes (ACCORD) glycaemic trial (n=10,251), a randomized, multicenter, double-blind factorial study which compared intensive vs. standard glycaemic control on cardiovascular outcomes in patients with diagnosed T2D. Over follow-up (mean±SD, 4.7±1.4 years), patients experienced T2D incident (SH) events. Stepwise Cox regression model and Akaike information criterion (AIC) were used to reduce the number of predictors until a set of statistically significant SH risk factors was identified. C-statistics were used to assess the discriminatory ability of models. Results: We identified 13 predictors for the model including insulin usage, age, race, education, use of insulin and anti-hypertensive medication, family history of CV disease, years since diabetes diagnosis, history of hypoglycemia in the last week, systolic and diastolic blood pressure, glomerular filtration rate, and hemoglobinA1c. This model had a c-statistic of 0.76. In the multivariable model, the 3 strongest predictors for SH over 5 years were patients with intensive glycaemic management (HR=2.59, 95% CI: 2.30-2.86), insulin use (HR=2.29, 95% CI: 1.93-2.72), and history of hypoglycemia in the last week (HR=1.76, 95% CI: 1.43-2.14). Conclusions: Using data readily available from the clinical setting, we identified a parsimonious set of variables that can help identify patients at high risk for SH over long-term follow up. Further estimation in more generalized populations is needed to replicate findings and apply to clinical management of T2D.

ASSOCIATIONS BETWEEN SERUM VITAMIN D CONCENTRATIONS AND DIABETES AMONG U.S. ADULTS

Kyoeun Kim*, Kyoeun Kim, Maria Argos, (Division of Epidemiology and Biostatistics, School of Public Health, University of Illinois at Chicago, Chicago, Illinois)

Lower concentrations of serum vitamin D (25(OH)D) have been reported to play a role in impaired glucose function, insulin resistance, and impaired glucose tolerance. Based on these underlying mechanisms, it has been suggested that lower serum levels of 25(OH)D are associated with increased risk of type 2 diabetes (T2D). We aimed to examine the associations between serum 25(OH)D and T2D among U.S. adults. A total of 29,041 adults were included in the analysis, from the National Health and Nutrition Examination Survey (NHANES) 2001-2012. T2D status was defined as doctor's diagnosis of diabetes, medication use, or HbA1C ≥6.5%. Levels of 25(OH)D were modeled as continuous as well as quadratic variables. To evaluate the effects of 25(OH)D on T2D, logistic regression models using PROC SURVEYLOGISTIC in SAS software were adopted. Participants’ age, gender, race/ethnicity, body mass index (BMI), smoking status and vitamin D supplements intake were included as covariates. We also performed a sensitivity analysis by sun exposure. Among the 29,041 participants, 2,081 men and 1,936 females had diabetes. After covariate adjustment, we observed a dose-response relationship between 25(OH)D and T2D status. Individuals in the lowest quartile of 25(OH)D had nearly twice the odds of T2D compared to participants in the highest quartile group (OR=1.97, 95% CI: 1.68-2.31). The 2nd and 3rd quartiles also showed increased risk of T2D compared to the highest quartile group (OR=1.63, 95% CI: 1.40-1.89, for Q2 vs. Q4; OR=1.18, 95% CI: 1.02-1.37, for Q3 vs. Q4, respectively). Sensitivity analyses suggested potential effect modification by sun exposure status, with individuals reporting sun exposure having higher ORs than individuals without sun exposure. Lower 25(OH)D level was associated with higher risk of T2D. Sun exposure may play a role as an effect modifier for the relationship between serum vitamin D and T2D.
HETEROGENEITY IN DIABETES PREVALENCE BY MODE OF PHYSICAL ACTIVITY AND RACE/EThNICITY AMONG U.S. ADULTS

Sandra E. Echeverria, Anna Divney, Chloe Mirzayi, Rosenda Murillo, Elizabeth Vasquez, (CUNY Graduate School of Public Health & Health Policy)

Substantial research shows that leisure-time physical activity (PA) is associated with reduced diabetes risk. We present novel results examining if this established association holds across mode of physical activity and race/ethnicity. Adults aged ≥20 years (n=16,903) sampled in NHANES 2011-16 were classified as engaging in none, some (1-149 min/week) or meeting national PA guidelines (≥150 min/week) for leisure-time, work, and transportation PA. Diabetes status was based on laboratory-confirmed HbA1C ≥ 6.5% or participant self-report. We fit log binomial models to estimate prevalence ratios (PR) for each mode of PA, controlling for age, gender, education, income and BMI. We tested for heterogeneity of main effects with cross-product terms between each mode of PA and race/ethnicity, plus nativity status for Latino participants. Across each mode of PA, participants who completed ≥150 minutes of PA were less likely to have diabetes compared to those with no PA (Leisure-time PA: PR=0.67, 95% Confidence Interval (CI)=0.58,0.77; work PA: PR=0.67, 95% CI=0.58,0.76; transportation PA: PR=0.64, 95% CI=0.55,0.76), after controlling for covariates. Non-Latino whites had the lowest prevalence of diabetes across all modes and levels of PA compared to other racial/ethnic groups (P for interaction <0.01). Diabetes prevalence was comparable for non-Latino Blacks and Latinos and tended to converge with that of non-Latino whites at the highest PA levels of leisure-time and transportation PA only. Moreover, foreign-born Latinos were more likely to engage in vigorous work PA than their U.S.-born counterparts and non-Latino whites. Meeting physical activity guidelines via any mode appears to confer protection from diabetes, with some heterogeneity observed by race/ethnicity and select modes and levels of PA. Findings suggest the need for public health policies and interventions to increase active living in all segments of the population to reduce diabetes risk.
THE INFLUENCE OF E-CIGARETTE USE ON INDOOR FINE AND ULTRAFINE PARTICLE CONCENTRATIONS Karena Volesky* Karena Volesky, Anthony Mikes, Christopher Secher, Louis Watson, Keith Van Ryswyk, Bruce Fraser, Scott Weichenthal, Paul J. Villeneuve,(Department of Epidemiology, Biostatistics and Occupational Health McGill University)

Background: Indoor electronic cigarette (e-cigarette) use exposes bystanders to a new source of particulate matter pollution. This is a public health concern because short-term exposure to elevated concentrations of fine particulate matter (PM2.5; aerodynamic diameter ≤ 2.5 µm), and ultrafine particles (UPPs; aerodynamic diameter ≤ 0.1 µm) are associated with increased risks of adverse respiratory and cardiovascular events. Objective: To estimate indoor bystander concentrations of PM2.5 and UPPs at distances of 0.5 and 1 meter from an e-cigarette user, and to investigate if these concentrations vary across e-cigarette models containing the same nicotine solution in near-to-real conditions. Methods: Particulate matter was measured for 22 minutes in 3 periods: 5.5 minutes pre-exposure, 6.5 minutes exposure (7 puffs), and 10 minutes post-exposure. We calculated cumulative exposures to PM2.5 and UPPs using the sum of the 2 highest concentrations divided by the length of the period. The experiment was replicated 3 times. We tested for differences between e-cigarettes using analysis of variance. Results: During the exposure period, the mean cumulative PM2.5 concentrations per minute across replicates for each e-cigarette model, at 0.5 meters, were 22 (adjustable voltage), 43 (1st generation), and 67 (tank style) thousand µg/m3, at 1 meter they were: 14, 10, and 72 thousand µg/m3 respectively. The mean cumulative exposure per minute in counts of UFPs at 0.5 meters were 483 (adjustable voltage), 666 (1st generation), and 872 (tank style) thousand particles/cm3. The corresponding UFP particle counts at 1 meter were 582, 622, and 1,585 thousand particles/cm3. Concentrations were highly variable between e-cigarettes using analysis of variance. Conclusion: E-cigarette use in indoor settings lead to short-term elevations of PM2.5 and UPPs concentrations at close proximity distances.

LONGITUDINAL BIOMONITORING OF POLYBROMINATED DIPHENYL ETHERS (PBDEs) IN A HOA OF GREAT LAKES BASIN RESIDENTS Michelle Raymmond Mitchell Raymmond, Brooke Thompson, (University of Wisconsin, Madison/Wisconsin Department of Health Services)

Polybrominated diphenyl ethers (PBDEs) are a class of chemical additives used widely in flame retardant applications starting in the 1970s until the 2000s/10. This analysis describes longitudinal trends in serum PBDE levels from 1994 through 2015 using data from the Great Lakes Fish Consumption Study cohort. PBDEs (BDE 28, 47, 85, 99, 100, and 153) were measured in serum in a subsample of participants in 1994, 2001, 2004, and 2014. Linear mixed effect regression models were used to evaluate effects of time and covariates (age, sex, BMI, and consumption of sport-caught fish) on log PBDE exposure (ng/g), as well as potential contributions of BDE-47 and 153 to total PBDEs. Estimates of geometric least square means were derived from model results using Tukey-Kramer adjustments to account for multiple comparisons. Serum levels of total PBDEs and several congeners increased between 1994 and 2001 (PBDE geometric mean 95%CI: [0.19, 0.06-0.22] to 0.26 [0.23, 0.30]), followed by a plateau between 2001 and 2004, and decreased between 2001 and 2014 (0.25 [0.22, 1.29] to 0.15 [0.12, 0.81]). Overall, PBDEs decreased by 47% (median) among 64 individuals with measurements in both 2004 and 2014. Across time, PBDEs increased with age and BMI, with the exception of BDE-153 for which BMI was not a significant predictor. Sex and consumption of sport-caught fish were not significant predictors of PBDEs in adjusted models. While percent BDE-47 did not change across time, percent BDE-453 was significantly higher in 2014-2015 compared to previous time periods (2014 vs. 1994, 2001, and 2004). These findings support initial observations of declining PBDEs and shifting congener profiles in the U.S. and Europe following production bans. Biomonitoring should be continued in the coming years as more consumer products containing PBDEs are recycled and disposed of at the end of their lifespan.

ELEMENTAL EXPOSURE TO COPPER AND ATTENTION DEFICIT HYPERACTIVITY DISORDERS (ADHD) AMONG CHILDREN IN PROXIMITY TO COAL ASH STORAGE SITES Chisolm Odoh* Chisolm Odoh, Lonnne Scau, Barbara Polivka, Gary Brook, Kristina Zer-Old, (University of Louisville)

Background: Elements like copper are essential for daily functioning of children, however, long-term exposure may result in deleterious effects. Copper is one of the elements found in coal ash waste produced from burning coal, which is prevalent in 5% of children in the U.S. is marked by behaviors such as hyperactivity, impulsivity, and inattention. Few studies have linked copper with neurobehavioral disorders. The purpose of this study is to evaluate the association between copper exposure and ADHD among children residing close to coal-ash storage sites. Methods: Research is being conducted among children ages 6-14 living within a 10-mile radius of two coal-ash storage sites in Kentucky. Copper exposure was estimated using filters from air samplers placed inside the homes of children. Concentrations of copper were determined by Proton Induced X-Ray Emission (PIXE) analysis. Scores from the Child Behavior Checklist were analyzed to measure ADHD. Logistic regression and the Wilcoxon test were used to assess the relationship between ADHD and copper exposure. Results: Among our child population, 28% had ADHD. Copper was found in 49% of participants’ homes. After adjusting for sex, age, ethnicity, and smoking, an odds ratio (OR) of 1.75 (99% CI: [0.68-4.5]) was determined. In addition, ADHD scores for children exposed to copper were higher compared to children not exposed to copper. Conclusion: This is the first study to assess ADHD and copper exposure in children residing near coal ash storage sites. While not significant, the OR was elevated, and the Wilcoxon results were higher in exposed children, indicating a possible relationship between copper exposure and ADHD. Copper is ubiquitous in the environment and it is important to understand exposures linked to behaviors so appropriate intervention and policies can be identified.

INJECTION-INDUCED EARTHQUAKES IN OKLAHOMA ASSOCIATED WITH MOTOR VEHICLE CRASHES Joan A. Casey* Joan A. Casey, Holly C. Stewart, Ralph Catalano, (UC Berkeley)

Anxiety-inducing life events increase the risk of motor vehicle crashes. We test the hypothesis that earthquakes, known to increase anxiety in the population, also increase the incidence of crashes. Our study took place in Oklahoma where wastewater injection has resulted in a dramatic increase in earthquakes between 2010-2016. We identified dates of earthquakes ≥ magnitude 4 (a level felt by most people) with data from the U.S. Geologic Survey. The Oklahoma Highway Safety Office provided monthly number and timing of vehicle crashes. In a time-series analysis, we evaluated monthly counts of earthquakes ≥ magnitude 4 in relation to daytime and nighttime vehicle crashes. We observed 67 earthquakes ≥ magnitude 4 per month and a mean of 418.8 daytime (6000.5, 5595.9) crashes per month. Granger-Wiener tests found a positive association between earthquakes ≥ magnitude 4 in a month and vehicle crashes the following month. The relationship appeared due to daytime crashes, which increased by 50 (SE= 19.2) for each earthquake ≥ magnitude 4. Autocorrelation alone explained 45% of the variation in daytime crashes, the addition of earthquakes in the prior month increased the variance explained to 53%. Findings persisted with alternative specifications of the earthquake variable. When changing the earthquake variable to a binary indicator scored 1 for months with 3 or more quakes of magnitude 4 or 0 otherwise, we observed an additional 159 daytime crashes in the following month. Consistent with our hypothesis, there was no association between earthquakes of magnitude ≤ 2.5 and crashes. We provide evidence of a novel association between induced earthquakes in Oklahoma and motor vehicle crashes that warrants further research given the high economic and social costs—a $2 billion nationwide in 2010 of such vehicle crashes.
THE UTILITY OF CAUSAL INFERENCE METHODS ON ESTIMATING THE EFFECT OF TRAFFIC POLLUTANTS ON EMERGENCY DEPARTMENT VISITS IN A COHORT OF CHILDREN WITH ASTHMA
Ryan Guin* Ryan Guin, Sheryl Magunam* (Colorado State University)

Introduction: Traffic-emitted Nitrogen dioxide (NO2) triggers adverse events in children with asthma. We modeled the effect of NO2 on emergency department (ED) visits in school aged children two ways: NO2 as a continuous predictor in a logistic regression, and NO2 as a binary predictor in a causal inference model. Methods: Our study population were school-aged children diagnosed with asthma, living in Oakland, California (n=706). Concentration of NO2 (µg/m3) exposure was assessed via land use regression conducted at the same time as school-based surveys. We assessed outcome status (ED visits) The conditional association between continuous NO2 and ED visit was assessed using logistic regression, adjusting for confounders. The marginal association between ED visit and binary cutoff of NO2 ≥ 19 µg/m3 was assessed using targeted maximum likelihood estimation (TMLE); potential confounders were accounted for through an ensemble of prediction algorithms. Results: Our logistic regression model showed a 1 µg/m3 increase in NO2 was associated with increased odds of an ED visit (OR: 1.05, 95%CI: 0.94-1.17). Our TMLE model showed exposure to NO2 ≥ 19 µg/m3 was associated with an increased risk of an ED visit (RR: 2.34, 95%CI: 2.00-2.79). Conclusions: We implemented a standard and causal inference framework to assess the relationship between NO2 and ED visits and found strengths and limitations to both approaches. The standard modeling approach allowed us to evaluate the concentration-response relationship between the exposure and outcome, but these results are harder to translate into actionable public health interventions. In contrast, results from our TMLE formalize our counterfactual question on the population effect if we reduced NO2 below 19 µg/m3. However, this association cannot be interpreted causally due to violations in assumptions of positivity and conditional exchangeability; common situations in environmental epidemiology.

ASSOCIATIONS OF SERUM PERFLUOROALKYL SUBSTANCE AND VITAMIN D BIOMARKER CONCENTRATIONS IN THE NATIONAL HEALTH AND NUTRITION EXAMINATION SURVEY (NHANES), 2003-2010
Taylor M. Enzel* Taylor M. Enzel, Joseph M. Baum, Jessie P. Buckley, (Johns Hopkins University Bloomberg School of Public Health)

Perfluoroalkyl substances (PFAS) are persistent endocrine disrupting chemicals found in industrial and commercial products. Previous research has shown that other endocrine disrupting chemicals such as phthalates and bisphenol A may alter circulating level of vitamin D; however, no research has examined associations between PFAS and vitamin D biomarkers. We conducted a cross-sectional analysis of 78,540 individuals aged 12 years and older participating in the 2003-2010 cycles of the United States National Health and Nutrition Examination Survey (NHANES). Concentrations of four PFAS and total 25-hydroxyvitamin D (25(OH)D) were measured in serum samples. We used multivariable linear regression to estimate covariate adjusted differences in total 25(OH)D per log 10-unit increase in PFAS concentrations. We assessed potential effect modification by gender, age, and race/ethnicity in stratified models. PFAS were detected in over 98% of the samples. After adjusting for confounders, a 10-fold increase in perfluorohexane sulfonic acid was associated with a 2.6 nmol/L increase (95% CI: 1.0, 4.2) in total 25(OH)D. Age, gender, and race/ethnicity did not modify this association. A 10-fold increase in perfluorooctanoic acid was associated with a 2.8 nmol/L decrease (95% CI: 1.6, 4.9) in total 25(OH)D, with associations significantly stronger among whites (p<5.3; 95% CI: -8.4, 2.3) and individuals older than 6 years of age (p<5.8; 95% CI: -9.7, -1.8). Other PFAS were not associated with total 25(OH)D. Our results suggest that some perfluoroalkyl substances may be associated with altered vitamin D levels in the United States population, and associations may vary by chemistry, age, and race/ethnicity.

RESIDENTIAL PROXIMITY TO ANIMAL FEEDING OPERATIONS AND CANCER RISK IN THE AGRICULTURAL HEALTH STUDY
Jared A. Fischer*, Jared A. Fischer, Laura E. Beane Freeman, Jonathan N. Hoffman, Aiona Blair, Christine Parks, Peter S. Thorne, Mary H. Ward, R. Jones, (Division of Cancer Epidemiology and Genetics, National Cancer Institute, Bethesda, MD, USA)

Background: Concentrated animal feeding operations (CAFOs), where animals and their wastes are housed over a small land area, are major sources of hazardous emissions into the surrounding environment. There is limited research on health outcomes among populations living near intensive animal agriculture, and no studies have assessed relationships with cancer. Methods: We evaluated the association between residential proximity to CAFOs and cancer risk in the Agricultural Health Study, a rural cohort of licensed pesticide applicators (mostly farmers) and their spouses. We identified among pesticide applicators and their spouses, respectively. We observed associations for CAFOs and cancer. Results: A total of 4,741 and 2,320 incident cancers (1993-2015) were identified among pesticide applicators and their spouses, respectively. We observed strong association with lymphoma and leukemia in pesticide applicators, with no significant associations for other tumor sites. Conclusions: In this first study of cancer risk among pesticide applicators and their spouses, we observed strong association with cancer in pesticide applicators and no significant associations for other tumor sites. This study provides evidence for the importance of considering pesticide exposure in cancer research.

REGIONAL AIR POLLUTION AND RISK OF ASTHMA INCIDENCE IN THE SOUTHERN CALIFORNIA CHILDREN'S HEALTH STUDY
Erika Garcia* Erika Garcia, Kirov T. Berhane, Tahila Islam, Rob McConnell, Robert Urman, Zhanghua Chen, Frank D. Gilliland, (Department of Preventive Medicine, University of Southern California, Los Angeles, California)

Although air pollution is linked with adverse pulmonary effects in children, including airway inflammation, decreased lung function, and asthma exacerbations, it remains unclear whether pollution causes asthma. Taking advantage of a natural experiment, we examined whether decreasing regional air pollution was associated with changes in asthma risk incidence rate in nine communities during a 20-year period across three cohorts in the Southern California Children's Health Study, a longitudinal cohort of 1,000 children (ages 5-17) enrolled in Los Angeles, Orange, and Riverside counties, California, from 1993 to 2006. Models included a fixed effect for town and a random effect for cohort nested within town, and adjustment for age at baseline, sex, ethnicity, race, gas stove or gas water heater use, and ambient temperature. The three cohorts included 4,410 white (53% female, 8.9% Hispanic, 9% White, 41% Hispanic) with no history of asthma at baseline. The RR for asthma, scaled to 1% Hispanic, with no history of asthma at baseline, was 0.70 (95% CI: 0.61-0.86) for a 10% decrease in asthma incidence rate. This study provides evidence for the importance of considering air pollution in asthma research.
MATERNAL PRENATAL WELL WATER ARSENIC EXPOSURE AND ENDOCRINE-RELATED PHENOTYPES IN BANGLADESHI CHILDREN AGED 5-7 YEARS: PRELIMINARY RESULTS Ye-Hsuan Shih* Ye-Hsuan Shih, Mohammad Hasan Shafquat, Tanvirul Islam, Abidin Ahmed, Golam Amit, Victoria Penney, Habibul Alam, Maria Argos, (Division of Epidemiology and Biostatistics, School of Public Health, University of Illinois at Chicago)

Background: Chronic exposure to arsenic is widespread, with elevated concentrations of arsenic in groundwater posing a threat to millions of people worldwide. Arsenic has been associated with several carcinogenic consequences and chronic diseases. In animal studies, arsenic toxicity has resulted in endocrine alterations. However, the association between arsenic exposure and endocrine-related phenotypes in early childhood is not well studied. Objectives: We evaluated the association between maternal arsenic exposure and endocrine-related phenotypes at baseline in 228 children aged 5-7 years using data from a subset of the Bangladesh Environmental Research in Children’s Health cohort. Methods: Maternal arsenic exposure was assigned based on the arsenic concentrations of the primary well used for drinking water during pregnancy and modeled as a continuous variable as well as quartiles. For endocrine-related phenotypes, including measurements of linear growth, body mass index, blood pressure, and fasting plasma glucose, z-scores were calculated and modeled as continuous variables. Crude and adjusted linear regression models were used to estimate beta coefficients and their 95% CIs for the associations between maternal arsenic exposure and z-scores of endocrine-related phenotypes. Results: Results suggest borderline associations between maternal arsenic exposure and z-scores of waist circumference. An interquartile (48.58 µg/L) increase in arsenic exposure was associated with a 0.08 (95% CI: -0.18, 0.00) increase in z-score of waist circumference, p for trend = 0.14. Conclusions: Preliminary results suggest a possible association between maternal arsenic exposure and endocrine-related phenotypes in children. Additional analyses will evaluate associations with cumulative lifetime arsenic exposure in relation to endocrine-related phenotypes in children as well as effects of metal exposure mixtures.


Background: Long-term exposure to air pollution has been associated with inflammation and cardiovascular disease. Although underlying molecular mechanisms remain to be elucidated, effects may be partially mediated through changes in methylation. Objective: We examined associations between long-term air pollution and candidate-gene-specific and global methylation in two random sub-cohorts selected from the Sister Study, a nationwide prospective cohort study of US women. Methods: In one sub-cohort we measured global DNA methylation (long interspersed nucleotide element, LINE1) by pyrosequencing; in the other we measured methylation at 3 selected CpG loci related to inflammatory pathways (genes TNF-α and TLR2) using the Illumina HumanMethylation450 BeadChip. Five-year average ambient fine particulate matter (PM2.5) and nitrogen dioxide (NO2) concentrations were estimated for the current residence. We used quantile regression models adjusting for age, body mass index, and cell type proportions. Analysis was restricted to nonsmokers who had lived at their enrollment address for at least 5 years. Results: Among 332 women from random sub-cohort 1 and 262 from sub-cohort 2, we observed that higher ambient air pollution was weakly associated with reductions in LINE1 methylation at the median, i.e., a spreading of the methylation distribution. For example, a 5 µg/m³ increase in 5-year PM2.5 concentration was associated with a 0.08 fold (95% CI: 0.07, 1.00) decrease in the 25th percentile of LINE1 methylation. A 5 ppb increase in NO2 was associated with both a 0.05 fold (95% CI: 0.07, 1.00) decrease in the 5th percentile of methylation at the TNF-α locus and a 1.07 fold (95% CI: 1.03, 1.11) increase in the 95th percentile. Conclusions: In our study there was evidence that residence in regions with higher ambient air pollution was associated with increased inter-individual variability in methylation patterns.

THE ROLE OF AGE ON RESPIRATORY HEALTH OUTCOMES AMONG ELEMENTARY SCHOOL CHILDREN LIVING IN POOR AIR QUALITY AREAS Annette Costa* Annette Costa, Christopher Yee, Rhonda Spencer-Hwang, (Loma Linda University)

Background: San Bernardino Railyard (SBR) is a major commerce hub and significant source of air pollution, mounting evidence suggests that air pollution promotes adverse health effects in children including low birthweight and premature births. Increased exposure may also mean higher risk of adverse respiratory health outcomes during rapid-growth periods. Loma Linda University’s Project ENRRICH investigates potential age-related vulnerability with increased proximity to SBR. Methods: Data was collected from children at two elementary schools: an experimental school adjacent to SBR (ES) and a socio-demographically matched comparison school 7-miles away (CS). The children underwent a respiratory screening that included non-invasive airway inflammation (FeNO) and lung-function (peak expiratory flow) testing, plus a questionnaire. Chi-square and logistic regression were used to assess associations between age (5-9 years vs. 9-12 years) and health-outcomes between schools. Results: Over 90% of children (N=865, 5-9 years: 653, 9-12 years: 212) in both schools participated. Overall, older children of nine years and older were at greater odds of experiencing low lung-function (OR: 1.43, 95% CI: 0.96-2.14) and increased airway inflammation (OR: 1.57, 95% CI: 1.00-2.46) When comparing children across schools by agegroup (younger vs. older), the children in either age-group at ES had significantly worse outcomes than their CS counterparts (OR: 1.95, 95% CI: 1.03-3.69 and OR: 1.27, 95% CI: 0.74-2.19, respectively). Conclusion: Although increased proximity to SBR was associated with increased respiratory challenges among all elementary school children, older children in this group experienced the greatest levels of airway inflammation and declining lung-function. Further research is warranted for understanding air-pollution impact on the respiratory health of children and potential age-related differences.

S/P indicates work done while a student/postdoc

Introduction. Accumulating epidemiological evidence points to a genetic susceptibility to placental abruption (PA). However, our understanding of the genetic mechanisms is incomplete. We conducted a genome-wide association study (GWAS) of PA and a meta-analysis of GWAS Methods: Participants of the Placental Abruption Genetic Epidemiology (PAGE) study, a population-based case-control study of PA performed in Lima, Peru, were genotyped using the Illumina HumanCore-24 BeadChip platform. Genotypes were imputed using the 1000 Genomes reference panel, and >4.9 million SNPs that passed quality control were included in the analysis. We performed a GWAS in PAGE participants (507 PA cases and 1,090 controls) and a GWAS meta-analysis in 2,512 participants (959 PA cases and 1,553 controls) that included PAGE and the previously reported Peruvian Abruption Placenta Epidemiology (PAPE) study. We fitted population stratification adjusted logistic regression models and fixed-effects meta-analyses using inverse-variance weighting. Results: Independent loci (linkage-disequilibrium < 0.80) suggestively associated with PA (P-values ≤ 5x10^-8) included rs5143646 and rs2074311 in ACC2, rs7249130, rs7250184, rs7249190 and rs1044082 in ZFPI, rs1133659 in CTNNBD2, and rs2074314 and rs3521718 near KCNJ11 in the PAGE study. Similarly, independent loci suggestively associated with PA in the GWAS meta-analysis included rs76258366 near FRX1, and rs90479544 and rs12264492 in ADAM12. Functional analyses of these genes showed trophoblast-like cell interaction, as well as networks involved in endocrine system disorders, cardiovascular diseases, and cellular function. Conclusions: We identified several genetic loci and related functions that may play a role in PA risk. Understanding genetic factors underlying pathophysiological mechanisms of PA may facilitate prevention and early diagnostic efforts.

MULTIPLE SCLEROSIS (MS) IS AN AUTOIMMUNE DISEASE OF UNKNOWN ETIOLOGY. PREVIOUS RESEARCH HAS DEMONSTRATED A LARGE NEGATIVE CORRELATION BETWEEN MATERNAL OBESITY AND THE RISK OF MS. WE HYPOTHESIZED THAT EPIDEMIOLOGICALLY MEASURED MATERNAL OBESITY WOULD BE ASSOCIATED WITH A RECURRENTLY REPORTED REGIONAL DNA METHYLATION MARKER IN CD4+ T CELLS, THE SCG5 GENE.

METHODS: WE PERFORMED A CASE-CONTROL ANALYSIS IN 94 WOMEN WITH RELAPSING-REMITTING MULTIPLE SCLEROSIS (RRMS) AND 94 AGE-MATCHED HEALTHY WOMEN. DNA METHYLATION (DNAm) AT THE SCG5 (SECRETOGRAIN V) PROMOTER WAS ASSESSED IN CD4+ T CELLS USING BISULFITE SEQUENCING. WE FITTED POPULATION STRATIFICATION-ADJUSTED LOGISTIC REGRESSION MODELS TO ESTIMATE LATENT VARIABLES THAT MIGHT CONFUSE RESULTS. GENE X ENVIRONMENT (G-E) INTERACTIONS WERE ALSO CONSIDERED TO ASSESS THE EFFECT OF GENETIC POLYMORPHISMS ON THE ASSOCIATION BETWEEN MATERNAL OBESEITY AND CD4+ T-CELL DNAM AT THE SCG5 GENE.

RESULTS: A SIGNIFICANT ASSOCIATION BETWEEN MATERNAL OBESEITY AND CD4+ T-CELL DNAM AT SCG5 WAS OBSERVED (P = 0.009, ODDS RATIO = 2.8, 95% CONFIDENCE INTERVAL = 1.1-7.0). SIMILARLY, AN INCREASING NUMBER OF HOME VISITS TO THE CHILD'S HOME DURING THE FIRST YEAR OF LIFE WAS ASSOCIATED WITH HIGHER CD4+ T-CELL DNAM AT SCG5 (P = 0.028, ODDS RATIO = 10.0, 95% CONFIDENCE INTERVAL = 1.9-54.1). AMONG MOBILITY-SENSITIVE GENES, HS3ST1 (HUMAN SULFATION 3, STEROID 5-17B) AND GLG3 (GLYCOSYLTRANSFERASE 3) WERE MODIFIED SIMILARLY BY MATERNAL OBESITY AND HOME VISITS.

CONCLUSIONS: THESE RESULTS SUPPORT THE HYPOTHESIS THAT MATERNAL OBESITY AND CHILDREN'S HOME ENVIRONMENT MAY INFLUENCE THE DNA METHYLATION PROFILE IN CD4+ T CELLS, WHICH IN turn MIGHT MODULATE THE RISK OF MS.
THE EFFECTS OF BODY COMPOSITION ON ASTHMA CONTROL AND QUALITY OF LIFE IN ADULT ASTHMA: A STRUCTURAL EQUATION MODELING STUDY Liang Jh® Yu-Ting Tse, Liang Jh, Wang Tn, (Department of Public Health, College of Health Science, Kaohsiung Medical University)

Background Previous studies have linked asthma and obesity, suggesting that higher BMI presents poor asthma control and life quality. The increased markers of inflammation in adipose tissue and serum are associated with obesity. In this study, we examined body composition and serum biomarkers to explore relationships between obesity, Asthma Control Test (ACT) scores, quality of life (QoL) and severity of asthma in adult asthma patients. Methods This was a patient cohort study that included 253 asthmatic patients from a medical center in southern Taiwan. We used ACT scores to determine the level of asthma control, and collected Taiwanese version asthma quality-of-life (TAQOL) questionnaires, and the severity of asthma was determined by patient medication history. We used structural equation modeling (SEM) to test the association between each body composition indicator and ACT, T AFLQ and severity of asthma. Result In our study, 253 patients were available after four years of follow-up (87.8%). We used SEM to construct the predicted model to examine the relationship between risk factors and outcome variables, and estimate standardized coefficients (β) for each pathway. The final predicted model of asthma patients' ACT, AQOL, severe asthma in SEM had a great model fit (Chi-square=26224.8, p-value<0.001, CFI=0.945, TLI=0.932, GFI=0.897, RMSEA=0.074). The WHR, torso body fat%, leptin, CRP, body fat% and BMI had significant direct and/or indirect association with asthma control, quality of life and severity of asthma in adult asthma patients. Conclusion In this study, we demonstrated that higher body fat (%) and BMI may reveal an under asthma control, poor quality of life and more severity of asthma, and the serum biomarkers (leptin, CRP) had indirect effects on outcome variables. Our findings suggested that asthma patients should have more awareness of their fat and weight control in order to get better control of asthma and a higher quality of life.

USE OF REMOTE SENSING DATA AND MACHINE LEARNING TO PREDICT ROOF TYPE FOR INDOOR RESIDUAL SPRAYING CAMPAIGNS Amandeep Chib*, Amandeep Chib, Akosileke Msieka, Hugh Starrook, (Department of Epidemiology and Biostatistics, UC San Francisco)

To help guide indoor residual spraying (IRS) of insecticide for malaria, information on the number and distribution of residential structures is essential. While open access datasets such as those created by the OpenStreetMap (OSM) project, provide valuable sources of data on buildings, information pertaining to whether or not they are residential is typically missing. Previous work has shown that it is possible to differentiate residential from non-residential buildings using building characteristics available in OSM data such as size, shape, and proximity to other buildings and roads. We investigated whether we would be able to accurately predict a structure's roof type from remotely sensed data and whether adding roof type as a covariate in the building type prediction algorithm resulted in an improvement in prediction accuracy of ~3%. While small in percent, a country level this gain in accuracy translates to thousands more buildings classified correctly, and to more efficient IRS campaigns.


Objective Neonatal deaths represent 45% of under-five deaths globally, with sub-Saharan Africa (SSA) contributing to half of these deaths. There is conflicting evidence on the role of maternal obesity in fueling neonatal mortality in the region. The goal of this study was to investigate the relationship between maternal obesity and neonatal mortality at a regional and country-level. Methods We conducted a retrospective analysis of nationally representative data from the Demographic and Health Survey (DHS) program in 33 SSA countries. We used multivariable logistic regression analyses to examine the association between maternal obesity and neonatal mortality at a regional and country level. Further, in the pooled data, we examined the separate effect modification of access to prenatal care and skilled birth attendant at delivery in the relationship between maternal obesity and neonatal mortality. Results Compared to women of optimal weight, maternal obesity was associated with 47% increased odds of neonatal mortality (95% CI, 1.47 - 1.81). The observed association between maternal obesity and neonatal mortality was positive in Togo (OR: 4.94, 95% CI, 1.67 - 14.6), Tanzania (OR: 2.73, 95% CI: 1.17 - 6.37), and Nigeria (OR: 1.67, 95% CI: 1.04 - 2.68). There was no interaction between maternal obesity and access to prenatal care or skilled birth attendant at delivery in its relationship with neonatal mortality. Conclusion This study provides further confirmation that maternal obesity may be linked to neonatal mortality in SSA. Current standards of prenatal care and skilled birth attendance at delivery may not lead to reductions in neonatal deaths in obese women. Coherently studies are needed in countries with high neonatal death rates in the region to strengthen the knowledge in this topic area.

EXPLORING THE ASSOCIATION BETWEEN SICK CHILD CARE UTILIZATION AND HEALTH SERVICE FACILITY QUALITY IN MALAWI Lingtui Litt*, Hannah H Leslie, Lingtui Liu, Himphrey Nsoma, Margaret K. Kruik, (Harvard TH Chan School of Public Health)

Background Increasing basic healthcare access in low-and-middle-income countries to enhance child survival is not enough to meet Sustainable Development Goal 3 in high-mortality settings, where inconsistent healthcare utilization and poor quality of care may undermine the benefits of health system access. We assess whether quality of sick child care in Malawi is linked to reduced utilization of essential services. Methods We defined two measures of quality of sick-child care: facility structural readiness and process of care, following WHO guidelines and using data from the 2013 Malawi Service Provision Assessment. We extracted demographic and health data from the 2013 Malawi MDG Facility Survey of households and linked households to facilities using geocodes to identify the nearest facility. We used logistic regression to examine the association of facility quality with utilization of formal health services for sick children under 5, controlling for demographic and socioeconomic characteristics. Results 508 facilities were linked with 12,258 children with recent illness symptoms, 56% of whom had been brought to a health facility. Facilities showed gaps in structural quality (68% readiness) and major deficiencies in process quality (28%), for an overall quality score of 44%. Utilization of sick child care services was consistently associated with facility quality (Adjusted OR (AOR) 2.06, SE 0.67). Both structural (AOR=1.44, SE 0.21) and process quality (AOR=1.42, SE 0.26) measures were associated with higher odds of care seeking. Conclusion Although Malawi's health facilities for curative child care are widely available, quality of care is inadequate; children were more likely to be brought to health facilities where better care is available. Improved structural and process quality could drive households to utilize care services more consistently. Quality of health services for children must be strengthened to end preventable childhood disease and death.
THE EVALUATION OF LABIAL CLOSURE STRENGTH AND QUALITY OF LIFE IN PEOPLE WITH INTELLECTUAL DISABILITY USING PATAKARA, A TWO-MONTH INTERVENTION STUDY Cheng-Hung Tsai*, Chen-Yen Chiu, Shih-Ming Chen, School of Public Health, National Defense Medical Center, Taipei, Taiwan.

Background: Health promotion is one of the important elements in public health. People with intellectual disability are one of the most vulnerable populations in society, and their oral function is generally poor. This is due to intake of food, swallowing, and forming facial expressions. The aim of this study was to describe the assessment of labial closure strength and quality of life in people with intellectual disability, and the association between labial closure strength and quality of life. Methods: This is a quasi-experimental study design, with a total of twenty participants recruited in the two-month study. We used Patakara for lip training 5 days a week, 3 times a day and takes 3 minutes per session. We evaluated the lip force with a Beauty Health Checker (BHC-VOl) before training (baseline data), after training for two weeks (2W), one month (1M) and two months (2M). In order to assess oral function, oral examination was conducted by a dentist. Short Form SF-36 questionnaire was used as a tool to evaluate quality of life. We compared the differences in data among baseline, 2W, 1M, and 2M using repeated measures analysis of variance (ANOVA) SPSS version 22.0 for Windows was used to analyze all the data. All statistical significance was set at p<0.05. Results: The results showed a statistically significant increase of labial closure strength (p<0.003). The mean force of the participants increased from 2.4 (standard deviation [SD]=48) to 4.3 (SD=3.6). However, the score of SF-36, weight and blood pressure did not change significantly, and there was no significant difference in oral function. Conclusion: In this study, we found that using Patakara for training was effective in improving labial closure strength. Further studies for over 2 months training period and randomized clinical trial are needed.

ASSOCIATION OF GENETIC ANCESTRY ADMixTURE AND EArLY CHILDHOOD OBESITY Sahel Hazrati, Sahel Hazrati. (Nova Translational Medicine Institute)

Background: Genetic ancestry and race may have controversial influence in research. Race and ethnicity do not capture all the heterogeneity; therefore, ancestral genetic background may help to better understand the prevalence and disparity of childhood obesity. Objective: To investigate relationships between children's genetic admixture proportions and obesity at 12 months of age. Methods: Children of 12 months of age were included in this cross-sectional study. Whole genome sequencing was performed and the ancestry of children was estimated by the ancestry and kinship toolkit projecting the imputed into the 1000 genomes principal components. Weight for Length Percentile (WLPP) at 12 months of age were categorized as <5th and ≥95th. Multiple logistic regression analysis was performed to calculate odds ratios (ORs) with 95% confidence interval (CI) for association of admixture proportion including European (EUR), African (AFR), East Asian (EAS) and South Asian (SAS) with WLPP categories adjusting for maternal age, birth weight, frequency of breast feeding and juice consumption. Results: 821 children from 83 maternal countries of birth were included; WLPP were ≥5th and 150 (13.8%) ≥95th. Crude odds ratios showed EUR admixture was protective (OR 0.45 [95% CI 0.27-0.74]) whereas AFR (OR 3.85 [95% CI 1.92-7.70]) and EUR (OR 5.70 [95% CI 2.19-14.85]) were positively associated with obesity. After adjusting for confounding variables, only AFR was associated with WLPP≥95th (OR 7.38 [95% CI 2.31-23.59]), while AMR was no longer associated with WLPP≥95th and EUR was no longer a protective factor. No association was observed between EAS or SAS with obesity. Discussion: AMR and AFR admixture were associated with WLPP≥95th at 12 months, while EUR admixture was protective. After adjusting for obese genetic factors, only AFR remained significantly associated with obesity suggesting this genetic background may contribute to the observed differences in obesity.

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BIOLOGICAL AGE AND DEPRESSION IN THE CORONARY ARTERY RISK DEVELOPMENT IN YOUNG ADULTS (CARDIA) STUDY Sahil Forrester*, Sarah Forrester, David Jacobs, Rachel Zmora, Pamela Shriner, Venetiake Rogers, Catherine Kiev, University of Massachusetts Medical School

Background: Biological age (BA) has been posited as a mechanism to measure the "weathering" hypothesis. Blacks biologically aging earlier than Whites due to psychosocial stress. Conceptually, BA represents the chronologic age (CA) at which most "normal" persons share a physical state. Generally, younger biological age among Blacks but not Whites, independent of chronological age.

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CARDIOMETABOLIC DYSFUNCTION AMONG U.S. ADOLESCENTS AND AREA-LEVEL POVERTY: RACE/ETHNICITY-SPECIFIC ASSOCIATIONS Andrew Williams*, Andrew Williams, Edmond Shennan, Natalie Slepian, Lauren Rosren, (Ernst Kennedy Shriver National Institute of Child Health and Human Development)

The purpose of this study was to examine race/ethnicity-specific associations between area-level poverty and cardiometabolic (CM) dysfunction among U.S. adolescents. Data were from 10,415 adolescents aged 12-19 in the National Health and Nutrition Examination Survey (1999-2012), linked with census tract data on area-level poverty (the percent population living in poverty, grouped into race/ethnicity-specific quartiles). CM dysfunction was parameterized by summing z-scores of six CM biomarkers, grouped into quintiles. Hierarchical ordinal models estimated overall and race/ethnicity-specific associations. Postrace analysis explored associations between area-level poverty and family poverty-to-income ratio. Overall, compared to the first quartile of area-level poverty, residents in third (OR:132, 95% CI: 1.13, 1.53) and fourth (OR: 1.27 95% CI: 1.08, 1.50) quintiles of area-level poverty experienced elevated odds of CM dysfunction. Area-level poverty predicted CM dysfunction among non-Hispanic white and Mexican American adolescents, but not among non-Hispanic black adolescents. In post-predictive analyses, among non-Hispanic whites, mean family poverty-to-income ratio declined from 3.53 in the first quartile to 1.60 in the fourth quartile (p<0.05), a greater decrease from among non-Hispanic blacks or Mexican American adolescents. We found race/ethnicity-specific associations between area-level poverty and CM dysfunction among U.S. adolescents, highlighting the moderating effect of race-ethnicity. Analyses suggest that higher area-level or family SES among non-Hispanic black teens is not associated with improvements in CM health, in contrast to non-Hispanic white adolescents. These findings suggest that socioeconomic status increases, non-Hispanic black individuals do not experience improvements in health status like non-Hispanic whites do. Future studies of effect of area-level determinants of CM dysfunction may consider race/ethnicity-specific associations.
FOOD DESERTS IN MINNEAPOLIS-ST. PAUL: SPATIAL ANALYSIS OF RISK FACTORS FOR HEALTH OUTCOMES Emily A Groene* Emily A Groene, Ashley M Hernandez, Joseph L Servadio, Subin Jang (Division of Epidemiology and Community Health, School of Public Health, University of Minnesota)

Background: The Centers for Disease Control and Prevention (CDC) defines food deserts as areas with inadequate access to healthy and affordable foods. Living in a food desert has been associated with cardiovascular disease (CVD), chronic kidney disease (CKD), diabetes, and obesity. Recent studies have utilized spatial analysis and have not accounted for public transportation access. This study uses spatial analysis to relate food deserts to health outcomes in the Minneapolis-St. Paul area controlling for public transportation access. Methods: Data were obtained from the Food Access Research Atlas, Minnesota Department of Transportation, and the CDC's 500 Cities Project. Data were analyzed at the census tract level (n=246) using a conditional autoregressive model to account for spatial autocorrelation and estimate differences in prevalence. We controlled for race, median family income, public transportation access, vehicle ownership, Supplemental Nutrition Assistance Program enrollment, smoking status, and health insurance access. Initial results: Census tracts with low access to food had significantly higher prevalence of diabetes (p=0.067, 95% CI:10.071, 1.602), obesity (p=0.591, 95% CI:0.004, 1.776), CKD (p=0.178, 95% CI:0.054, 0.302), and CVD (p=0.437, 95% CI:0.083, 0.790) in the fully-adjusted models. Tracts with a greater proportion of households without a vehicle had significantly lower prevalence of obesity (p=2.12*10^-3, 95% CI:3.96*10^-3, 3.02*10^-3), and tracts with greater public transportation access had significantly higher prevalence of CVD (p=9.21*10^-4, 95% CI:1.22*10^-4, 1.74*10^-4). Discussion: Our findings suggest that low access to healthy and affordable food is significantly associated with poorer health in the Minneapolis-St. Paul metropolitan area. Transportation characteristics showed modest associations with health. Future studies should examine the role public transportation access plays in determining food access and health.

SIP indicates work done while a student/postdoc
INCOME INEQUALITY AND SOCIOECONOMIC DISPARITIES IN SELF-RATED HEALTH IN THE UNITED STATES A SPATIAL ANALYSIS Chun-Tung Kuo* Chun-Tung Kuo, Ichiro Kawachi (Department of Social and Behavioral Sciences, Harvard T.H. Chan School of Public Health)

Background: Income inequality has been hypothesized as an important social determinant of population health. However, few studies have investigated whether income inequality is damaging to health because of its impact on widening socioeconomic disparities in health. Also, prior studies failed to account for the spatial dependence of health disparities. We thus used spatial lag regression to examine the relationship between state-level income inequality and socioeconomic disparities in self-rated health in the US. Methods: We calculated the Slope Index of Inequality (SII) for self-rated health in the fifty US states using data from the 2010 Behavioral Risk Factor Surveillance System. The SII reflects the absolute disparities in self-rated health according to income and education groups. Data on the state-level Gini coefficient, median household income and educational attainment in 2011 were obtained from the US census. Using a spatial lag model, we examined associations between the state-level Gini and SII while accounting for spatial autocorrelation. Results: Average income- and education-based SII in reporting poor/fair health was -413 (SD=66) and -305 (SD=63), while ranged from -53.6 to -16.6, respectively. Moran's I score for income- and education-based SII was 0.52 and 0.55, indicating the distribution of SII was spatially clustered. The spatial lag model showed that the state-level income inequality was associated with larger health disparities after controlling for income and educational level. One unit rise in the Gini coefficient was associated with increased -5.2 in income-based SII (95% CI=0.86, -2.07) and -1.75 in education-based SII (95% CI=-1.1, -2.4). Additionally, the Gini was also associated with higher percentage of people reporting poor/fair health. Conclusion: Higher income inequality is not only associated with worse health outcomes but also associated with wider socioeconomic disparities in self-rated health in the US.

S/P indicates work done while a student/postdoc

TRENDS IN SOCIOECONOMIC INEQUALITIES IN ISCHEMIC HEART DISEASE IN ONTARIO, CANADA, 2000-2012 Brendan T Smith* Brendan T Smith, Chantel Ramirez* Peter Smith, Hong Chen, Heather Manson, Jack Tu,互联网 Restella, (Public Health Ontario/University of Toronto)

Background: Low socioeconomic position (SEP) is an important risk factor for ischemic heart disease (IHD). Current surveillance methods use area-based SEP measures to monitor trends in socioeconomic inequalities in IHD. The extent to which these methods underestimate individual-level socioeconomic inequalities in IHD is unclear. Objective: To estimate and compare socioeconomic trends in IHD by household income and material deprivation in Ontario from 2000 to 2012.

Methods: A population-based, pooled cross-sectional study was conducted using data from the Ontario residents of 6 Canadian Community Health Survey cycles (2000-2012) linked to the administrative Discharge Abstract Database (n=119,529 over 35 years of age, 55% female). Prevalent IHD included an IHD hospitalization within 10 years, measured across quintiles of equivalized household income and the Ontario Marginalization Index's material deprivation scale. Relative-weighted Poisson regression models were used to estimate IHD rates representative of the Ontario population adjusted for age, sex, ethnicity, marital status and immigration. Socioeconomic inequalities in IHD were estimated using the slope index of inequality (SII) and relative index of inequality (RII). Results: Socioeconomic inequalities in IHD were observed across income quintiles on both absolute (SII=345 per 10,000, 95%CI=207,483) and relative (RII=2.3, 95%CI=1.9,346) scales in 2000, decreasing by 2012 (SII=170 per 10,000, 95%CI=104,293; RII=1.8, 95%CI=1.3,263). A similar pattern was observed across material deprivation quintiles, however with smaller inequalities in 2000 (SII=195 per 10,000, 95%CI=79,312; RII=1.1, 95%CI=1.5,211) and 2012 (SII=42 per 10,000, 95%CI=26,628; RII=1.5, 95%CI=2.0,214). Conclusion: Consistent socioeconomic inequalities in IHD were observed in Ontario, with decreasing trends between 2000 and 2012. Area-level material deprivation underestimated individual-level socioeconomic inequalities in IHD.

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THE IMPACT OF EMPLOYMENT AND SOCIOECONOMIC POSITION CHANGE ON SCREENING MAMMOGRAPHY UTILIZATION DURING THE GREAT RECESSION: THE HEALTH AND RETIREMENT STUDY

Joshua Demb, Isabel E. Allen, Robert A. Hiatt, Dejana Braithwaite (University of California, San Francisco)

Despite recent large-scale efforts to improve screening access, major structural events could radically impact screening behaviors. Between 2007 and 2009, the Great Recession led to spikes in unemployment nationwide, and left many low and middle-income families uninsured due to an acute decrease in employer-sponsored health insurance. These changes in employment and employer-sponsored insurance could have exacerbated inequalities in cancer screening access. Using data from the 2004, 2008 and 2012 waves of the longitudinal, population-based Health and Retirement Study (HRS), we assessed how individual-level employment and socioeconomic position (SEP) changes affected screening mammography utilization during the Great Recession. Multilevel models accounted for state-level factors as random intercepts and study year as random slopes. The HRS study population of 11,611 women (at baseline) was weighted to represent the general US population. At baseline, 230 women were unemployed (2%) From 2004 to 2012, proportions of uninsured women increased from 28% to 39% and retired women from 28% to 39%. Our findings showed interaction of individual-level employment status and year, and SEP and year (both p<0.01). Comparing screening utilization among unemployed women versus those employed full-time, the odds ratios associated with screening utilization were 1.05 (95% CI 1.05-1.06) in 2004, 0.57 (95% CI 0.57-0.6) in 2008 and 0.83 (95% CI 0.82-0.85) in 2012. Comparing screening utilization among women living in a household under the poverty line compared to above the poverty line, the odds ratios associated with screening utilization were 0.80 (95% CI 0.79-0.81) in 2004, 0.95 (95% CI 0.93-0.97) in 2008, and 0.80 (95% CI 0.80-0.81) in 2012. These findings indicate unemployment during the Great Recession had a strong impact on mammography screening utilization among US women, and highlights the need for policy solutions to prolong healthcare access during periods of unemployment.

DOES RAPID FEDERAL EXPANSION OF PREVENTIVE HEALTH SERVICES REDUCE DEPENDENCY ON THE EMERGENCY DEPARTMENT? THE CASE OF FEDERALLY QUALIFIED HEALTH CENTERS

Tim Bruckner, Parvati Singh (Public Health University of California, Irvine)

Federally Qualified Health Centers (FQHCs) provide preventive health services, regardless of patients’ ability to pay, in low-income communities. The reach of FQHCs has expanded by an unprecedented 70% in the last decade. Over 21 million Americans receive health care from FQHCs. Scant research, however, estimates whether the rapid expansion of preventive services in FQHCs over time reduced dependency on the emergency department (ED). This issue is crucial from a public health standpoint given mixed results from a previous health care experiment in Oregon that attempted to improve primary care over crisis services. We test our hypothesis that increases over time in FQHC services for three “prevention quality indicator” conditions (i.e., diabetes, hypertension, and heart attacks) coincide with fewer ED visits. We conducted a difference-in-differences analysis using ED and FQHC data from the Department of Health and Human Services’ Healthcare Cost and Utilization Project (HCUP). We included 148 counties from nine US states, with over 2.5 million ED visits for these three conditions (2006-1). Results show that over time, ED visits decreased for diabetes and hypertension by 25% and 10%, respectively, a period that coincides with FQHC expansion in the state. However, it is not clear if these decreases were driven by reduced ED visits or increased FQHC visits. Future research should examine this question using longitudinal data at the patient level.
HIV DIAGNOSIS FOLLOWING AN STI DIAGNOSIS AMONG MALES INCLUDING MSM: WHAT IS THE INCIDENCE? Carla Tilchin* Carla Tilchin, Christina Schumacher, Kevin Psyter, Ravi Murva, Elizabeth Hueme, Patrick Chance, Jack Jennings. (Center for Health and Community Health Research, Department of Pediatrics, Johns Hopkins School of Medicine)

Background: The release of the first drug for HIV pre-exposure prophylaxis (PrEP) in 2012 marked the beginning of a new era of HIV prevention. Although PrEP has shown to be highly efficacious, identifying and ultimately increasing uptake among the highest risk male subgroups remains a challenge. Methods: We created a retrospective cohort of HIV-uninfected males with an early syphilis or gonorrhea infection using public health surveillance data from 2009 to 2015 in Baltimore City. Incidence rate ratios and cumulative incidence estimators were used to assess the relationship between each bacterial STI and HIV transmission stratified by sexual transmission risk category, i.e., men who have sex with men (MSM) vs. non-MSM.

Results: Among MSM, one in ten syphilis or gonorrhea diagnoses were followed by an HIV diagnosis within two years of the STI diagnosis. Identifying as MSM (vs. non-MSM) was also significantly associated with a more than 4.08 (95% CI: 2.25-7.91) or 5.82 (95% CI: 3.42-10.34) fold increase in HIV infection after a syphilis or gonorrhea infection, respectively. Among non-MSM with gonorrhea, another STI infection was associated with a 3.07 (95% CI: 1.36-6.86) fold increase in HIV incidence as compared to non-MSM with only one gonorrhea infection. Conclusions: The findings suggest that local providers should offer PrEP to any MSM diagnosed with an early syphilis or gonorrhea infection and non-MSM with another STI diagnosis after a gonorrhea diagnosis. The short time to an HIV diagnosis among MSM after a syphilis or gonorrhea infection suggests immediate PrEP initiation. On-demand PrEP may also warrant consideration among MSM.

DEFINING GAY NEIGHBORHOODS USING CENSUS DATA AND GAY BARS IN FLORIDA Daniel E Mauck* Daniel E Mauck, Kristopher P Fennie, Gladys Iluentes, Eric Ferik, Diana M Sheehan, Merabti Gevergiz, Lorene M Madlik, Emma C Spencer, Mary Jo Topka. (Department of Epidemiology, Florida International University)

Background: Studies have defined gay neighborhood residence using the percent of households composed of male-unmarried partnerships according to the census. However, this method may be insufficient to define a gay neighborhood. Neighborhoods with social venues, such as gay bars, have been proposed as an alternate definition. Objective: To examine agreement between residential concentration of male-unmarried partnerships and number and density of gay bars as measures to define gay neighborhoods. Methods: Gay neighborhoods were defined in 3 ways: 1. The number of male-unmarried partner households in a census tract was divided by total households in a census tract (from the 2001-2011 American Community Survey) to obtain a residential concentration percentage; 2. Cutoffs varied in 1-unit increments from 1-10% to classify neighborhoods as “gay” or “not gay” (e.g., 21% was a “gay” neighborhood); and 3. Gay bar density was calculated as number of gay bars in a census tract divided by total households in a census tract; 4. Gay bar “neighborhood” was set at 50% percentile. The number of gay bars in a census tract was used, with 21 gay bars as cutoff for “gay” neighborhood.

Cohen’s Kappa coefficient was less than 0.2 for all associations, indicating poor agreement. Cohen’s Kappa coefficient increased from the 1% cutoff to the 4% cutoff, and then decreased for residential concentration and gay bar density. The highest agreement between residential concentration and gay bar density was at the 4% cutoff (0.15). A similar trend was seen for residential concentration and number of gay bars, with highest agreement for the 3% cutoff (0.17). Conclusion: There was little agreement between residential concentration and gay bar density; suggesting they are not measuring the same construct. HIV prevention should target both where MSM socialize and live.


Background: Black-americans have disproportionately higher rates of sexually transmitted infections (STIs). Racism and discrimination have been associated with adverse health outcomes, including increased incidence of STIs. Skin tone and colorism (i.e., discrimination against darker skinned individuals) have also been associated with adverse health outcomes among Blacks and could affect STIs. Objective: To determine associations between reported skin tone and/or colorism (i.e., discrimination against darker skinned individuals) and lifetime STI incidence among adolescents presenting for reproductive health services in an urban public healthcare system. Methods: Women 13 to 24-years-old who presented for a first trimester termination of pregnancy at an urban public healthcare system in Maryland during the year 2015 were invited to participate in a voluntary anonymous survey. Participants reported having "light", "medium", or "dark" skin tone and their degree of colorism (i.e., discrimination against darker skinned individuals) had also been assessed using a 5-item validated scale. The associations between reported skin tone and/or colorism (and education) and lifetime STI incidence among adolescents were assessed using multiple logistic regression. Results: The sample included 24% light skinned individuals, 53% medium skinned individuals, and 23% dark skinned individuals. The highest agreement for the 3% cutoff (0.17) was seen for the 3% cutoff (0.15). A similar trend was seen for residential concentration and number of gay bars, with highest agreement for the 3% cutoff (0.17). Conclusion: There was little agreement between residential concentration and gay bar density; suggesting they are not measuring the same construct. HIV prevention should target both where MSM socialize and live.

UTILITY OF PEER EDUCATORS TO CONDUCT SEXUALLY TRANSMITTED DISEASE SURVEILLANCE AMONG YOUNG WOMEN SEEKING CARE IN AN URBAN PUBLIC HEALTHCARE SYSTEM Jessica M. Madrigal*, Jessica M. Madrigal, Ashlesha Patel, Patrice Williams. (University of Illinois at Chicago, School of Public Health, Division of Epidemiology and Biostatistics)

Background: People 15-24 years old account for nearly two-thirds of the sexually transmitted disease (STD) cases in Cook County, IL. Effective screening, treatment, and education are necessary to prevent spread. Our goal was to identify factors associated with STDs among adolescents presenting for reproductive health services at an urban public healthcare system. Methods: Women 13 to 24-years-old who presented for a first trimester termination of pregnancy at a county clinic in 2015-2016 were approached to have a visit with a health educator. Data collection included age, race/ethnicity, factors related to sexual behaviors, and use of preventive care. We reviewed 3,853 patient charts to abstract STD testing (chlamydia (CT) and gonorrhea (GC)) and follow-up results. Logistic regression was used to identify factors associated with positive STD status. Results: On average, women were 21 (SD=2.2) years old, 90% African American, and the majority were eligible for financial assistance. Overall, 14.9% had a positive STD test. CT prevalence was 12.6% (n=48), GC was 1.4% (n=56), and <1.0% (n=32) were GC and CT positive. Positive screening varied by age, race, and sexual-risk behaviors. In a multivariable model, number of sex partners, prior STD testing, and having sex in exchange for payment were associated with STD prevalence. Compared to women who never had a HIV test, those with a prior HIV test had 15% decreased prevalence (PR=0.85, 95% CI 0.71, 1.0) of a STD. Women who had received the CT/GC testing in the prior two years had 24% decreased prevalence (PR=0.76, 95% CI 0.63, 0.92) compared to women who did not. Treatment rates were 96% for CT and 68% for GC. Conclusion: Providing comprehensive health education, STD screening, and follow-up services to young women presenting for abortion care may help reduce the transmission of STDs in the community. We observed lower prevalence of STD among women with prior health screenings. Surveillance and evaluation of prevention efforts should continue.
Late HIV diagnoses represent missed opportunities in HIV prevention and testing. Disparities in late diagnosis can identify populations in need of increased outreach. We examined the association between late HIV diagnosis and race/ethnicity, nativity, and language preference among men who have sex with men (MSM) and transgender (trans) people in King County, WA. Using HIV surveillance data, we identified MSM/trans people newly diagnosed with HIV from 1/1/2010-12/31/2016. CDC defines late HIV diagnosis as an AIDS diagnosis ≥1 year of HIV diagnosis. We combined country of birth and language preference into 3 categories: US-born, foreign-born (FB) English-speaking, and foreign-born non-English-speaking (4 US-born non-English speakers were excluded). We used logistic regression to evaluate characteristics associated with late HIV diagnosis. From 2010-2016, 1136 MSM/trans people were newly diagnosed with HIV in King County. 924 (81%) were US-born, 151 (13%) FB English speakers, and 61 (5%) FB non-English speakers. Most were White (62%), followed by 17% Latino, 10% Black, 6% Asian, and 5% other. Among FB cases, median time from entry to the US and HIV diagnosis was 10 years (IQR=3.75-19). 284 (21%) cases had a late HIV diagnosis. 21% of US-born, 19% of FB English speakers, and 36% of FB non-English speakers were diagnosed late. Adjusting for age, race/ethnicity, and injection drug use, FB non-English-speakers were 2.9 times more likely than US-born MSM to be diagnosed late (95%CI=1.14-4.51). FB English speakers did not differ from US-born MSM (OR=0.77; 95% CI=0.44-1.43). Race/ethnicity was not associated with late diagnosis (p=0.03). In the absence of overall racial/ethnic disparities in late HIV diagnosis among MSM/trans people in King County, foreign-born non-English speakers were at increased risk of late HIV diagnosis, suggesting a need to improve outreach to non-English speakers and collect data about immigration to better address disparities in late diagnoses.

Global trends in the diagnosed incidence of HIV from 2017 to 2027: Effects of changing demographics and pre-exposure prophylaxis use

Background Twenty years since the introduction of highly-active antiretroviral therapy, HIV infection remains a major global health problem with 1.8 million new infections reported in 2016 (UNAIDS, 2018). We forecast global trends in the diagnosed incidence of HIV over the next decade, taking into account changing demographics and pre-exposure prophylaxis (PrEP) use. Design/Methods We obtained recent incidence data on HIV infection (CDC, 2017; ECDC, 2015; UNAIDS, 2017). We forecast changes through 2027 by incorporating changes in population demographics and, in instances where risk factors were unquantifiable, historical trends. Given recent reports on plans to implement programs that provide PrEP to high-risk populations in the United Kingdom (Gallagher, 2017), and its more widespread use in the United States, we applied incidence trends to our forecast to incorporate the effect of PrEP use in certain high-income nations. We assumed a 90% efficacy of PrEP based on RCT data (Molina, 2017), that only the "men who have sex with men" at-risk group will be eligible for PrEP, and that PrEP use will increase over five years until it reaches 70% of the eligible population. Results In 2017, the estimated HIV diagnosed incidence ranged from 2 per 100,000 in the high-income Asia-Pacific countries to 90 per 100,000 in Africa. The % change in the number of HIV diagnosed incidence cases over our forecast period from 2017 to 2027, ranged from a 46% decline in North America to a 93% increase in Europe, mostly driven by Eastern European countries. We estimate more than 300,000 fewer cases by the end of the forecast in North America and Western Europe due to PrEP use, and more than 1 million additional cases in Eastern Europe due to non-demographic factors. Conclusion We expect HIV incidence to gradually decline or stabilize in many world regions over the next decade, except in Eastern Europe, where we estimate a substantial increase likely due to inadequate HIV prevention measures.
USING A NOVEL SPATIAL ANALYSIS TO PREDICT ZIKA DISTRIBUTION IN THE MEXICO-U.S. BORDER, 1947-2017 Sarah Ayton*, Esteban Picazzo Palencia, Dori Eliis Cortes Hernandez, (Department of Epidemiology, Mailman School of Public Health, Columbia University)

Ecological niche models are used to characterize the potential global range of a species and global ecological shifts. However, these models may misrepresent the spatial distribution of disease if they fail to account for phylogenetic shifts and sociocultural contributors to transmission. We propose a novel niche modeling approach that utilizes within-hemispheric occurrence to characterize probable Zika distribution in the Mexico-United States border, and compare projections from this novel method with traditional niche models. Our approach oversamples occurrence from areas of interest, producing regional species projections. Traditional niche models used pre-2017 Zika occurrence data (474 georeferenced point locations), predominantly from the eastern hemisphere. Regional models added occurrence data (108 georeferenced point locations) from 2017 Pan American Health Organization reports. Models were built with 60% occurrence data (randomly selected) and validated with the remaining 40%, and including modeling methods with a sensitivity and specificity over 85%. As expected, traditional models had a greater global weighted mean sensitivity (100.000) and lower specificity (89.330) than those samples yielded 8.5 times more LR- HPV false positives in HC2 results (17/790) than in H13 (2/790). This, in combination with the very small amount of H13 false positives, resulted in very small false positive predictions. This, in accumulation with the very small amount of H13 false positives, results in a very small false positive predictions. Additionally, strong effects of incarceration and living with someone with HCV (7.5\% of all male-female ratio of 2.2 and 3.3\% were children under the age of 15 years. The average age of the patients was 37.1±0.8 years. According to the results, 89\% of pulmonary TB cases were positive by microscopic examination and 1.5\% had a primary pulmonary TB infection. Nearly three-quarters of the cases (71\%) were smokers, 21\% were cannabis addicts and 7\% were alcoholics. The average body weight at diagnosis of tuberculosis was 56.2±0.5 kg for all patients. The mean duration between the onset of symptoms and pulmonary TB diagnosis was 57.2 days (range 1·365 days). The majority of patients (80.3\%) showed signs of tuberculosis impregnation. Among the 427 cases for whom the treatment outcome is known, 63\% were successfully treated, 25\% completed their treatment, 8\% were lost to follow-up, 5.3\% were transferred out to other health facilities and 0.7\% died. Conclusion: Tuberculosis can be controlled by preventing tuberculosis and, by treating active disease.
ENVIRONMENTAL RISK FACTORS FOR TOXOPLASMA GONDII SEROPOSITIVITY AND ITS ASSOCIATION WITH ALLOSTATIC LOAD IN RESIDENTS OF CENTRAL NORTH CAROLINA
Andrey I. Egorov, Rachel Converse, Shannon M. Griffin, Jennifer N. Styles, Elizabeth Klein, Elizabeth Sams, Edward Hudgens, Timothy J. Wade, (US EPA)

Toxoplasma gondii infection can be acquired through ingestion of undercooked meat or environmental oocysts excreted by cats. This cross-sectional study of 206 adults in the Durham-Chapel Hill, North Carolina metropolitan area had two objectives: 1) to assess environmental risk factors for Toxoplasma gondii infections and 2) to evaluate an association of chronic infections with biomarker-based measure of physiologic dysregulation known as allostatic load (AL). Serum samples were tested for IgG antibody to T. gondii using commercial diagnostic ELSA kits. AL was estimated as a sum of 15 biomarkers of health dichotomized at distribution-based cutoffs. Vegetated land cover was associated with lower AL in seronegative (p < 0.0001) and seropositive individuals (p = 0.035). Greater vegetated land cover was associated with lower AL in seronegative (p < 0.0001) and seropositive (p = 0.0004) individuals. The results suggest that some individuals residing in green areas could be at a higher risk of acquiring T. gondii infections through inadvertent ingestion of soil contaminated with cat feces. These zoonotic infections may partially offset the health benefits of green spaces in a subset of the population. This abstract does not reflect EPA policy.

KNOWLEDGE AND AWARENESS OF HBV, HCV, AND HIV INFECTIONS BY THE INFECTION AND CO-INFECTION STATUS AMONG BLOOD DONORS IN KUMBA DISTRICT, CAMEROON
Mokom Kendric Asongwe, Mokom Kendric Asongwe, Min Kyung Lim, Neus-Hope Neg Telang (Department of Cancer Control and Population Health, National Cancer Center Graduate School of Cancer Science and Policy, Republic of Korea)

Background: In 2015, the global estimated burden of chronic infections with hepatitis B virus (HBV) and hepatitis C virus (HCV) was 257 and 71 million people respectively. Cameroon is known to be endemic for these infections with a prevalence of 11.2% and 6.5% for HBV and HCV respectively. However, little is known about the awareness of these infections have been investigated among blood donors to give basic information for planning on effective control. Methods: A cross-sectional study has been conducted among 700 adults who visit four major hospitals in the Kumba District for blood donation from October 2017 to February 2018 and voluntarily participated in the current study with informed consent. Information on knowledge and awareness on HBV, HCV, and HIV infections has been collected with structured questionnaires, while the infection status identified from the result of serologic tests done in the blood donation units. Results: Until December 31, 2017, 405 participants were recruited (385 male and 20 female, age range 17-68 years old). HBV, HCV and HIV infection prevalence were 13.3%, 4.0%, and 5.9%, respectively. Among HBV positive cases, 13.0% were infected with HCV (n = 7) and 8.3% were with HIV (n = 2). Coinfection of HBV and HCV was 1.9% (n = 1). Only 4.4% of subjects had received HBV vaccination. Approximately half of the respondents had never heard about HBV (49.1%) and HCV (44.9%) infection while it was 100% for HIV. Comprehensive analysis of awareness and knowledge on other associated factors would be done after finalizing recruitment using multivariate model. Conclusion: Data collection is ongoing. Relevant conclusions and recommendations will be made based on final results obtained upon completion of analysis at the end of the study period.

INCIDENCE OF ACUTE MYOCARDIAL INFARCTION AND STROKE AFTER TUBERCULOSIS TREATMENT: A RETROSPECTIVE COHORT STUDY OF FORMER TB PATIENTS IN TAIWAN, 2002-2013
(Division of Epidemiology and Biostatistics, School of Public Health, George State University, Atlanta, GA, USA)

Background: Increasing evidence indicates that active tuberculosis (TB) disrupts host metabolism and may contribute to subsequent chronic non-communicable disease risk, but little is known about the risk of acute myocardial infarction (AMI) and stroke after TB. Aim: We aimed to determine the association of treatment duration and extrapulmonary TB with the risk of AMI and stroke among former TB patients in Taiwan. Methods: We analyzed a retrospective cohort of patients with active-TB in the Taiwan National Health Insurance Research Database during 2002-2013. Eligible patients included adults with active-TB (265 years old) confirmed by ICD-9 codes and anti-TB drug prescriptions for > 28 days. Patients with previously diagnosed cardiovascular disorders (diabetes, AMI, stroke, hypertension, and dyslipidemia) were excluded. Hazard AMI and stroke were defined by ICD-9 codes indicated > 1 years after TB diagnosis date. Cox models were used to estimate relative hazard rates of disease incidence. Results: During the study period, 157,444 patients were diagnosed with active-TB. Of 63,327 eligible patients, 400 had incident of AMI (age-adjusted incidence rate IR 1.3 per 1000 person-years; 95%CI 1.2-1.4) and 1366 had incident of stroke (age-adjusted IR 3.9 per 1000 person-years; 95%CI 3.7-4.1). Adjusting for age, gender, diabetes, dyslipidemia and hypertension, the hazard rate of AMI (adjusted hazard ratio aHR 1.9 95%CI 0.9-3.9) and stroke (aHR 1.0 95%CI 0.8-3.9) were similar among patients treated for >6 months compared to those treated for ≤6 months. The hazard of AMI (aHR 0.95%CI 0.7-1.2) and stroke (aHR 1.0 95%CI 0.9-1.2) among extrapulmonary TB patients were similar relative to those with pulmonary TB. Conclusion: We found higher incidence rates of AMI and stroke in previously treated TB patients compared to Taiwanese national estimates. Among former TB patients, treatment duration and site of TB were not significantly associated with increased incidence of AMI or stroke.
ESTIMATING DISEASE PROGRESSION AND SYMPTOM-SPECIFIC CARE SEEKING BEHAVIOR FOR TB-INFECTED INDIVIDUALS IN CAMBODIA

Karl Johnson* Karl Johnson, Hojoon Sohn, David Dowdy, (Krieger School of Arts and Sciences, Johns Hopkins University, Baltimore, MD, USA)

Background: Mechanistic understanding can enhance our ability to draw epidemiological inference, but most data are not mechanistic in nature. We provide an example of using clinical and surveillance data on tuberculosis (TB) to improve our mechanistic understanding of disease progression and healthcare seeking in Cambodia. Methods: We created a simple Markov state-transition model of TB symptom progression consisting of three states: asymptomatic, mildly symptomatic, and strongly symptomatic (defined such that TB treatment would be initiated upon presentation to the healthcare system for these symptoms). We calibrated an open cohort (under an equilibrium assumption) to reflect surveillance estimates of TB disease (prevalence/incidence ratio, estimated prevalence of asymptomatic disease) and a closed cohort (of individuals with active TB) to reflect pre-chemotherapy-era clinical data (the disease duration, mortality risk of untreated TB). These cohorts were used to infer monthly transition probabilities between the three states and monthly probabilities of contacting the healthcare system, subject to reasonable simplifying constraints. Results: Monthly state transitions were estimated to be 12% (mild to asymptomatic), 21% (asymptomatic to mild), 16% (mild to strong) and 9% (strong to mild). Monthly probabilities of seeking care for TB symptoms were estimated to be low (5% for mild, 10% for strong). Conclusion: By calibrating a small mechanistic model to observational data from surveillance and clinical studies, we can infer that TB follows a dynamic trajectory of symptom progression, with frequent transitions between symptom categories. We also infer that the long duration of disease at the population level likely reflects infrequent healthcare seeking, even for symptoms severe enough to trigger treatment for TB. These results can be used to subsequently estimate the epidemiological impact of strategies to find and treat undiagnosed TB cases in the community.

*S/P indicates work done while a student/postdoc
PERSISTENT RACIAL DISPARITIES IN HOMICIDE FROM 1999-2015 IN THE UNITED STATES Berna Buyukozturk* Berna Buyukozturk, Joanna Drowos, Charles Hennekens, (FAU Charles E. Schmidt College of Medicine)

Objective: To examine race-specific trends in homicide rates in the US from 1999-2015 among those aged 15 to 54 years. Methods: Public domain data was used from the Multiple Cause of Death (MCD) File. Homicide rates were age-sex-adjusted and calculated with 95% confidence interval (CI) according to gender, race, and cause of death. Validity of the ethnicity data was available for non-Hispanic blacks (NHB), African Americans, and non-Hispanic whites (NHW). Results: Between 1999 and 2015, the average of homicides among NHB, African Americans, and NHW aged 15 to 54 occurred among NHB. The relative risk of mortality from homicide in NHB compared to New England increased. Homicide rates for both NHB and NHW reached their lowest point in 2014, but increased in 2015. Among NHB men, there was an overlap in 95% CI from 2014 to 2015. Conclusions: Homicide had declined between 2006 and 2014 until an apparent trend reversal in 2015, particularly among NHB men. Policy Implications: The present data contribute to a recent report sponsored by the United States Department of Justice that called for investigation of racial trends in the 2015 increase in homicide mortality.

USE OF PRESCRIPTION OPIOIDS AND INITIATION OF FATAL TWO-VEHICLE CRASHES A PAIR-MATCHED ANALYSIS Stanford Chihuri*, Guohua Li, Stanford Chihuri., (Columbia University)

The impact of the opioid epidemic on traffic safety is of great concern as the prevalence of drug-involved crashes continues to rise. Although driver use of prescription opioids is known to double the risk of crash involvement, the individual and joint effects of prescription opioids and alcohol on crash causation have not been adequately studied. Using a pair-matched design, we assessed the association of driver use of prescription opioids and alcohol with the initiation of fatal two-vehicle crashes. Toxological testing data for 36,462 drivers who were involved in fatal two-vehicle crashes were analyzed with conditional logistic regression modeling. In each of the 19,321 fatal two-vehicle crashes studied, the driver whose error led to the crash was treated as the crash initiator and the other as non-initiator. Failure to keep in proper lane accounted for 41.1% of the fatal two-vehicle crashes, followed by failure to yield right of way (25.3%), failure to obey traffic sign (14.9%), and speeding (11.6%). Crash initiators were more likely than non-initiators to test positive for prescription opioids (5.0% vs. 3.0%, P<0.001), alcohol (28.7% vs. 9.9%, P<0.001), and both (1.0% vs. 0.3%, P<0.001). Relative to drivers who tested negative for both substances, the adjusted odds ratios of fatal two-vehicle crash initiation were 2.28 (95% confidence interval [CI]:1.99 to 2.61) for those testing positive for prescription opioids and negative for alcohol, 5.27 (95% CI: 4.86 to 5.72) for those testing positive for alcohol and negative for prescription opioids, and 5.82 (95% CI: 4.10 to 8.27) for those testing positive for both prescription opioids and alcohol. The results indicate that driver use of prescription opioids is associated with a significantly increased risk of initiating fatal two-vehicle crashes. Further research is warranted to evaluate the potential interaction effects on crash causation of prescription opioids with alcohol, other drugs and driver characteristics.

TITLE: LONGITUDINAL ANALYSIS OF EMERGENCY DEPARTMENT UTILIZATION BY ASSAULTED ADOLESCENTS Kevin Kwan*, Kevin Kwan, Jonathan Boyajian, Magdalena Cerda, Skira Goldman-Mellor, (University of California, Merced)

Assault injuries are a leading cause of morbidity among youths in the U.S. Prior research indicates that assaulted adolescents are also at high risk for future drug utilization, self-harm behavior, and repeat violence victimization. However, this work typically uses data from a single hospital or clinic, and these associations are poorly understood from a population perspective. We examined use of emergency department (ED) services—overall and for drug, self-harm, and assault outcomes—among adolescents with an index assault visit in 2010. Statewide ED data from California were obtained for all adolescents aged 10-19 who presented to the emergency room in 2010 and had a valid unique identifier (n=108,703). Identifiers were used to link each patient's index visit to all subsequent visits through September 30th, 2015, as well as to prior ED visits during 2006-2009, to any facility in the state. Odds of subsequent ED visits for drug abuse, self-harm, and assault (assessed using diagnostic codes) were compared for patients who experienced assault-related injuries in 2010 and patients who received care for all other complaints (controls). Analyses utilized logistic regression, controlling for patient age, sex, rurality, insurance status, and prior histories of assault, suicide attempt, and drug use visits. On average, assaulted adolescents (mean age = 17.0; 34.8% white) had 2.5 more total ED visits during follow-up compared to controls. 17.8% of assaulted individuals had a subsequent visit to the ED; average time between these visits was 25 months. Odds of follow-up visits for drug use, self-harm, and assault were 1.31 (95% CI: 1.2, 1.5), 2.3 (95% CI: 2.1, 2.5), and 4.1 (95% CI: 3.9, 4.3) times higher, respectively, among assaulted adolescents compared to controls. Assault victimization among the adolescent population is associated with negative health outcomes, including future ED utilization for drug use and suicide attempt as well as repeat violent victimization.

TIMING OF STRESS FRACTURES AFTER INITIATING A NEW PHYSICAL TRAINING REGIMEN Craig J McKinnon*, Craig J McKinnon, Julie M Hughes, Joseph Cardouni, (United States Army Research Institute of Environmental Medicine)

Study Design: Retrospective Cohort Study Objectives: Report the incidence rate and timing of stress fractures (SF) in a population beginning a new physical training regimen. Background: Stress fractures (SF) are an injury of interest for military service. The length of time for clinical manifestation of a SF (T) after starting a new or demanding physical training regimen is not well defined in medical literature. Methods: This study was conducted using medical encounter and personnel data on U.S. Army Soldiers from 2002-2011 (n=1,206,168). Overall SF incidence rates, as well as race-specific and location-specific rates, were calculated for the first 6 months of military service. Results: Although SF diagnoses were seen during the first two months of military training, the steepest increase in SF diagnoses occurred in weeks 3-5, with a peak in the overall rate of SF diagnoses occurring during week 8. The overall rate of SF was 7.65 SF per 1,000 Soldiers, with race-specific rates of 5.02 per 1,000 in male Soldiers and 21.26 per 1,000 in female Soldiers. SF diagnoses steadily decreased over the remainder of the 6 month period. The temporal patterns of SF diagnoses for the regions examined followed a similar pattern as was seen overall for SF, except the exception was femoral neck SF rates for the regions examined. Conclusions: The greatest increase in the rate of clinical diagnoses of SF occurred 5.9 weeks after beginning military-specific physical training and activities. These data suggest that heightened awareness of SF as a differential diagnosis for individuals with lower extremity pain may be warranted around the third week of entry into a new training program, although some diagnoses occur sooner. After 13 weeks of training was reached without SF, the risk for this injury steadily decreased.
Background: Non-battle injuries (NBI) accounted for ~35% of military casualties and led to ~20% of death in U.S. Service Members (SM) in Afghanistan and Iraq Wars (OEF/OIF). Although NBI has been well studied in US Army, there remains a gap in our understanding of etiologies and trends that contribute to fatal NBI (FNBI) among all deployed SM. Methods: Data from the Defense Casualty Analysis System (DCAS) and Department of Defense Trauma Registry (DODTR) were reviewed. FNBI cases identified and descriptive analyses were performed. Trend in FNBI defined as FNBl/all death was assessed using a weighted moving average (WMA) and a time-series analysis with autoregressive integrated moving average. Results: From DCAS, 23,435 patients injured in 10/2001-12/2014 in OEF and 36,364 patients injured in 3/2003-8/2010 in OIF were analyzed. Overall mortality was 10.0% in OEF and 12.1% in OIF. Of all deaths, FNBI accounted for 21.4% (n=502) in OEF and 21.1% (n=929) in OIF. Trend in FNBI first decreased from 82% in 2002 to 21% in 2011 in OIF and from 35% in 2003 to 21% in 2006 in OIF; since those times, both conflicts were consistently at 21%. From DODTR, 29,958 patients injured in 1/2002-12/2014 were identified for in depth analysis. Of these, 34.1% were NBI cases. Cumulative incidence rate of NBI was higher in female (63.3%), in Air Force (66.3%) and Navy (48.3%) compared to Army (34.7%) and Marines (25.7%). The top five mechanisms of NBI were fall (21.4%), motor vehicle crash (18.8%), machinery/equipment (12.6%), blunt objects (10.7%) and sports (6.8%). The leading causes of FNBI were gunshot (33.5%), vehicle crash (32.5%), airplane crash (10.2%), flame/inhalation injury (5.8%), machinery/equipment (2.9%), drowning (2.9%) and fall (2.4%). About 25% of FNBI was intentional. Conclusion: FNBI was high and consistent among deployed forces during the study period. The findings may guide targeted safety interventions which reduce a preventable death on military force during war.

RELIABILITY OF SELF-REPORTED TRAUMATIC BRAIN INJURIES IN RESEARCH STUDIES Kathryn Taylor* Kathryn Taylor, Kristin Heaton, Susan Proctor, (U.S. Army Research Institute of Environmental Medicine)

Clinically diagnosed traumatic brain injuries (TBI) are the gold standard for TBI ascertainment in research studies. However, this information is not always available and many studies rely on self-reported TBIs. In athletes, self-reported TBIs exceed the number of clinically diagnosed TBIs. This study evaluates the concordance between reported and medical record-identified TBIs and whether factors such as prior deployment or a diagnosis of either post-traumatic stress disorder (PTSD), depression or anxiety affects accuracy of TBI recall in large cohort of US Army Soldiers. Between 2007 and 2010, 416,296 Soldiers were asked about past head injuries in the prior 4 years as part of the DoD pre-deployment Automated Neuropsychological Assessment Metrics (ANAM) program. Information on clinically diagnosed TBIs, PTSD, anxiety and depression and prior deployment from medical encounter data was obtained from the Total Army Injury and Health Outcome Database (TAIHOD). Intraclass correlation coefficients (ICC) were used to evaluate agreement between reported and clinically diagnosed TBI and results stratified by deployment status and identified diagnoses. Soldiers reported having more TBIs than were identified via medical encounter reports. The concordance between the reported and clinically diagnosed TBIs was minimal (ICC=0.18 95% CI: 0.18, 0.19). Agreement was higher among those who had been deployed previously (ICC=0.20 95% CI: 0.20, 0.20) or had a diagnosis of PTSD (ICC=0.29 95% CI: 0.27, 0.31), depression (ICC=0.26 95% CI: 0.23, 0.29) or anxiety (ICCs=0.23 95% CI: 0.22, 0.23). Whether self-reported TBIs meet clinical diagnostic criteria is unknown but reliance on diagnosed TBIs alone may miss relevant TBIs. Factors such as certain comorbidities and deployment history only minimally improved the agreement. Further work is warranted to better understand factors relating to identification of TBIs in epidemiological research.
CARDIORESPIRATORY FITNESS AND RISK OF SLEEP APNEA IN 1.5 MILLION MEN Casey Crump* Casey Crump, Jan Sundquist, Marilyn A. Winkleby, Kristina Sundquist, (Icahn School of Medicine at Mount Sinai)

Background: Sleep apnea is increasing in prevalence and an important cause of morbidity and mortality. Male sex, obesity, and advancing age are established risk factors. However, the independent effects of cardiorespiratory fitness (CRF) on risk of sleep apnea have not been previously examined. Identification of new risk factors early in life may help facilitate earlier and more effective primary prevention.

Methods: A national cohort study was conducted to examine CRF in all 1,547,478 Swedish military conscripts during 1969-1997 (97-98% of all 18-year-old men nationwide each year) in relation to risk of sleep apnea through 2012 (maximum age 62 years). CRF was measured as maximal aerobic workload in Watts using a well-validated bicycle ergometer test, and sleep apnea was identified from nationwide outpatient and inpatient diagnoses. Poisson regression was used to compute incidence rate ratios (IRR) for the association between CRF and long-term risk of sleep apnea, adjusted for age, height, weight, and other potential confounders.

Results: There were 44,612 (2.9%) men diagnosed with sleep apnea in 39.7 million person-years of follow-up. Low CRF was independently associated with increased risk of sleep apnea in adulthood, after adjusting for age, height, weight, socioeconomic factors, and family history of sleep apnea (lowest vs. highest CRF tertile: IRR, 1.41; 95% CI, 1.37-1.46; P<0.001; continuous CRF variable per 100 Watts IRR, 0.72; 95% CI, 0.71-0.75; P<0.001). Low CRF was associated with increased long-term risk of sleep apnea even among men with normal body mass index (BMI). Conclusions: In this large national cohort, low CRF at age 18 years was independently associated with higher risk of developing sleep apnea later in life, even among men with normal BMI. These findings suggest that primary prevention of sleep apnea should begin early in life and include cardiorespiratory fitness, even among those with normal BMI.
POSTTRAUMATIC STRESS DISORDER AND RISK OF SELECTED AUTOIMMUNE DISEASES IN US MILITARY PERSONNEL

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Prior research increasingly suggests a link between posttraumatic stress disorder (PTSD) and physical health. Stress disorders may lead to impairment of the immune system and development of autoimmune disease. Among active duty US military personnel enrolled in the Millennium Cohort Study, we prospectively investigated the association between PTSD and risk of selected autoimmune diseases (ADs): rheumatoid arthritis, systemic lupus erythematosus, inflammatory bowel diseases, and multiple sclerosis. Incident cases were identified from medical encounter records in the Military Health System Data Repository. Participants were classified as having a history of PTSD if they (1) self-reported receiving a health care provider's diagnosis of PTSD, or (2) screened positive using the PTSD Checklist–Civilian Version. Participants were classified as having a history of another mental health condition if they (1) self-reported receiving a health care provider's diagnosis of depression, or (2) screened positive for major depression, panic disorder, or another anxiety disorder using standardized Patient Health Questionnaire algorithms. Hazard ratios (HRs) and 95% CIs were estimated using multinomial Cox regression models adjusted for demographics. Among 115,028 participants followed for a mean of 5.2 years, risk of any of the selected ADs was 80% higher for those with a history of PTSD (HR, 1.80; 95% CI, 1.45–2.24) compared with those with no mental health condition. Risk was also modestly elevated for those with a history of another mental health condition (HR, 1.28; 95% CI, 1.01–1.62). For each selected AD, risk was higher for those with PTSD relative to those with no mental health condition, though the HR was not significant for lupus. Results did not differ by sex. These findings suggest that active duty military personnel with PTSD may be at an increased risk of a range of ADs and that other mental health conditions may be associated with a more modest increase in risk.

INITIAL ASSESSMENT OF HURRICANE HARVEY EXPOSURES AND MENTAL HEALTH IMPACT

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Background: The full psychological and physical effects of Hurricane Harvey are still unknown. We assessed hurricane exposure and the immediate mental health needs of the population to define public health priorities for a larger epidemiological study. Methods: Converstion sampling was used to recruit participants (n = 41) from the greater Houston area aged ≥18 years, who completed a questionnaire about demographics, hurricane exposures, and physical/mental health. Post-Traumatic Stress Disorder (PTSD) was measured with the PCL-S (a score ≥5 indicated probable PTSD symptoms). The Patient Health Questionnaire-4 (PHQ-4) was used to assess symptoms of depression and generalized anxiety disorder. Results: The majority of the cohort was female (56%), White (33%), Black (33%) or Hispanic (20%), and experienced an exposure during Harvey (88%). The mean age was 44 years (SD = 10 years). The average PTSD score was 32.9 (SD = 17.1); 46% of participants met the threshold for probable PTSD. Increased personal exposure (ORadj 1.78, 95% CI: 1.4–2.12) and property-related exposure (ORadj 1.57; 95% CI: 1.22–2.1) were both statistically significantly associated with an increased odds of probable PTSD symptoms. A perception of chemical/toxic exposure due to Hurricane Harvey was reported by 44% of participants. Conclusions: The number of personal or property exposures was positively associated with mental health symptoms three weeks post-harrience. Perceived chemical exposure needs objective validation and has implications for the ongoing response to Hurricane Harvey.

ESTIMATING THE EXTENT TO WHICH CURRENT MENTAL HEALTH SYMPTOMS MAY BE ATTRIBUTABLE TO INTIMATE PARTNER VIOLENCE IN A COMMUNITY-BASED SAMPLE

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Background: Although a large body of evidence links intimate partner violence (IPV) to poor mental health, existing studies often restrict to women in clinical or similar settings, notably those providing mental health services, should be treated in emergency departments (EDs) which often serve as a nexus for intervention programs seeking to reduce self-harm recurrence. Identifying which youth face excess risk for recurrent self-harm, however, has been hindered by lack of rigorous epidemiologic data. We used statewide, all-payer ED data from California to examine incidence and predictors of repeated self-harm visits (assessed using ICD-9 injury codes E950–E952) among a cohort of adolescents with any self-harm visit in 2010 (n = 5,484). Subsequent ED visits for self-harm were tracked through 2015, to any facility in the state, using unique patient identifiers. Predictors of future self-harm included sociodemographic and geographic factors at index visit and patients’ 2006–2009 histories of prior ED utilization. Cumulative incidence of any repeated ED self-harm visit was 10.7% within 1 year and 19.1% by end of follow-up. In covariate-adjusted negative binomial hurdle models, self-harm recurrence during follow-up was higher among adolescents admitted as inpatients at index visit (ORadj 4.58; 95% CI [1.20, 16.9]), those with prior ED visits for self-harm (ORadj 3.00 [2.41, 3.73]), and those with prior visits for other mental health problems (ORadj 2.16 [1.78, 2.61]). Repeat visits were also more likely among adolescents who were younger, female, Medicaid insured, and who had more total ED visits in 2006–2009, but less likely among those of minority race. Other factors, including violence of the index self-injury, patient history of ED visits for substance use and assault, and patient treatment, did not predict recurrence. The high rate of repeat self-harm in our population-based study of adolescent ED patients underscores the need for more effective treatments in this vulnerable group. Youth with prior mental health problems and high ED utilization rates face particularly elevated risk.
Mental Health

Proportion of Subsequent Psychopathology Conferred by Subthreshold PTSD in a Military Cohort

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Background: This study identified the relative proportion of later PTSD that can be attributed to baseline subthreshold PTSD compared to baseline diagnosable PTSD.
Methods: We analyzed data on 3,457 US military members from the sister study of the PTSD Checklist Current PTSD criteria (i.e., DSM-IV criteria, functional impairment), subthreshold PTSD (Criteria A, at least one symptom in each cluster), and to PTSD. We calculated the exposure rate, risk ratio (RR), and population attributable fraction (PAF) to determine the burden of subthreshold PTSD attributable to baseline subthreshold PTSD compared to baseline diagnosable PTSD. Results: The annualized prevalence of subthreshold PTSD and diagnosable PTSD was 11.9% and 5%. The RR for diagnosable PTSD at follow up among participants with current PTSD at baseline was more than twice that of those with subthreshold PTSD (3.0 vs. 1.58). The PAF of subthreshold PTSD was considerably greater among persons exhibiting subthreshold PTSD at baseline (PAF = 35%; 95% CI = 26.0–42.9%) compared to persons with chronic PTSD (PAF = 28%; 95% CI = 21.8–33.8%). The results were robust to changes in subthreshold PTSD definition. Conclusions: Subthreshold PTSD accounts for a substantial proportion of eventual diagnosable PTSD. More attention is needed to intervene on these symptoms, not just to affect the greatest reduction in the burden of PTSD within military populations.

Racial/Ethnic Differences in the Age of Menarche and Transdiagnostic Psychiatric Disorder Risk: A Latent Modeling Approach

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Early or late age of pubertal maturation in girls is associated with exposure to psychosocial stress and poorer mental health. However, investigations consider only individual disorder risk, and do not investigate differences by race/ethnicity status. The sample included all female respondents from the National Comorbidity Study Adolescent Supplement (n=5,183), ages 13-17, among them non-Hispanic White (NHW) n=4,078, non-Hispanic Black (NHB) n=1,656, and Hispanic n=132. Confirmatory factor analysis was used to identify and fit four latent outcomes: fear, distress, behavior, and substance disorders. Associations between menarche timing (early age ≤ 10,11; late age 13, 14 vs. average age 12) and latent disorders were estimated in a structural equation model (SEM) for each race/ethnicity group, adjusted for age, sexual activity, income, race, parent marital status, BMI, and child adversity. Measurement models showed good fit for each race/ethnicity group. Among NHW respondents, onset of menarche before age 11 was positively associated with distress (coef=-0.1, 7, p<0.008), fear (coef=0.01, 3, p<0.001), and substance disorders (coef=0.02, 7, p<0.001). Among NHB respondents, onset before age 11 was positively associated with distress disorders (coef=0.05, 7, p<0.001), and onset at age 13 was negatively associated with behavior disorders (coef=-0.03, 7, p<0.025). Among Hispanic respondents, onset at age 14 was positively associated with fear disorders (coef=0.03, 7, p<0.001). Model coefficients suggested a negative association with behavior disorders (coef=-0.03, 7, p<0.001). Biological processes initiated at puberty are influenced by one's social context to affect emotional and social development. Early or late age of menarche may have different implications for the development of mental health problems in different racial/ethnic groups.

Prevalence of Treatment for Eating Disorders in a Population-Based Sample

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It is known that a minority of people with eating disorders receive treatment. However, little is known about treatment patterns among people with the most common types of eating disorders: binge eating disorder (BED), purging (PD) and other types of unspecified feeding or eating disorder (OSFED). Data came from the Growing Up Today Study, a prospective cohort study that began in 1996 when participants were aged 9 to 14 years. Symptoms of eating disorders were included on all questionnaires from 1996-2013. Treatment for eating disorders was ascertained from the 2013 survey, as well as from a 2014 survey to the mothers. Based on their reports of symptoms, 5.1%, 3%, 4%, 6%, and 25% of participants met criteria for anorexia nervosa (AN), bulimia nervosa (BN), BED, PD, and OSFED, respectively. Among the 1,059 females classified as having an eating disorder, 12.5% reported receiving treatment. The prevalence of treatment was 20%, 44%, 11%, 22%, and 11% for those with AN, BN, BED, PD, and OSFED, respectively. Only 25% of the participants who received treatment met criteria for OSFED and did not receive treatment for AN or BN. The majority of participants with eating disorders did not receive treatment for their disorders. OSFED was the most prevalent eating disorder and the least likely to receive treatment. These findings highlight the need for better recognition of OSFED by primary care providers.
Background: Children exposed to socioeconomic adversity have elevated levels of psychological difficulties immediately and long-term. However, few studies have examined the role of long-term patterns of family socioeconomic adversity ascertained in a dynamic fashion. Methods: The Danish National Birth Cohort (DNBC) is a longitudinal, population-based study, which recruited 100,417 women in pregnancy (1996-2002). Household poverty from the year before birth until the child was 10 years of age (n=12 measures) was obtained from the National Danish Registries and modeled using Group-based modeling (Proc Traj). Child mental health symptoms were measured at 11 years using mother and child-reported Strengths and Difficulties Questionnaires (SDQ), and the child-reported Stress in Childhood (SiC) scale. Results: Four categories of family socioeconomic position were identified: 1) No poverty (83.5%); 2) Intermittent poverty (8.6%); 3) Poverty during the perinatal period (4.9%); and 4) Chronic poverty (3.0%). Controlling for several early life characteristics of the family, mother and child, significant associations were found between membership in the "Intermittent" poverty group and offspring psychological difficulties (RR=1.18, 95% CI: 1.07; 1.30; conduct problems: RR=1.38, 95% CI: 1.19; 1.60; hyperactivity: RR=1.18, 95% CI: 1.01; 1.38; and stress: RR=1.10, 95% CI: 1.03; 1.17). Conclusions: Children growing up in households characterized by financial instability have elevated levels of psychosocial symptoms, especially externalizing behaviours, as well as stress in early adolescence. Policies geared towards raising disposable income among families at risk of poverty throughout childhood may prevent mental health problems and help break the vicious circle between early disadvantage and mental health.
NON-INFERIORITY APPROACHES IN THE OBSERVATIONAL SETTING
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Introduction: Medical treatments are initially considered safe and effective based on randomized control trials. These studies typically include relatively healthy and homogeneous subjects. Post-trial observational studies can be conducted to compare various treatments, though these studies have a risk for non-ignorability of treatment assignment. Objective: to present non-inferiority approaches available in the observational setting using a sample of parapneumonic infection patients with or without protocol adherence. Methods: A retrospective cohort study was conducted using data from three Midwestern hospitals for patients admitted with a complication parapneumonic infection during 2014-2017. Treatment protocol included a chest tube with twice daily instillation of P-Amylase for at least three consecutive days. Protocol non-adherence was defined as a deviation from the treatment protocol and non-inferiority was defined as a length of stay (LOS) less than 110% of protocol compliant patients' LOS. Non-inferiority approaches (e.g., bivariate, multiple regression, Bayesian model, doubly robust (DR) augmented inverse propensity weighted model, lasso) were employed. We developed a clinical pre-scrub model in a cohort of Veterans Affair (VA) nursing home residents. The prediction model, which included sex, race, HCW dependency, the presence of any device, diabetes, and chronic skin breakdown, showed good performance (c statistic=0.70, sensitivity=74%, specificity=52%) in the development set. The decision curve analysis indicates this model has greater clinical utility than using a rules culture for detecting co-colonization to determine which residents should be placed on contact precautions. The prediction model demonstrated less utility in the validation cohort, suggesting a separate rule should be developed for the VA nursing home population.

THE DEVELOPMENT AND VALIDATION OF A CLINICAL PREDICTION RULE TO PREDICT TRANSMISSION OF METHICILLIN-RESISTANT STAPHYLOCOCCUS AUREUS IN NURSING HOMES
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The prevalence of methicillin-resistant Staphylococcus aureus (MRSA) colonization among nursing home residents is high. Healthcare workers (HCW) can often serve as vector in the transmission of MRSA. The ability to identify residents who are likely to transmit MRSA to HCWs and clothing during clinical care is important so that infection control measures such as contact precautions can be employed. We developed a clinical prediction rule with demographics and clinical characteristics as predictors of MRSA transmission to HCWs given within a cohort of residents from a community nursing home. We externally validated this model in a cohort of Veterans Affair (VA) nursing home residents. The prediction model, which included sex, race, HCW dependency, the presence of any device, diabetes, and chronic skin breakdown, showed good performance (c statistic=0.70, sensitivity=74%, specificity=52%) in the development set. The decision curve analysis indicates this model has greater clinical utility than using a rules culture for detecting co-colonization to determine which residents should be placed on contact precautions. The prediction model demonstrated less utility in the validation cohort, suggesting a separate rule should be developed for the VA nursing home population.

AN APPLICATION OF MACHINE LEARNING FOR THE REFINEMENT OF AN EHR-DERIVED COHORT
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Electronic health record databases (EHR) are frequently used for cohort identification in health services research studies. A primary challenge is that the EHR query (algorithm) may produce an overly broad list of patients. When this occurs, subsequent manual chart review is required to verify patient eligibility. In 2015, we used a structured algorithm to query a university-based EHR database to identify women with symptomatic uterine fibroids for recruitment into a national comparative-effectiveness registry. Manual review of a random sample of charts showed that 1 in 4 of the women identified by our final algorithm did not have symptomatic fibroids (PPV 76%). Since it is prudent to avoid placing recruitment phone calls to these women for both pragmatic and ethical reasons, we employed an open-source machine learning application (CLARK's) to explore its potential as an alternative to manual review of (all charts) for eligibility verification. CLARK's task was to increase the PPV of our EHR-derived recruitment list by classifying patients in "symptomatic" or "non-symptomatic" based on the contents of their charts, using the application's random forest option. Two randomly selected sets of charts from our EHR-derived cohort were submitted to CLARK: a training set (n=397), followed by a test set (n=163). When applied at a high confidence level of 80% or more, as compared to manual review, CLARK successfully identified 97% of symptomatic cases, with a PPV of 85%. For further refinement of an EHR-derived cohort of N=1,000 with a PPV of 76%, this improvement represents 110% of protocol compliant and non-adherent patients, respectively. Non-inferiority was revealed in the non-adherent group for all conducted analytic approaches. Presented will be full model descriptions along with pros and cons of each of these naïve to more complex methods. Conclusion: There are many techniques available for the examination of non-inferiority in the observational setting. Each approach has its strengths and weaknesses. Notable limitations may include model dependence, misspecification, covariate imbalance, lack of prior information, and use of p-values for decision making.

SHRINKAGE REGRESSION FOR CONFOUNDER ADJUSTMENT IN THE PRESENCE OF COLLIDER-STRATIFICATION BIAS
Malcolm Barrett*
Malcolm Barrett, (University of Southern California)

It has been demonstrated that shrinkage regression methods, such as the lasso, can be effective for detecting confounding bias in settings where expert knowledge is limited or where high dimensionality prohibits sensible directed acyclic graph (DAGs). Shrinkage techniques can both stabilize the effect of true confounders and, depending on the method, reduce or eliminate noise variables. However, it’s not clear whether these methods are effective in the presence of confounder-stratification bias. To assess this effect, a modified form of a lasso regression that only shrinks covariates was tested against GLM methods and change-in-estimate selection to compare resulting bias in the presence of 30 confounders, 30 noise variables, and 10 colliders over 10,000 simulations. The true odds ratio between the exposure and outcome was 1.50. For each approach tested, the correct (exposure + confounders), crude model with just exposure, exposure + confounders + collider, and exposure + confounders + noise. The modified lasso performed best for all circumstances, with the least mean bias for the correct model (estimate: 1.49 [95% CI 1.31, 1.71], bias: 0.04%), and the model with exposure + confounders + noise (estimate: 1.45 [95% CI 1.27, 1.67], bias: 0.08%). The presence of colliders introduced instability of estimates for all approaches. The lasso had a smaller degree of bias than the GLM models and was more stable, but the confidence intervals were still wide. When including all variables, the estimate for lasso was 1.55 [95% CI 1.04, 2.94] vs 2.06 [95% CI 0.52, 5.7] for GLM, with a bias of 36.2% vs 37.6%, respectively. The lasso reduced mean bias and stabilized estimates in the presence of colliders, but confidence intervals remained considerably wide. A combined method using DAGs where possible and shrinkage methods where necessary may therefore be a more generalizable approach to addressing adjustment in observational studies.
WHICH EFFECT MEASURES MATTER MOST, AND WHEN? Gregory H Cohen* Gregory H Cohen, Laura Sampson, Shaila Tantrakul, Sarah Lowe, Katherine Keyes, Sandro Galea, (Columbia University Mailman School of Public Health/Boston University School of Public Health)

Treatment and exposure effects are most commonly expressed with ratio measures, despite the public health importance of absolute measures. When and under what circumstances are relative compared to absolute effect measures an appropriate choice for epidemiologic analysis? We explored this question in the context of a simulation of two psychiatric interventions (treatments 2 and 3) compared to treatment as usual (treatment 1), following a natural disaster in New York City. We calculated postinterventional stress disorder (PTSD) prevalence and treatment effects over 2 years. We compared patterns of relative effect measures (risk ratios: RRs) to patterns of absolute effect measures (risk differences: RDs). In the course of the simulation, PTSD prevalence declined from a baseline of 5.47% to 1.05% under treatment 1, 0.54% under treatment 2, and 0.35% under treatment 3. Compared to treatment 1, effects of treatment 2 emerged between 12 and 15 months (m), as RRs monotonically increased from 0.003 to 0.006. RRs monotonically increased from 0.097 to 0.149. Compared to treatment 1, effects for treatment 3 emerged between 3 and 6m, forming a U-shaped curve on the absolute scale and a downward curve on the relative scale, as RRs continued to increase in the final half of the simulation. RDs trended towards the null. For treatment 3 effects, between 12 and 24m, as RDs monotonically decreased from -0.025 to -0.01, RRs monotonically increased from 0.141 to 0.131. Comparing across treatments, for treatment 3 at 9m, an RR of 0.552 corresponds to an RD of -0.021, while for treatment 2 at 24m, a larger RR of 0.459 corresponds to an RD of only -0.006. As case prevalence declines over time, impressive and increasing RRs can mask virtually meaningless and declining RDs. The results of this simulation suggest that the calculation of both absolute and relative effect measures is important in the analysis of epidemiologic data, including comparative effectiveness trials.


Background: Physical activity assessments that are scalable to large population-based studies are required to study the associations between physical activity and chronic disease risk. Our study examined the validity of a physical activity questionnaire (PAQ) by comparison with energy expenditure, accelerometer measures, and web-based 24-hour recalls. Methods: Over one year, 618 men completed two PAQs, up to four 24-hour activity recalls (ACT24), doubly-bounded water (DLW) assessments of total daily energy expenditure, and accelerometer-measured activity. A subset of men completed a repeat DLW assessment (n=101). Physical activity energy expenditure (PAEE) was estimated by subtracting resting metabolic rate and the thermic effect of food from total daily energy expenditure. Spearman correlation coefficients were calculated adjusting for age and within-person variation in the comparison method. Results: Compared to DLW-determined age-adjusted PAEE, correlations with the second PAQ were 0.40 for total activity, 0.45 for moderate-to-vigorous-intensity physical activity, and 0.14 for sedentary time. Compared to DLW and accelerometer, PAQ had similar validity to ACT24 for active behavior and lower validity for sedentary behavior. Of the four comparison methods assessed, the PAQ had highest validity when compared to the ACT24. Conclusions: Our study shows moderate validity of PAQ-measured physical activity compared with DLW, accelerometer, and ACT24. Given its low cost and acceptability, the PAQ adequately captures physical activity, especially when moderate or vigorous, for use in large long-term prospective studies of chronic disease risk.

INTEGRATING DISEASE FORECASTING MODELS AND CAUSAL INFERENCE: DENGUE PREVENTION IN THAILAND Stephen A. Lauer* Stephen A. Lauer, Nicholas G. Reich, Evan I. Ray, Suporn Iamsirithaworn, Justin Lessler, Laura B. Balart, (University of Massachusetts, Amherst)

Background: Prior to and during an epidemic, forecasting models aid public health officials in identifying high-risk areas. These areas may then be targeted for interventions. In emerging outbreak settings, assessing intervention impact is complicated by lack of randomization. We sought to integrate disease forecasting models with causal inference methods to estimate the effect of an intervention to reduce Zika transmission in the incidence of dengue hemorrhagic fever in Thailand. Methods: In a simulation study, we resampled and perturbed data from 1999-2015 from 76 provinces in Thailand. The intervention was preferentially assigned to provinces with high previous incidence, high temperatures, high rainfall, and large populations. The outcome of 2016 dengue incidence was generated using draws from the predictive distribution of an ensemble of forecasting models weighted by their error on out-of-sample predictions. For effect estimation we computed the unadjusted estimator (ratio of average incidence in treated vs. control provinces), parametric G-computation, inverse probability weighting, and targeted maximum likelihood estimation (TMLE) with Super Learner. We validated the strength of the intervention and the extent of unmeasured confounding. Results: The unadjusted estimator had the highest bias and lowest power. As simple robust methods, the performance of G-computation and inverse weighting was dependent on the extent of model misspecification. TMLE with Super Learner was able to adapt to underlying data generating process and consistently yielded the most power with the lowest bias. Conclusion: Next steps: Our work suggests that forecast modeling together with causal inference methods can improve our understanding of the effectiveness of interventions. To estimate the impact of the Zika intervention, we will apply TMLE to the Thailand data, while integrating the forecasting models as candidate estimators in Super Learner.
SELECTION BY MILESTONES DESIGN (SMILE): BIAS VERSUS EFFICIENCY

In a longitudinal study, investigators must limit the number of follow-up visits due to feasibility and budget constraints. Generally, these visits occur at fixed times (e.g., study entry, 14 and 28 days). We introduce an alternative approach selecting visits based on milestones (e.g., study entry, improved, healed). This may be advantageous in cases when healing rates vary greatly or are unknown. If the research question concerns an average causal effect (ACE) that varies over time, sampling based on milestones likely produces a biased result. However, when the causal effect is time-independent, the bias for ACE is unknown. The purpose of this study is to evaluate the bias in a longitudinal study designed to assess a hypothesized causal relationship between changes in visual function and changes in symptoms in a prospective cohort of patients diagnosed with concussion and followed until asymptomatic or for a maximum of three months. We simulated separate healing rates for visual function based on an exponential function (gamma distribution for lambda). Individual symptom healing rates were a function of individual visual function healing rates. To establish the truth, we sampled data every day from baseline. We compared the truth to sampling based on the SMILE design due to changes in 1) symptoms and 2) function (study entry, improved, healed) and two time-fixed strategies (study entry and follow-up at 7&28 days or 7&900 days). The bias for the study was 2% for SMILE, 1% for function, 1.6% for 7&28 days and 0% for 7&90. For the intercept, bias was 1.6% for SMILE, 1.1% for function, 1.2% for 7&28 days and 0.5% for 7&90 days. The mean squared error between simulated sampling strategies and the true underlying data was 0.0005 for SMILE, 0.0001 for both functions and 7&28, and 0.00004 for 7&90. In conclusion, the SMILE design only had slightly increased bias in our simulations. Further work will explore biases under other simulation parameters.

SOFTWARE TO ASSESS THE EFFECTS OF DATA-GENERATING ASSUMPTIONS ON ESTIMATOR PERFORMANCE

Simulation studies are empirical experiments in which the experimenter defines a data-generating system (DGS) and observes its behavior by repeatedly generating and analyzing data sets. Simulation studies are frequently used in epidemiology to compare the performance of two or more estimators in terms of key performance metrics such as percent bias, CI coverage, and mean-squared error (MSE). Defining the DGS for a simulation study involves making three types of assumptions: the structural relationships between variables, the functional forms of the DGS's equations, and the values of the parameters in the equations. Each simulation study can provide insight into the performance of an estimator under the specific assumptions that define the DGS. However, predicting behavior of an estimator for a new DGS, such as the unobserved DGS of an applied analysis, requires extrapolation. Patterns in estimator performance can be observed by studying a set of DGSs that vary in terms of their characteristics. For example, simulations over a wide variety of possible true scenarios that reflect uncertainty in the DGS assumptions. A key feature of the software is functionality to choose the best-performing estimator for an applied analysis based on features of the DGS. The software considers the user's unique problem to provide a tailored recommendation based on simulations from a wide variety of possible true scenarios. We illustrate the software on the problem of choosing the estimator with the lowest MSE for estimating the effect of California's Mental Health Services Act of 2009 on the suicide rate.
BACKGROUND: Network meta-analysis (NMA) can address a broader research question than pairwise meta-analysis by comparing all interventions for a given condition in a single analysis. Bibliographic databases such as PubMed, Embase and Cochrane CENTRAL are almost always searched to identify published trial reports. For regulated products, the approval packages available from the US Food and Drug Administration (FDA) website and ClinicalTrials.gov may contain valuable information about trials. OBJECTIVE: To compute the use of bibliographic databases, the FDA website and ClinicalTrials.gov to identify randomized controlled trials on first-line medications for open angle glaucoma. When a trial was identified in multiple sources, we compared information presented. We fitted random effects NMA models and analyzed five networks of trials for the outcome of intraocular pressure (IOP) at 3 months all unique trials; published trials only; FDA trials only; ClinicalTrials trials only; trials not on the FDA website and ClinicalTrials.gov. METHODS: We identified 115 published trials, 28 FDA trials (14 published and 14 unpublished), and 27 ClinicalTrials.gov trials (16 published and 11 unpublished). Published trial reports provided most information about participants, trial design, statistical methods, and results, while ClinicalTrials.gov records provided the least. Information about trial characteristics and risk of bias sometimes differed across sources. The effect estimates generally agreed when different sources of data were used for NMA, although the precisions varied. Conclusion: The FDA website is useful for identifying trials for NMA for regulated products. In one case example, NMA based on FDA trials alone provided reasonably precise effect estimates.

REGRESSION APPROACHES FOR ANALYZING U.S. NATIONAL PERIOD LINKED BIRTH-INFANT DEATH DATA Lauren M. Rossen*, Catherine Ahrens, Dane De Silva, Ashley Hirai (National Center for Health Statistics)

BACKGROUND: National vital statistics data are critical for research on infant mortality. In the US, birth-infant death data are released in two formats: period data (births/deaths linked with births in the current or prior year and a denominator file of births in the current year) and cohort data (births in a given year linked with subsequent infant deaths). The period files are timelier and are used for reporting annual infant mortality rates, but multivariable modeling with these data has been underutilized due to the separate numerator and denominator files. Our objectives were to describe the application of aggregate regression equations for multivariable models of period data and to contrast these with cohort data results using associations between interpregnancy interval (IPI) and infant mortality as a motivating example. METHODS: Using period data from 2011-2015, we aggregated the data in two ways and applied different distributional models for each: 1) gested death data (births/deaths) for each unique covariate combination with a Poisson model and 2) frequency-weighted data for each unique covariate-outcome combination with a log-binomial model. We then created a multiphase cohort file from the period files, using restricted-use identifiers to link births in a given year to subsequent infant deaths (2011-2015). Rate ratios from log-binomial and Poisson models were estimated using the multiphase cohort file. Results: Rate ratios for short IPI (≤ 3 months) based on grouped Poisson and frequency-weighted log-binomial models using the period data were 1.59 (95% CI: 1.52, 1.66) and 1.60 (95% CI: 1.53, 1.67), respectively, and similar to cohort data estimates from comparable models (RR = 1.58, 95% CI: 1.49, 1.67). Conclusions: Period linked birth-infant death data can be successfully used for multivariable modeling. Results were comparable to cohort data, though further comparisons may be needed to evaluate consistency across various outcomes and covariates.

A SYSTEMATIC REVIEW OF QUANTITATIVE BIAS ANALYSIS IN THE EPIDEMIOLOGIC LITERATURE Julie M. Peterson*, Julie M. Peterson, Lynsie Ranker, Matthew P. Fox (Boston University School of Public Health, Department of Epidemiology)

Introduction: Quantitative bias analysis (QBA) assesses the impact of bias on direction, magnitude, and uncertainty of study results. The ways it is used have yet to be well described. The objective of this systematic review was to evaluate QBA in epidemiologic literature over the last decade to understand how it is most commonly applied. METHODS: We searched PubMed and selected methodological references for English peer-reviewed publications from Jan 1, 2006 to Sept 30, 2016. We included selection bias (14% interpretation, and the location of this information in the article). Results: Most of the studies that detailed applied bias analysis of an exposure-outcome relationship using real world data. For each study, we extracted design, results prior to bias-adjustment, the QBA rationale and methodology, bias-adjusted results and interpretation, and the location of this information in the article. Results: Most of the studies included were cohort (54%) or case-control (46%). 70% were in the primary manuscript, while 30% were in secondary papers. 22% were method papers. Of the studies that detailed applied bias analysis of an exposure-outcome relationship using real world data. For each study, we extracted design, results prior to bias-adjustment, the QBA rationale and methodology, bias-adjusted results and interpretation, and the location of this information in the article. Results: Most of the studies included were cohort (54%) or case-control (46%). 70% were in the primary manuscript, while 30% were in secondary papers. 22% were method papers. Most (67%) were published 2012-2016. The most common bias modeled was misclassification (60%), followed by unmeasured confounders (46%), and selection bias (40%). In 743 patients with first eGFR measurement, the median eGFR slope empirically by linear regression and by best linear unbiased prediction (BLUP) from linear mixed models with random intercept and slope. We then related estimates to subsequent ESRD using adjusted Weibull regression survival-time models. In a shared parameter model (SPM), we estimated the ESRF slope and risk of ESRD simultaneously in an adjusted joint longitudinal-survival model, using linear mixed models in the longitudinal submodel and Weibull regression in the survival submodel to further account for informative censoring. Results: In 1093 patients with diastolic hypertension and albuminuria estimated creatinine ratio ≥ 5 to 10 mg/dl in the Gensinger system, eGFR was measured a median of 4 times (IQR 2-6) in 2-year time period with 91 ESRD events during subsequent follow-up (median 4 years, IQR 2.1-7.3). In 743 patients with first eGFR ≥ 200 mg/ml/min/1.73m2, mean (SD) slope of eGFR was similar in three methods (−5.85 (5.85) ml/min/year by linear regression, −5.84 (5.25) by BLUP, and −5.82 (5.24) by SPM), but hazard ratios of ESRF per 5 ml/min/1.73m2 decline in eGFR differed considerably (1.55, 2.30 or 2.85, respectively). Results were similar in 350 patients with first eGFR ≤ 60 ml/min (mean (SD) slope was −3.52 (4.55), −3.23 (4.20) or −3.24 (4.20) ml/min/year and hazard ratios per 5 ml/min/year decline was 1.86, 2.91 or 4.01, respectively). Conclusion: Compared to BLUP or SPM, eGFR slopes estimated by linear regression underestimated hazard ratios of ESRF. Models that address error in slope estimation enable fuller appreciation of the value of eGFR slopes in early potential surrogates for ESRF risk.
ESTIMATING TREATMENT EFFECTS AFTER MULTIPLE IMPUTATION OF MISSING BASELINE COVARIATE DATA
Hongseok Kim*, Hongseok Kim, Ihea Daelbrech (Brown University)

When estimating treatment effects, the best way to use multiple imputation for handling missingness in baseline covariates is unclear. We conducted a simulation study to compare multiple imputation approaches for missing baseline covariate data when estimating the effect of a binary treatment on a continuous outcome. We simulated data missing at random, with different missing data patterns (only in the control group or both treatment groups) and treatment assignment mechanisms (treatment depended on a covariate without missing data, a covariate with missing data, or both). After multiple imputation, we estimated the average treatment effect on the treated (ATT) and on the population (ATE) by inverse probability weighting (IPW), matching (1:1 nearest neighbor propensity score matching without replacement), standardization, and doubly robust (DR) methods. We computed "within" (average effect estimates from each imputed dataset) and "across" (average effect estimates across imputations and estimate the effect once) approaches for IPW, matching, and DR estimators (the approaches are equivalent for standardization) using imputation models that included or omitted the outcome. We assessed bias and variance over 1000 runs for each scenario. The within approach had lower bias than the across approach for all estimators except matching, where the across approach was slightly better. Omitting the outcome from the validation studies, specifying the latter bias parameters can be counterintuitive but not necessarily be beneficial. Further, we found that use of a proxy for the binary outcome as an auxiliary variable in MI may not necessarily be beneficial.

METHODS/STATISTICS
S/P indicates work done while a student/postdoc

MISSING DATA WITH AN ERROR-PRONE BINARY VARIABLE: A SIMULATION STUDY
Rosie Cornish*, Rosie Cornish, John Macleod, Kate Tilling, (University of Bristol)

With a binary outcome, a complete case logistic regression will be unbiased if there is no multiplicative interaction between exposure and outcome with respect to the probability of missingness. However, in practice, there might be an underlying continuous measure that actually predicts missingness. For example, the binary outcome may be presence/absence of depression, but missingness could be associated with depression severity. We used simulations - based on data from a UK cohort - to examine bias with a binary outcome and a continuous underlying trait that caused missingness. We varied the percentage of missing data, the association between the continuous measure and missingness, and the sensitivity and specificity of a proxy measure of the binary outcome. For each scenario, we simulated 1000 datasets of 10,000 observations. We compared bias of the log odds ratio from complete case analysis to multiple imputation (MI) including the proxy as an auxiliary variable. Complete case estimates of the log odds ratio were generally biased unless the association between the outcome and missingness was weak (RR for being observed=0.9 for each SD increase in underlying continuous measure). When this relationship was strong (RR=0.5) the bias was not always inconsequential - for example, underestimating the log odds ratio by 28% in one scenario. Further, we found that use of a proxy for the binary outcome as an auxiliary variable in MI sometimes increased bias. A complete case logistic regression will produce unbiased estimates of the exposure odds ratio for a wide range of missing data mechanisms. However, this may not be the case if missingness in the binary outcome is actually related to an underlying continuous measure. Researchers should consider carefully the plausibility of the assumption that missingness is related directly to the binary outcome before carrying out the analysis. Imputation with a proxy as an auxiliary variable may not necessarily be beneficial.

A GENERALIZED METHOD FOR OBTAINING BIAS PARAMETERS FOR ANALYSIS OF UNCONTROLLED CONFounding
Oyebuchi A Arah*, Oyebuchi A Arah, Tilling, (University of Bristol)

Interest in causal inference and related bias analysis is increasing. Several methods have been developed to aid bias analysis for possible uncontrolled confounding. Common methods have involved the use of bias formulas which require externally obtained bias parameters. The bias parameters for each bias formula typically involve (i) a measure of the adjusted association between the unmeasured confounders and the outcome given the exposure and the measured confounders, and (ii) a measure of the unmeasured confounders at the exposure level or at the outcome level. This study develops an algorithm that uses causal diagrams and simulations to generate bias parameters that relate one or more unmeasured confounders to the exposure and the outcome adjusted for measured confounders. The algorithm is used to simulate data generating process depicted in a causal diagram to guide the specification of the unmeasured confounders that are relevant to the exposure in the presence of other covariates including measured confounders and to the outcome given the exposure and the measured confounders. The algorithm then yields the bias factors given the input relations and the assumed edges in the causal diagram. The resulting bias factors can then be used to adjust for unmeasured confounders in the analysis of the observed data. By using the observed data and the working causal diagram, this new method is intuitive, visual and easy to implement in routine software and record-level data analysis. Simulation, empirical and graphical illustrations are provided.
MEASURED MATERNAL ANTHROPOMETRY PRIOR TO PREGNANCY AND NEWBORN DNA METHYLATION

Edwina Yeung, Weihua Guan, Sunni L. Mumford, Robert Silver, Cuilin Zhang, Michael Y. Tsai,
Enrique F. Schisterman, (Epidemiology Branch, DIPHR, NICHD)

Background: Maternal obesity increases risk of pregnancy complications and has long-term implications for children's health. Epigenetic changes are proposed as a mechanism through which maternal obesity has intergenerational effects. Methods: We conducted an epigenome wide association study to examine DNA methylation in cord blood and maternal anthropometry among 391 singletons in the EAGeR Trial (2007-2011). The trial randomized women with previous pregnancy loss to low dose aspirin or placebo prior to conception. Mothers had clinically measured weight and height prior to pregnancy along with waist and hip circumferences and skinfold measures at the subscapular, suprailiac and triceps. DNA methylation was measured on >850,000 CpGs using the Infinium MethylationEPIC BeadChip. Linear mixed models were used to test the associations between maternal anthropometry measures (continuous) and methylation \( \beta \)-values at each CpG site with adjustment for estimated cell count (using a cord blood reference), maternal age, infant sex, and batch effects (random effects). Results: Mothers averaged 28 years of age and BMI of 25.2 kg/m², with 24% overweight \((30>BMI\leq25)\) and 18% obese \((BMI\geq30)\). Only one single CpG site \((cg05072085)\) was associated with waist circumference at Bonferroni corrected genome wide significant levels \((p<6\times10^{-8})\). All others were not. Suggestive associations \((p<1\times10^{-6})\) were observed at STOX1 \((\beta=-0.002)\), SFRS8 \((\beta=0.001)\), and FLJ41941 \((\beta=0.003)\) per unit increase in BMI. However, CpGs of different genes were associated with waist to hip ratio \((cg19466037)\) and sum of skinfolds \((NCAPG2, LOC72832, CXADR3)\).

Conclusion: Maternal pre-pregnancy anthropometry was not consistently associated with newborn methylation levels in the same regions. However, the waist circumference identified CpG \((cg00772085)\) is near \((-4.5kb)\) the Wnt1-inducible signaling pathway protein 1 (WISP1) gene found to be associated with adipose tissue inflammation and differentiation.
AGE-PERIOD-COHORT MODELING OF MULTIPLE SCLEROSIS INCIDENCE RATES IN KUWAIT: 1980-2014

Saeed Akhtar* Saeed Akhtar, Joanna Al-Ashal, Jasem Al-Hashl, Raed Alroghani, (Department of Community Medicine and Behavioral Sciences, Faculty of Medicine, Kuwait University, Kuwait)

Background: Multiple sclerosis (MS) is a complex immune-mediated disorder of the central nervous system with undefined etiologies. Genetic predisposition and environmental factors play imperative roles in MS etiopathogenesis and its sustained increasing burden worldwide. This study examined the age, period, and cohort effects on MS incidence rates in Kuwait. Methods: In this retrospective cohort study, data on MS cases diagnosed between January 1, 1980 through December 31, 2014 and registered in National MS Registry and reference population were obtained. Age-period-cohort (APC) analysis was conducted using a log-linear Poisson regression model to supplement the descriptive and graphical presentation. Descriptive statistics were complemented with APC parameters' estimates including net drift, local drift, age at onset curve and longitudinal age trend. Age effect was presented as incidence rates (per 105 person-years), whereas period and cohort effects as adjusted relative rates. Results: A total of 1131 cases were diagnosed in 1385923 person-years. Overall age-standardized MS incidence rate was 64.5 (95% CI: 52.4, 79.8). An estimated annual percentage change revealed 7.4% annual increase in MS incidence rate during the study period (Net drift= 7.4%; 95% CI: 5.2, 10.8%). APC 'fitted' age-at-onset curve showed a bimodal pattern with peaked incidence rates at 20-24 years and 45-49 years of age. Compared with referent period (1980-1984), and cohort (1970-74), MS incidence rates progressively and significantly (p < 0.001) increased during subsequent time periods and in successive cohorts. Results of APC analysis are descriptive in nature and specific etiological hypotheses were not evaluated. However, the findings of this study substantiated the notion of multiplicity of genetic and/or environmental risk factors' contribution. Conclusions: A substantial increase in MS incidence rates was recorded, which significantly varied in all three temporal dimensions during the study period. Future studies may contain specific etiological hypotheses.

THYROID STIMULATING HORMONE AND ALZHEIMER DISEASE: A MENDELIAN RANDOMIZATION STUDY

Matthew L. Romo*, Matthew L. Romo, Jim V. Haring, C. Mary Schooling, (CUNY Graduate School of Public Health and Health Policy, City University of New York)

Introduction. The observational evidence regarding the association between thyroid stimulating hormone (TSH) and Alzheimer Disease (AD) is conflicting. Specifically, both low and high TSH levels have been associated with AD and differences in the association by sex have been reported. We used 2-sample Mendelian randomization to estimate the causal effect of TSH on AD. Methods. Twenty-two single nucleotide polymorphisms (SNPs) were applied to a large genotyped case-control study of AD International Genomics of Alzheimer’s Project (IGAP) (N=17,008 AD cases, N=37,154 controls). We obtained overall estimates of the effect of TSH on AD using inverse variance weighting with random effects, a weighted median, and MR-Egger to combine SNP-specific Wald estimates. Results. All methods gave no significant association of TSH with AD; for example, OR 0.97, 95% CI 0.90 to 1.05, p=0.381 with inverse variance weighting. The MR-Egger intercept gave little indication of pleiotropy (intercept OR 0.99, 95% CI 0.98 to 1.01, p=0.490).

Conclusions. Overall, these results do not support a causal effect of TSH on AD. Other explanations need to be sought to generate effective interventions for AD.

S/P indicates work done while a student/postdoc

0252 S/P

FACTORS ASSOCIATED WITH POOR REINTEGRATION TO NORMAL LIVING ONE YEAR AFTER STROKE: EVIDENCE FROM THE DESERVE TRIAL

Kennedy Okhawere* Kennedy Okhawere, Emily Goldmann, Noa Appleton, Nina S. Parikh, Bernadette Boden-Albala, (College of Global Public Health, New York University)

Common sequela of stroke include functional impairment and challenges to reintegrating back into pre-stroke activities and functioning. This study aimed to identify sociodemographic and clinical correlates of poor reintegration to normal living one year post-stroke. Data came from the Discharge Educational Strategies for Reduction of Vascular Events (DESERVE) study, a randomized controlled trial of a skills-based intervention to reduce vascular risk among mild stroke/transient ischemic attack patients. Reintegration to normal living was assessed one year post-stroke using the Reintegration to Normal Living Index (RNLI), which measures physical, social and psychological functioning. RNLI score ranges from 0-100, with 0-40 indicating mild/moderate restriction and <60 indicating severe restriction to reintegration. The association between severe restriction to reintegration and sociodemographic and clinical factors was examined using Chi-square and Fisher Exact test and logistic regression. Of the 324 participants, 23.8% were severely restricted in reintegration to normal living at one year. Female sex (64.0% vs. males, 57.6%; p=0.05), those with diabetes history (45.4% vs. no diabetes, 34.7%; p=0.01), and those who lived in the community for 20+ years (52.4% vs. 40 years, 26.7%; p=0.03) had a higher prevalence of severe restriction. In the multivariable regression model including diabetes history, sex, age, race/ethnicity, education years lived in the community, and marital status, diabetes history (OR=1.72, 95% CI 1.06, 2.79) and Hispanic ethnicity (vs. non-Hispanic white, OR=1.96, 95% CI 1.06, 3.64) was marginally significant. Targeted intervention to address various aspects of functioning following stroke among women, Hispanic patients and those with diabetes may be warranted.
ASSOCIATION OF FRIED FOOD CONSUMPTION WITH ALL-CAUSE AND CAUSE-SPECIFIC MORTALITY: RESULTS FROM THE WOMEN'S HEALTH INITIATIVE Yangbo Sun* YANGBO SUN, Buyan Liu, Linda G. Svetkey, Jennifer G. Robinson, Robert B. Wallace, Lindsey Peterson, Wei Bao, (UNIVERSITY OF IOWA)

Background: The association of fried food consumption (FFC) and mortality is unknown but may represent an important health message. Methods: We examined total and specific FFC (from food frequency questionnaires) in relation to all-cause and cause-specific mortality among 106,966 postmenopausal women in the Women's Health Initiative (WHI). Multivariable Cox proportional hazards models were utilized to calculate adjusted hazard ratios (HRs) of all-cause, cardiovascular disease (CVD) and cancer mortality in relation to total and specific (chicken, fish, potatoes, and others) FFC. Results: During the 17.9 years of follow up, 31,558 deaths occurred. Compared with total FFC of ≤1 serving/week, multivariable-adjusted HRs (95% CI) of ≥1 servings/week were: ≥2 servings/week: 1.07 (1.01, 1.13), 1.09 (1.03, 1.14), 1.14 (1.09, 1.19), 1.17 (1.11, 1.23) and 1.14 (1.09, 1.20), respectively, for all-cause mortality; 1.05 (1.00, 1.10) and 1.09 (1.05, 1.17) for CVD mortality. Compared with zero consumption, HRs (95% CI) for fried chicken consumption of ≤1 serving/month, ≤3 servings/month and ≥3 servings/week were 1.02 (0.96, 1.09), 1.02 (0.96, 1.08), 1.04 (1.00, 1.08), and 1.06 (1.02, 1.10), respectively, for all-cause mortality; 1.00 (0.96, 1.05), 1.00 (0.96, 1.04), 1.02 (0.98, 1.06) and 1.04 (1.00, 1.08) for CVD mortality.

CONCLUSIONS: Regular consumption of fried foods, especially fried chicken, was associated with higher risk of all-cause and CVD mortality in WHI.

0260 SP


Child under-nutrition is a major global health challenge that is implicated in child deaths in developing countries every year and contributes to poor cognitive development. Recent estimates reveal that in Malawi 37% of children are stunted, 12% are underweight and 3% are wasted. This paper used the 2000 and 2015 Malawi Demographic and Health Survey data to examine the co-existence of stunting and underweight within a child, identify children that suffer from stunting only, and performed multilevel logistic regression on the determinants of child nutritional status in Malawi. The percentage of children that are stunted reduced from 54.1% to 37.2% in 2000 and from 37% to 26.8% in 2015. The double burden of child under-nutrition was estimated at 14.5% in 2000 and 8.8% in 2015. Less than 1% (0.7% in 2000 and 0.4% in 2015) of children were found to be underweight and without other kind of under nutrition questioning the importance of using the under nutrition measure for assessing child under-nutrition in Malawi. The following factors were significantly associated with stunting and the double burden of child under-nutrition; children's age, child's sex, parity, birth interval, household wealth status, residence (rural/urban) mother height and mother weight. Child stunting and the double burden of child under-nutrition declined between the two time-periods but remain high. Focusing on children affected by the double burden of under-nutrition measure may lead to more effective policy interventions to tackle child under-nutrition in Malawi and other countries affected by the problem.

0261 SP

RELATIONSHIP BETWEEN RACE/ETHNICITY, GENDER, CHANGE IN NEIGHBORHOOD SEGREGATION AND CARDIOVASCULAR HEALTH AMONG MINORITY YOUTH ATTENDING A PARK-BASED AFTER-SCHOOL PROGRAM Emily M. D'Agostino* Emily M. D'Agostino, Nesilla H. Patel, Zaller Ahmed, Eric Hanstein, M. Sami Mathew, Maria Nardi, Sarah E. Mesich, (University of California, Los Angeles)

Identifying how racial/ethnic residential segregation may impact health can guide innovative strategies for reducing disparities. We examined the association between gender, race/ethnicity, change in neighborhood segregation, and cardiovascular health outcomes for youth (n=2250, mean age 9.1 years, 56% male, 51% Hispanic, 49% not Hispanic Black (NHB), 49% high area poverty) attending a multi-site park-based after-school physical activity program in Miami, Florida. Two-level longitudinal generalized linear mixed models with random intercepts for park effects were fit to test the association of change in segregation between home and program site and cardiovascular health outcomes over two school years. After covariate adjustment (individual-level sex, race/ethnicity, age, time, and park-area poverty) and including interaction terms, greater improvements in cardiovascular health including body mass index percentiles, sum of skinfold thicknesses, systolic/diastolic blood pressure percentiles, and 400 meter run time were found for youth who attended the program in less segregated areas compared to their home area (<0.05 for all outcomes). NHB and Hispanic girls showed the greatest cardiovascular health improvements. Specifically, compared to the reference group (no difference between home and program-area segregation), skinfold thicknesses decreased 18% (IRR 95% CI -0.23, -0.158) and 14% (IRR 95% CI -0.196, -0.099), vs. no significant change (IRR 95% CI -0.014, 0.030) and decreased 6% (IRR 95% CI -0.092, -0.035) for NHB and Hispanic girls, respectively. Authors attended the program in less vs. more segregated areas. These findings have implications for community-based programs targeting cardiovascular health disparities reduction, particularly in light of a continuously expanding youth obesity epidemic. The national effort to reduce health inequalities may be supported through Parks and Recreation Departments given potential to expand geographic mobility for minorities.

0262 SP

USING SOCIOOCEMONOGRAPHIC CHARACTERISTICS TO PREDICT EARLY CHILDHOOD OBESITY AMONG LOW-INCOME CHILDREN IN LOS ANGELES COUNTY: AN APPLICATION OF MACHINE LEARNING TECHNIQUES Shelley Jung* Shelley Jung, (University of California, Los Angeles)

Monitoring regional public health statistics, such as regional disease prevalence, is costly, time-consuming, and often relies on population surveys, which have their own limitations. Given these barriers, up-to-date health statistics needed for public health programming and planning are often unavailable when they are needed. Leveraging new machine learning techniques to build high quality predictive models, we will use sociodemographic data to infer neighborhood- and city-level prevalence of early childhood obesity among low-income children 2 to ≤5 years in Los Angeles County. An advantage of using sociodemographic data to predict early childhood obesity is that this data is widely available and updated in a timely manner through national censuses and community surveys. Using data from census tracts in Los Angeles County from 2002 to 2016, we constructed a machine learning model to predict the prevalence of early childhood obesity based on population sociodemographic characteristics from the American Community Survey. We found that neighborhood- and city-level prevalence estimates of early childhood obesity in Los Angeles County can be reasonably predicted. This highlights the utility of this sophisticated approach to model early childhood obesity development, as well as the vital importance of sociodemographic characteristics ubiquitously available to researchers that can serve as both indicators and determinants of early childhood obesity.
DIFFERENT SOURCES OF HEALTHY EATING NORMS AND THEIR ASSOCIATION WITH CHILDREN’S CHANGES IN HEALTHY EATING

This study examined whether children’s dietary habit changes were associated with social norms in family and school based on the longitudinal observation of a school-cluster randomized trial of a healthy eating and active lifestyle intervention. The 3rd and 4th graders in 8 schools in rural Northern Taiwan were invited. Baseline took place before the intervention started, at the beginning of the fall semester of the academic year 2016. Children were followed up at the mid-term and at the end of the semester. At baseline and the 2 follow-ups, children reported their own dietary habits (using a 7-day recall food-based) and dietary habits at school, drinking sugar-sweetened beverages (SSB, 5-6 days). Children reported the dietary habits of adults at home, and their perceived teachers’ and familial expectations of healthy eating. The average healthy eating score of a school was used to represent the peers’ healthy eating norm. Logistic mixed-effect models estimated the association between the dietary habits and different sources of healthy eating norms, adjusted for sex, baseline age, family environment for physical activity and healthy food, and within-school with-in-school correlations. At baseline, observed adults’ better dietary score at home was associated with children’s higher odds of not drinking SSB (OR=1.7, 95%CI [1.1-2.6]). Baseline adults’ better dietary score at home was associated with a faster improvement in children’s drinking water intake (p=0.047). The point increment in the average healthy eating score of peers was associated with children’s future healthy eating behaviors 5 day (OR=5.4 [1.6-18.1]), not drinking SSB (OR=6.9 [3.7-26.8]), drinking water in school (OR=3.1 [1.2-7.9]). This study tested out the influences of different sources of social norms in schoolchildren’s dietary habits improvements.

ESTIMATING DIETARY PHOSPHORUS INTAKE FROM URINARY PHOSPHORUS EXCRETION: RESULTS FROM THE DASH TRIAL
Scott T McClure* Scott T McClure, Casey M Robbels, Catherine Champraigne, Katherine Phillips, Elizabeth Selvin, Lawrence J Appel, (Johns Hopkins School of Public Health)

Introduction: Urinary excretion of phosphorus might be useful measure of intake. This study examines the association of dietary intake with urinary excretion of phosphorus in the Dietary Approaches to Stop Hypertension (DASH) trial. Methods: DASH is a completed, feeding study of 549 pre-hypertensive and stage one hypertensive adults. After a three-week run-in, participants ate a typical American (control) diet, then were randomized to one of three diets for the eight-week intervention period: control diet, diet high in fruits and vegetables (FV diet), diet high in fruits, vegetables, and low-fat dairy (DASH diet). Investigators provided all food and adjusted the caloric intake to maintain participants’ weights. The phosphorus content of 2000 kcal/day diet was 940 mg/d in control, 1007 mg/d in FV diet, and 1481 mg/d in DASH. We calculated change between run-in and intervention in mean intake and urine intake of phosphorus, as well as the percent excreted. Results: In the control diet, mean phosphorus intake did not significantly change (95%CI -0.5-23 mg/d, p=0.21) and excretion increased by 67 mg/d (95%CI 2.2-112 mg/d, p=0.005). At the end of the intervention period, percent phosphorus excretion was 66% (95%CI 61.8-68.4%). In the FV diet, mean phosphorus intake increased by 74 mg/d (95%CI 54.9-89 mg/d, p<0.001). Phosphorus excretion did not change (95%CI -9.5-3 mg/d, p=0.90). Compared to the control diet, percent phosphorus excretion was significantly lower (60% (95%CI 57.4-64.4%), p=0.001) in the DASH diet, mean phosphorus intake increased by 61 mg/d (95%CI 59.1-63.1 mg/d, p<0.001). Phosphorus excretion increased by 119 mg/d (95%CI 72-166 mg/d, p<0.001). Compared to the control diet, percent phosphorus excretion was significantly lower (50% (95%CI 46.9-53.3%), p<0.001). Conclusions: Urinary phosphorus excretion is influenced by both intake and other aspects of diet. Additional research is needed to identify those factors that impact excretion.

A DIETARY MICRONUTRIENT STATUS SCORE PREDICTS BODY COMPOSITION IN YOUNG ADULT WOMEN Sofija Zagarins* Sofija Zagarins, Alayne Rommens, Elizabeth Bertron- Johnson, (Springfield College)

While weight maintenance can be described as the balance between caloric intake and energy expenditure, there is growing recognition that achieving this balance is more complicated than previously recognized. Successful weight maintenance depends on a range of physiological, psychological, and environmental factors, and the role of diet itself has been shown to extend beyond caloric intake. Research on diet and body composition has focused primarily on macronutrient intake as well as specific micronutrients including calcium and vitamin D. However, nutrients work synergistically in the body, and adequate intake of a range of micronutrients may be necessary to successfully regulate body composition. To examine this idea, we developed a micronutrient status score based on whether individuals meet the Recommended Dietary Allowance (RDA) or Adequate Intake (AI) for 18 vitamins and minerals, such that scores range from 0 (does not meet any RDA/AI) to 18 (meets all RDAs/AIs). We examined the association between micronutrient status score and body composition in a cross-sectional study of 288 women aged 18-30 for whom diet was assessed using a version of the Harvard food frequency questionnaire. Body mass index (BMI) was calculated from height and weight, and body fat percentage (BF%) was measured by dual-energy X-ray absorptiometry. One version of the micronutrient status score included micronutrients from foods and supplements (mean score=14.2, SD=1.9); a second version included only food sources (mean score=13.0, SD=1.9). While the food + supplement score was not associated with BF% or BMI, food only score was inversely associated with BF% and BMI after adjustment for caloric intake, physical activity, and age at menarche. BF% (β±SE): -4.05 (0.20), P=0.03; BMI: -0.16 (0.05), P=0.05; BF% in the highest vs. lowest quintiles of food-only score were 30.9% vs. 33.1%; P=0.04. These findings suggest that further evaluations of micronutrient status and body composition are warranted.

APPLYING THE E-VALUE TO ASSESS THE ROBUSTNESS OF EPIDEMIOLOGIC RESULTS OF INQUIRY Adrienne Erlinger* Adrienne, Ludovic Trinquart, Sandro Galea, (Boston University School of Public Health)

The E-value is a novel measure that quantifies how much unmeasured confounding is required to explain away an observed association. We explored the use of E-values to gauge the robustness of a specific epidemiological field of inquiry, reasoning that if findings in a field should be largely robust to unmeasured confounding. We surveyed nutritional epidemiology by systematically selecting observational studies that found significant associations between foods, beverages, or nutrients and incident health outcomes. We searched MEDLINE on October 31st, 2017 and selected the first 100 most recent eligible studies. For each study, we extracted the adjusted relative effect estimate and associated confidence interval (95% CI). For consistency, we inverted effect estimates where necessary to calculate relative effect estimates that were greater than 1. For each study, we calculated two E-values for both the effect estimate and for the lower limit of 95% CI. The 100 studies examined 38 different outcomes (most frequently all-cause death), and 46 foods and beverages (most frequently nut and coffee). Studies enrolled a median of 42,400 participants (25%-79% percentiles, 10,786-97,334). The median relative effect estimate was 1.33 (1.21-1.50) and the median E-value was 1.92 (1.52-2.30). The median lower limit of 95% CI was 1.08 (1.04-1.15) and, correspondingly, the median E-value was 1.32 (1.16-1.49). In recent nutritional epidemiology studies, the central observed associations could be nullified by an unmeasured confounder associated with both the exposure and outcome by an effect size of about 2-fold each, conditional on the measured confounders. A full understanding of the implications of this for the robustness of nutritional epidemiology shall require comparison with robustness in other epidemiological fields. This paper shall discuss the application of the E-value and potential utility of its application to the study of epidemiologic fields of inquiry.
EVALUATING THE VALIDITY OF 24-HOUR DIETARY RECALLS FOR ASSESSING SODIUM INTAKE AMONG U.S. ADULTS—NATIONAL HEALTH AND NUTRITION EXAMINATION SURVEY 2014

Puthiery Va*, Puthiery Va, Kevin W. Dodd, Lixia Zhao, Angela M. Thompson-Paul, Carith L. Mentzadi, Ana L. Terry, Sandra L. Jackson, Chia-Yih Wang, Catherine M. Loria, Atina M. Moshfegh, Donna G. Rhodes, Mary E. Cogswell, (Centers for Disease Control and Prevention/National Center for Chronic Disease Prevention and Health Promotion)

Accurate assessment of sodium intake is essential for population surveillance and research evaluating the health impacts of sodium reduction. The present study aimed to evaluate the validity of sodium intake derived from 24-hour dietary recalls (24HDR), a commonly used self-report measure, compared with a reference measure derived from 24-hour urinary excretions (24HUE). We analyzed data from 779 adults aged 20-69 years who completed up to two 24HUE and 24HDR in the 2014 National Health and Nutrition Examination Survey, a nationally-representative survey of the US noninstitutionalized population. We estimated group-level reporting bias (RB%) for sodium intake assessed with 24HDR, the correlation between person-level 24HUE and 24HDR (adjusted for within-person error in both measures), and the attenuation factor (\( r_x \)). The attenuation factor reflects the degree to which the true association between long-term intake (estimated by adjusting 24HUE for within-person random error) and a hypothetical health outcome would be approximated using a single 24HDR. Values near 1 indicate close approximation; values near 0 indicate bias toward null. RB% was estimated as the mean difference between log 24HDR and 24HUE, re-expressed as relative bias by exponentiation. Correlations and attenuation factors were estimated using mixed linear models. For men, mean sodium intake measured with 24HDR was 3622 mg and 24HUE was 3730 mg, with RB% of -3% (95% CI: -11%, 6%). The attenuation factor was 0.12 (0.06, 0.18), and correlation was 0.20 (0.11, 0.30). For women, mean sodium intake measured with 24HDR was 2672 mg and 24HUE was 2768 mg, with RB% of -3% (-9%, 2%). The attenuation factor was 0.13 (0.06, 0.20), and correlation was 0.27 (0.13, 0.41). Group mean 24HDR and 24HUE for sodium are similar. The low attenuation factors and correlations suggest associations of health outcomes with 24HDR sodium may be strongly biased toward the null due to systematic and random measurement error.

MATERNAL PRE-PREGNANCY WEIGHT, WEIGHT GAIN IN PREGNANCY AND THE INFANT GUT MICROBIOME


Background: The intergenerational cycle of obesity, perpetuated by the continued rise of maternal obesity in the US, may be partly explained by mother-to-infant sharing of microbiota. Prospective data to test this hypothesis are sparse. Aim: To prospectively analyze maternal pre-pregnancy BMI and gestational weight gain in relation to the infant gut microbiome at 6 weeks in the New Hampshire Birth Cohort (NHBC). Methods: We ascertained exposure data from questionnaires and medical records. We generated infant gut microbiome data from infant stool collected at 6 weeks, using Illumina MiSeq DNA sequencing (V4-V5 region). We used linear regression for infant gut alpha-diversity model and negative binomial regression, with log-transformed sequence variants, for microbiota-abundance models. We included maternal age, education, and parity in Model 1, plus Mediterranean diet score in Model 2. Based on prior literature, we stratified analyses by delivery mode. Results: Among 335 mother-infant pairs, 56% had normal pre-pregnancy BMI (referent), 27% were overweight, 14% obese, and 3% morbidly obese. Among 318 pairs with weight gain data, 10% had inadequate weight gain, 30% adequate (referent), and 60% excess. In the vaginal strata, maternal obesity was associated with higher alpha diversity (measured by number of observed species, Shannon Diversity Index, and Chao1) in the vaginal group. 16 OTUs were differentially abundant in Models 1 and 2 (FDR adjusted \( p \)-value < 0.1); there was overrepresentation of Streptococcus (genus), E. coli, B. fragilis, and V. dispar among infants born to overweight mothers, Bifidobacterium (genus) in infants born to obese mothers, and Staphylococcus (genus) in infants born to mothers who gained excess gestational weight. There were no significant results among C-Section infants. Conclusion: Maternal pre-pregnancy BMI and gestational weight gain may be associated with the infant gut microbiome diversity and composition at 6 weeks in vaginally delivered infants.
EFFORT-REWARD IMBALANCE IN POLICE WORK: ASSOCIATIONS WITH AN ATYPICAL CORTISOL STRESS RESPONSE

John Violanti* John M. Violanti, Desta Fekedulegn, Ja K Gu, Penelope Allison, Anni Marsatikano, Michael E. Andrew, (SUNY Buffalo)

Background: The effort-reward imbalance (ERi) model proposes that less stress at work depends on an equitable balance of demand and reward. ERi has been associated with job stress. Stress triggers cortisol secretion via the Hypothalamic-Pituitary-Adrenal (HPA) axis, and any significant deviation from a typical cortisol pattern can indicate HPA axis dysfunction. Studies of ERi in police work have demonstrated a lack of adequate reward structure. In the present study we examined association of ERi with magnitude and pattern of awakening cortisol response.

Methods: The sample was 176 police officers enrolled in the Buffalo Cardio-Metabolic Occupational Police Stress (BCOPS) Study. ERi was the exposure variable. Outcome variables were saliva-based peak and mean cortisol values, total area under the curve (AUC) and baseline (AUCI), and slope of linear regression line fitted to the log transformed cortisol data. Regression analyses were used to examine linear trend between ERi and the cortisol parameters. Repeated measures analysis was performed to examine whether the pattern of cortisol over time differed between low ERi (median) and high ERi (median).

Results: Mean age was 46 years (SD=6.6). After adjustment for potential confounders, there was a significant inverse association between ERi and peak cortisol (β=-0.20, p=0.009), average cortisol (β=-0.23, p=0.003), and total area under the curve (β=-0.21, p=0.009). ERi was not significantly associated with AUCI (β=0.01, p=0.214), slope of the regression line fitted to the cortisol profile (β=0.009, p=0.908). Results from repeated measures analyses showed that the cortisol profile did not vary significantly between officers with high and low ERi (interaction p-value=0.790). Conclusion ERi was inversely associated with the magnitude of awakening cortisol but not with pattern over time. The results are consistent with previous research in other occupational groups.

0271

ASSOCIATIONS OF VITAMIN D3 WITH OBJECTIVE SLEEP DURATION IN POLICE OFFICERS

Anna Muttsakova, Anna Muttsakova, Luanda E. Charles, Desta Fekedulegn, Cathy Timney-Zara, Ja K. Gu, Michael E. Andrew, John M. Violanti.* (National Institute for Occupational Safety and Health)

Rationale: Individuals with deficient levels of 25-hydroxy vitamin D (vitamin D3) may be at increased risk of developing adverse health outcomes including cardiovascular disease (CVD) and cancer. Police officers may experience sleep deprivation due to shiftwork, long work hours, and other occupational stressors and have a higher prevalence of CVD than the general population. We examined associations of vitamin D3 with objectively measured sleep duration among 261 police officers (71% men). Methods: Participants were from the Buffalo Cardio-Metabolic Occupational Police Stress Study. They wore a wrist actigraph for 15 consecutive 24-hour periods and sleep parameters were derived using the ActiGraph software. Vitamin D3 was measured by a liquid-phase radioimmunoassay technique. ANOVA/ANCOVA were used to compare mean hours of sleep across vitamin D3 categories: deficient (12<20 ng/mL), inadequate (12–20 ng/mL), and adequate/high (20≥30 ng/mL) according to NIH guidelines. Models were adjusted for age, race/ethnicity, BMI, waist circumference, depression score, cognitive protein, and multivitamin intake. Effect modification was assessed for sex. Results: Officers (mean age=48.3 yrs) slept on average 6.8 hours/day. Vitamin D3 level ranged from 4.5 to 83.4 ng/mL. Among all officers, vitamin D3 was positively and significantly associated with sleep duration after adjustment for age but not after further adjustment. Sex significantly modified the association (interaction p=0.0056). Among female officers, those who were deficient in vitamin D3 had significantly fewer hours of sleep (91.5±9.5 hrs) compared to those who had adequate levels (7.4±0.3 hrs; p=0.028) and those who had adequate/high levels of vitamin D3 (7.1±0.6 hrs; p=0.005). Conclusion: Our results show that vitamin D3 deficiency is associated with shorter sleep duration but only among female officers. Reasons for the differences by sex are not entirely known. Our results support those of previous studies.

0272

NASAL AND SINUS SYMPTOMS: CHRONIC RHINOSINUSITIS AND OTHER RISK FACTORS FOR WORK ABSENTEEISM AND PRESENTEEISM


Chronic rhinosinusitis (CRS) affects nearly 31 million people in the United States, yet few studies have assessed the impacts of CRS and related morbidities on work productivity. The goal of this study was to identify and estimate the effects of CRS on work absence and presenteeism in a population-based sample. Five questionnaires were mailed to a stratified random sample of Geisinger Health System (NSS) staff. We assessed days of work missed due to illness (absenteeism) or presenteeism (nasal symptoms and days worked), number of days affected by nasal symptoms (nasal symptoms), and the number of days of work missed due to illness (absenteeism) or presenteeism (nasal symptoms), and the number of days of work missed due to illness (absenteeism) or presenteeism (nasal symptoms), and the number of days of work missed due to illness (absenteeism) or presenteeism (nasal symptoms), and the number of days of work missed due to illness (absenteeism) or presenteeism (nasal symptoms). Absenteeism was calculated based on self-report and presenteeism was calculated based on the use of sick leave. The results of this study are consistent with previous research and suggest that individuals with CRS are at increased risk of work absence and presenteeism.
META-ANALYSIS COMPARING INFECTION RISK FOR FEMORAL AND NON-FEMORAL CENTRAL LINE INSERTION SITES

Audrey Herring, Liana Merz, (BIC HealthCare)

Purpose: Guidelines for prevention of catheter-related infections recommend non-femoral sites for catheter insertion among adult patients. However, studies published after these guidelines suggest the evidence may be less clear for some populations, like intensive care unit (ICU) patients. The aim of this project is to determine if the femoral site has greater infection risk compared to other non-femoral sites among adult ICU patients. Methods: A systematic search for relevant literature was conducted using electronic databases Medline (via PubMed), Cochrane Collaboration, Cumulative Index to Nursing and Allied Health Literature, EMBASE, and Google. The quality of included studies was assessed using standardized instruments. Meta-analysis was conducted using Review Manager 5.3 to assess risk. Results: Combined results of 12 studies showed insertion at the jugular site had a slight decreased risk of CRBSI compared to the femoral site (RR 0.58, 95% CI 0.36-0.94), while risk of CRBSI was significantly lower for the subclavian site compared to femoral (RR 0.44, 95% CI 0.22-0.88). However, heterogeneity among studies in both jugular and subclavian sites was substantial (I^2=54% and 60%, respectively), with significant differences in pooled results between study designs. Moreover, tests of sensitivity analysis did not show any significant differences in CRBSI risk between sites. Conclusions: Combined results of included studies indicate central line insertion at the jugular and subclavian sites are associated with a decreased risk of CRBSI compared to the femoral site. This finding has implications for future research and clinical practice.

INCREASED RISK OF DELAYED GRAFT FUNCTION AND ACUTE REJECTION FOLLOWING HLA-INCOMPATIBLE LIVE DONATION


Over 30% of kidney transplant candidates are "sensitized", meaning that they produce antibodies to foreign HLA found in donor tissue. These candidates face decreased access to compatible kidney transplants, poorer quality of life, and high risk of mortality in absence of transplantation. Desensitization treatment followed by incompatible live donor kidney transplantation (ILKT) has been transformative for many patients who have a willing but incompatible live donor. However, due to circulating anti-HLA antibodies, ILKT recipients may face increased risk of delayed graft function (DGF) and acute rejection (AR), postoperative complications that increase risk of subsequent graft loss and death. Using a novel linkage of national registry data with patient medical records in 22 US transplant centers, we studied 1029 adult live donor kidney transplantation recipients 1997-2011, of whom 1025 received ILKT. ILKT recipients were categorized by increasing antibody strength (positive-Luminex/negative-Flow, PLNF; positive-Flow/negative-cytotoxic crossmatch, PFC; positive-cytotoxic crossmatch/PC; PFC) measured prior to desensitization. Multivariable logistic regression was used for adjustment for donor and recipient covariates identified in a priori. Among compatible, PLNF, PFC and PCC recipients, we observed DGF in 3.3%, 2.7%, and 6.2% and 8.6%, respectively. In adjusted models, there was no evidence of increased odds of DGF in PLNF recipients (OR=0.73, 0.29-1.76, p=0.5). However, the odds of DGF were 72% higher among PFC (OR=1.37, 1.72-2.54, p=0.001) and 130% greater for PCC (OR=2.30, 1.45-3.58, p=0.001). Likewise, PFC (OR=2.90, 1.67-4.71, p=0.001) and PCC (OR=16.60, 1.79-154, p<0.001) recipients were associated with increased AR. Kidney transplant recipients who undergo ILKT are at higher risk of DGF and AR, particularly at higher levels of antibody strength. Optimizing long-term outcomes for ILKT recipients depends on a better understanding of DGF and AR in this vulnerable population.

POSTDOCTORAL FELLOWSHIP LENGTH AND FUTURE RESEARCH PRODUCTIVITY

Tiffany Holland, Tiffany Holland, Keesun Kim, Carrie Nobles, Ya-Ling Lu, Indulatai Senti, Stephen Gillman, Enrique Schiffermann, (NICHD, NIH)

Introduction: The length of postdoctoral fellowships, number of doctors pursuing them, and academic job market have seen dramatic changes in recent years. However, there is little research on attributes of fellowships most relevant to future scientific achievement. We analyzed the association of a modifiable aspect of postdoctoral training, fellowship length, with future productivity and whether this association varied by research discipline at the Division of Intramural Population Health Research (DIPHR) of the Esai's Kennedy Shriver National Institute of Child Health and Human Development. Methods: Demographics of 87 DIPHR postdocs from 2000-2015 were collected by internal documentation and coordinated web search. Productivity metrics, including total publication count, publications since end of postdoc and Hendrix through 2016, were collected via PubMed and Scopus. Linear regression models adjusted for fellowship start year, number of publications at entry, DIPHR branch and mentor seniority. Results: Overall, each additional year of training was associated with an increase in Hendrix, though this result was attenuated after adjustment of 0.8, 95% confidence interval [CI] =0.2, 1.9. In the Epidemiology branch, each additional year was associated with a 1.6 point increase in Hendrix (95% CI 0.1, 3.0) and additional lifetime publications (95% CI 1.1, 15.4). No clear associations were found in the other DIPHR branches. Conclusion: Longer postdoctoral training had a small positive effect on future research productivity of Epidemiology postdocs. This association was less clear for other research disciplines. Additional research on the effect of a broader range of fellowship characteristics on research productivity outcomes, including differences across disciplines, could help tailor postdoctoral training programs to maximize the success of trainees.

INCREASED RISK OF DELAYED GRAFT FUNCTION AND ACUTE REJECTION FOLLOWING HLA-INCOMPATIBLE LIVE DONATION

Tiffany Holland, Tiffany Holland, Keesun Kim, Carrie Nobles, Ya-Ling Lu, Indulatai Senti, Stephen Gillman, Enrique Schiffermann, (NICHD, NIH)

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TRENDS IN USE OF GABAPENTIN IN CKD AND ASSOCIATED ADVERSE OUTCOMES
Aditya Surapaneni*, Aditya Surapaneni, Alex R. Chang, Shoshana H. Ballew, Teas Novick, Yingying Song, Joe Gorish, Morgan Gratta, (John Hopkins University)

Background: Gabapentin is eliminated by the kidneys and often used in patients with chronic kidney disease (CKD), but it is unknown whether this use is associated with adverse clinical outcomes. Methods: We examined trends in use of gabapentin among adult patients without a history of malignancy from Gesing et al., an integrated health system in rural Pennsylvania. To capture patients using gabapentin to treatment resistant depression, we developed propensity scores using logistic regression on demographics and clinical variables and matched users of gabapentin to non-users, evaluating risk of altered mental status, hospitalization, and death. Results: Use of gabapentin increased from 2013 to 2016 (p for trend <0.0001), particularly among patients with CKD, with nearly 142% of patients in eGFR <30 mL/min/1.73 m² using gabapentin in 2016. In the propensity matched cohort of 14,678 patients, users of gabapentin had a significantly higher risk of altered mental status (HR 1.61, 95% CI 1.31-1.97) and hospitalization (HR 1.21, 95% CI 1.13-1.30) compared to non-users, but there were no significant differences in risk of death (HR 1.16, 95% CI 0.98-1.36). Risk was consistent across level of eGFR. Conclusion: Gabapentin use was common, particularly in CKD, and associated with higher risk for different adverse outcomes.

TREND-IN-TREND METHOD TO ANALYZE ABUSE OF INFREQUENTLY PRESCRIBED DRUGS IN THE COMMUNITY
Nabarun Dasgupta*, Nabarun Dasgupta, John Schwartz, Richard C. Dart, (Univ. of North Carolina & RADARS System)

Public health officials are interested in assessing whether new opioid analogues with abuse deterrent properties have lower abuse in the community setting. However, the years immediately after launch are characterized by idiosyncratic geographic uptake of expensive medicines, with low market sales and population penetration. National prescribing-adjusted estimates from Poison Reatreament centers typically influence by the few locations where a new product is popular; concurrent inter-station obfuscate expected time series findings. Developed for individual-level pharmacoeconomics, trend-in-trend analysis simultaneously accommodates variations in prescribing levels as well as calendar time effects. We extended it to aggregate data to account for community-level prescribing variation. Individually, low volume opioid analogues were analyzed by US 3-digit ZIP code and calendar quarter (2009/3-2010/4q4), within a logistic framework. Exposure-outcome measures dispensed with exposure status determined using threshold regression. Outcome: Any product-specific intentional abuse or misuse case from 50 US poison centers or past-month endorsement by endofollow study. Treatment centers, covering 551.3% of total cases. Results: Expendable drug use had 429 abuse cases, crude OR 2.43 (95% CI 2.00, 2.97), Mantel-Haenszel OR across quarters of dispensed units 1.96 (1.60, 2.40), calendar time: instrumental variable: 2.32 (2.11, 2.56), trend-in-trend 2.03 (1.66, 2.49). During the study period, manufacturing disruptions and other forces altered dispensing volume among drugs; blinded results will be presented for the other drugs, with varying uptake patterns. Modifications to the R package will be described, including initial parameter estimates to avoid local maxima, algorithm selection and convergence, and bootstrapped confidence intervals. Sensitivity analyses will be presented. Conclusion: This analytic approach promises for analyzing new low volume drugs, but needs further characterization.

S/P indicates work done while a student/postdoc
To determine the influence of maternal history and 17-alpha-hydroxyprogesterone (17OHP) on time to spontaneous recurrent preterm delivery, we conducted a retrospective chart abstraction study of pregnant women who received at least one dose of 17OHP for the prevention of recurrent preterm birth through our hospital's pharmacy. We included women who delivered between January 1, 2006 and December 31, 2016 at ≥20 completed weeks gestation and excluded multiple gestations and severe fetal anomalies. Information collected from pharmacy and medical records included gestational age at delivery of current pregnancy, dates of 17OHP doses received, maternal demographics, parity, maternal medical conditions, pregnancy conditions in prior pregnancies, and cause of prior preterm deliveries. We used time to event analysis to study our main outcome of interest, spontaneous preterm delivery (<37 weeks gestation). Observations were censored at the time of delivery for intrapartum preterm delivery, or at 37 completed weeks gestation for all term deliveries. Out of 286 women, 53 (19%) had a recurrent spontaneous preterm delivery. Time to spontaneous preterm delivery was significantly related to gestational age at earliest prior preterm delivery (hazard ratio (HR)=0.94, p=0.003), number of prior preterm births (HR=0.87, p<0.001), number of prior term births (HR=0.54, p<0.002), history of preterm delivery (HR=0.42, p=0.030), and undetermined reason for a prior preterm birth (HR=2.32, p=0.013). Time to spontaneous preterm delivery was not related to maternal age, race, or weight; history of chronic infectious disease; gestational diabetes; fetal growth restriction; placental abruption; choioamnionitis, or intrauterine fetal demise in a prior pregnancy; or the amount of 17OHP received in this pregnancy. Reproductive history is an important determinant of risk of recurrent spontaneous preterm delivery and can assist clinicians in estimating recurrent preterm birth risk.

REPRODUCTIVE HISTORY, 17OHP USE, AND TIME TO SPONTANEOUS RECURRENT PRETERM BIRTH Valery A Danilack* Valery A Danilack, Desmond M Sutton, Mari J Benison, Linda A Nelson, Erika F Werner, (Brown University, Women & Infants Hospital)

S/P indicates work done while a student/postdoc

PRENATAL LEVELS OF POLYUNSATURATED FATTY ACIDS IN ASSOCIATION WITH AUTISM SPECTRUM DISORDER Kristen Lyall* Kristen Lyall, Gayle Windham, Nathaniel Snyder, Jasmine Carver, Craig Newshaffer, (Drexel University)

Polysaturated fatty acids (PUFAs) are critical to fetal neurodevelopment, but limited information exists regarding their potential role in autism spectrum disorder (ASD). To address this question, we analyzed data from 481 cases of ASD (identified from the California Department of Developmental Services, (DDS)), and 476 frequency matched general population controls (randomly selected within strata of age, sex, and maternal age). We measured prenatal PUFAs and ASD, particularly considering comorbidities and using PUFAs measured in neonatal blood spots will also be presented. Further analyses of prenatal PUFAs and ASD, particularly considering comorbid intellectual disability, may be warranted given the potential magnitude of the effect of altered levels of these fatty acids.

ASSOCIATION WITH AUTISM SPECTRUM DISORDER PRENATAL LEVELS OF POLYUNSATURATED FATTY ACIDS IN INFLUENCE OF MATERNAL AND OFFSPRING GENETIC SUSCEPTIBILITY TO OBESITY ON BIRTHWEIGHT IN AFRICAN ANCESTRY POPULATIONS INTRA-UTERINE VS SHARED GENETIC INFLUENCE Deepika Shrestha Deepika Shrestha, Muhammad Rahman, Tegdasiehe Werkalemahu, Chuming Zhu, Fadil Tekols-Aysho, (Epidemiology Branch, Division of Intramural Population Health Research, University Kennedy Shriver National Institute of Child Health and Human Development, National Institutes of Health)

Genetic susceptibility to adulthood obesity can influence birthweight through mechanisms involving the fetus (through shared genetic effect) and/or the mother (by modulating the intrauterine environment). We investigated the effects of maternal and genetic risk of obesity on birthweight and evaluated whether these genetic influences modify the well-known association between maternal pre-pregnancy BMI (pBMI) and birthweight. Genotypic and phenotypic data of 950 mother-baby pairs of African ancestry were obtained from the Hyperglycemia Adverse Pregnancy Outcome study (DIAGP study ascertainment ph/0000096-v.4p1). A genetic risk score for obesity was generated for mothers (mGRS) and babies (bGRS) as the weighted sum of 97 BMI-increasing alleles. The median mGRS was used to categorize samples at having high-low genetic risk for obesity. Linear regression analysis was performed to calculate the association adjusting for birth weight covariates and proportion of African ancestry. A one allele increase in mGRS was significantly associated with a 1.30 greater birthweight (95% CI=2.47,1.4), high bGRS was significantly associated with 7.09 greater birthweight (95% CI=1.30,1.35) compared to low bGRS. However, mGRS was associated with a modestly higher birthweight but did not reach statistical significance. The significant birthweight-increasing effect of maternal pBMI (β=0.59, 95% CI=1.21, 1.99) was modified by mGRS (P for interaction=0.03), but had a stronger and significant association with birthweight among low mGRS (β=0.97, 95% CI=1.11,1.62) but not among high mGRS (β=0.45, 95% CI=2.92,6.12). Genetic risk of obesity in later life had strong birthweight-increasing effect as opposed to the weak birthweight-increasing effect of maternal genetic risk to obesity. Findings suggest that obesity genetic risk loci are important components of the life course associations between birthweight and obesity in later life.

PERINATAL & PEDIATRIC


Background: Infant growth varies across socioeconomic factors including maternal education and income, serving as an indicator of environmental influence in early life with long term health consequences. Previous research has identified socio-demographic gradients in growth with a focus on the first year and beyond, but estimates are sparse for growth before 6 months. Methods: Participants (n=1,142) from a randomized iron deficiency anemia prevention trial in healthy infants from low- to middle-income neighborhoods in Santiago, Chile (1991-1996). Anthropometric measurements included monthly weight (kg), length (cm) and weight-for-length (WFL) values from birth to 6 months. For each measure, we estimated 3 individual-level growth parameters (size, timing and velocity) as outcomes from SuperImposition by Translation and Rotation (SITAR) models. Subsequently, we used lasso regression with post-selection inference methods to estimate the linear association between each of the growth parameter outcomes and covariates including gestational age, maternal age, education, and socioeconomic position (SEP). We used a false discovery rate of 0.05 to correct for multiple comparisons. Results: Lower SEP was associated with higher length velocity growth parameters for both males (0.21, 95% CI=0.04,0.37), females (0.17, 95% CI=0.05,0.31), and the pooled sample (0.22, 95% CI=0.13,0.31) - outcome units are percent increase in velocity above the average growth curve. Lower SEP was also associated with slower growth timing for females (0.25, 95% CI=0.05,0.42) - outcome units are shifts in days from the average growth curve. Conclusion: Previous research on growth in older infants and children shows positive associations between income and maternal education with length velocity. We found evidence supporting an opposite direction of association at an earlier age, which may inform age-specific prevention efforts aimed at infant growth.
NEONATAL VS. FETAL GROWTH STANDARDS TO IDENTIFY SMALL FOR GESTATIONAL AGE INFANTS AT RISK OF ADVERSE OUTCOMES

Neran Boghossian, Marco Geraci, Erika Edwards, Jeffrey Horbar, (University of South Carolina)

It is unclear whether small for gestational age (SGA) defined by a neonatal or by a fetal growth standard is a better predictor of adverse newborn outcomes. We aimed to evaluate and compare the predictive power of SGA for adverse neonatal outcomes using three fetal growth charts (National Institute of Child Health and Human Development (NICHD), World Health Organization (WHO), and Unitedigarth growth charts) and one neonatal sex-specific birthweight standard. SGA was defined as <10th percentile of birth weight for gestational age. Outcomes included mortality, necrotizing enterocolitis (NEC), severe intraventricular hemorrhage (IVH), severe encephalopathy of prematurity (sROP), and chronic lung disease (CLD). A total of singleton infants from 2006-2014 with gestational age between 22 and 29 weeks and enrolled at one of the 852 U.S. centers participating in Vermont Oxford Network were studied. Receiver operating characteristic (ROC) curve analysis was used to compare the four methods of calculating birth weight cutpoints in relation to the outcomes. The percentage of SGA newborns ranged between 25.9% and 29.7% when using the fetal growth charts. In contrast, the percentage was 10% when using the neonatal chart. The area under the ROC curve (AUC) for different outcomes was similar across charts (mortality: 0.82, NEC: 0.64, IVH: 0.75, sROP: 0.84, and CLD: 0.77). After adjusting for maternal race/ethnicity, antenatal corticosteroids, postnatal life support, and newborn sex, the AUCs increased but did not differ similarly regardless of the chart used to classify SGA newborns. In conclusion, the predictive power of SGA for adverse outcomes is comparable across neonatal and fetal growth charts.

S/P indicates work done while a student/postdoc

ASSOCIATION OF SOCIAL SUPPORT AND ANTEPARTUM DEPRESSION AMONG PREGNANT WOMEN

Lauren E. Friedman, Bria Gelaye, Sixta Sanchez, Michelle A. Williams, (Harvard T.H. Chan School of Public Health)

Background: The absence of social support has been associated with health outcomes including poor mental health, increased chronic disease burden, and increased mortality. However, few investigators have evaluated the association between social support and antepartum depression. Objective: To examine the extent to which early pregnancy social support and antepartum social support are associated with antepartum depression among women in Peru. Methods: A total of 2,062 pregnant women participated in structured interviews. Social support during antepartum pregnancy was measured using the Social Support Questionnaire Short Form (SSQ-S). We evaluated the number of individuals that participants could turn to in different situations (Social Support Number Score; SSQN) and participants’ satisfaction with social support they received (Social Support Satisfaction Score; SSQS). Consistent with previous studies, median SSQN and SSQS scores were used to characterize participants according to high and low levels of social support. SSQN scores were also evaluated for family and non-family social support items. Antepartum depression was assessed using the Patient Health Questionnaire-9 (PHQ-9). Multivariable logistic regression procedures were used to estimate adjusted ORs and 95% CIs. Results: Approximately 28% of women had antepartum depression. Among those with antepartum depression, 65.5% reported low SSQN, while 66.5% reported low SSQS. Women with low non-family SSQN were more likely to have depression; the association was not significant among women with low family SSQN. Women with high SSQN were 22% less likely to have antepartum depression (AOR: 0.78; 95% CI: 0.63-0.97). Similarly, pregnant women with high SSQS score were 45% less likely to have antepartum depression (AOR: 0.55; 95% CI: 0.45-0.68). Conclusion: Social support during early pregnancy is associated with a reduced risk of antepartum depression. Increased social support may improve maternal mental health during pregnancy.

INFANT VACCINATION EDUCATION PREFERENCES AMONG LOW-INCOME PREGNANT WOMEN

Erika Fuchs, Jacqueline Hirth, Fang Jian Guo, Veronica Brown, Leslie Coffin, Abley Berenson, (University of Texas Medical Branch)

Background: Women who receive prenatal vaccinations are more likely to have children who are up to date on childhood vaccinations. Prenatal appointments may be an opportunity for targeted interventions. The aim of this study was to examine the infant vaccination education preferences of pregnant women by prenatal vaccination status. Methods: An in-person health behavior questionnaire, available in English or Spanish, was conducted from June 14-July 21, 2017, in reproductive health clinics serving low-income women in southeastern Texas. Eligible participants (N = 335) were pregnant women ≥20 years old attending a participating clinic. Participants were asked about prenatal vaccination behavior and preferences about infant vaccination education. Differences between participants who did and did not receive prenatal tetanus, diphtheria, and acellular pertussis (Tdap) vaccination were examined using chi-squared tests in State SE Version 14.2 with p < 0.05. Results: The mean age was 26.4 years (range: 14-44 years). The majority of participants were Hispanic (78.2%), born outside of the United States (53.7%), and married or living with a partner (69%). One quarter (24%) of participants had less than a high school education. Half (50%) of participants reported having received the Tdap vaccine during their current pregnancy. The majority (90.2%) of participants were willing to discuss infant vaccination pretably, close to half (48.9%) considered the best time to get information about infant vaccination, and many (40.6%) were open to receiving infant vaccination information from nurses who give prenatal vaccinations. The results indicate that prenatal programs that aim to improve infant vaccination would be well accepted among low-income women.

THE EFFECTS OF MODERATE TO VIGOROUS INTENSITY SPORTS AND EXERCISE ACTIVITY DURING PREGNANCY ON INFANT SIZE AT BIRTH

Samantha Ehrlich, Romina Netuveli, Motiqa M Hedderson, Assiamira Knibb, Erika Fuchs, Jacqueline Hirth, Fang Jian Guo, Veronica Brown, Leslie Cofie, Abbey Berenson, (University of Texas Medical Branch)

Background: Women who receive prenatal vaccinations are more likely to have children who are up to date on childhood vaccinations. Prenatal appointments may be an opportunity for targeted interventions. The aim of this study was to examine the infant vaccination education preferences of pregnant women by prenatal vaccination status. Methods: An in-person health behavior questionnaire, available in English or Spanish, was conducted from June 14-July 21, 2017, in reproductive health clinics serving low-income women in southeastern Texas. Eligible participants (N = 335) were pregnant women ≥20 years old attending a participating clinic. Participants were asked about prenatal vaccination behavior and preferences about infant vaccination education. Differences between participants who did and did not receive prenatal tetanus, diphtheria, and acellular pertussis (Tdap) vaccination were examined using chi-squared tests in State SE Version 14.2 with p < 0.05. Results: The mean age was 26.4 years (range: 14-44 years). The majority of participants were Hispanic (78.2%), born outside of the United States (53.7%), and married or living with a partner (69%). One quarter (24%) of participants had less than a high school education. Half (50%) of participants reported having received the Tdap vaccine during their current pregnancy. The majority (90.2%) of participants were willing to discuss infant vaccination pretably, close to half (48.9%) considered the best time to get information about infant vaccination, and many (40.6%) were open to receiving infant vaccination information from nurses who give prenatal vaccinations. The results indicate that prenatal programs that aim to improve infant vaccination would be well accepted among low-income women.
AN APPLICATION OF STATISTICAL METHODS TO EVALUATE THE RELATIONSHIP BETWEEN GESTATIONAL WEIGHT GAIN AND PRETERM BIRTH  

Studying the link between gestational weight gain (GWG) and preterm birth is difficult due to their inherent dependence. Serial GWG measurements provide ideal data, but are rarely available in population health datasets. To address this challenge, Huchon et al. (2013) developed GWG-for-gestational-age z-scores, a new way of incorporating pregnancy weight data as an exposure in regression models to model preterm birth that would reduce bias induced by not properly accounting for gestational age. However, Mitchell et al. (2016) challenged this approach, claiming that repeated measures of weight gain through pregnancy should be the gold standard for predicting gestational outcomes. They proposed using a proportional hazards (Cox) model with GWG as a time-varying covariate to assess the relationship between GWG and overall gestational duration. Here, we apply both methods to electronic medical record data that contain serial weight measurements from 39,295 pregnant women in Sweden. We test for differences in the association between GWG and preterm birth by prepregnancy BMI and for nonlinear associations. We further use a linear random-effects model with restricted cubic splines to identify whether the pattern of weight gain in pregnancy between women who gave birth preterm versus at term meaningfully differs at any point before 37 weeks.

VALUATION OF SPONTANEOUS ABORTION FOLLOWING INADVERTENT QUADRIVALENT HUMAN PAPILLOMAVIRUS VACCINATION DURING PREGNANCY IN THE VACCINE SAFETY DATALINK  
Gabriela Vázquez-Benitez, Gabriela Vázquez-Benitez, Byte O. Klarbäck, Hanther S. Linksted, Siewgini Shehi, Jingyi Zhu, Allison Wnek, Nicola P. Klein, Rulin C. Hecht, Matthew F. Daley, James G. Davloutsis, Michael J. Jackson, Sophia R. Newcomer, James D. Nordin, (HealthPartners Institute)

The Vaccine Safety Datalink maintains a pregnancy episode table to evaluate the safety of maternal vaccination. It uses a pregnancy episode algorithm (PEA) to retrospectively identify pregnancies from electronic health and birth data. Spontaneous abortions (SABs) are identified through diagnosis and procedure codes and assigned a default gestational age (GA) of 10 weeks. Since outpatient misclassification could cause bias, our objective was to validate SABs at the level of gestational age (GA) and GA within a cohort study of inadvertent human papillomavirus (HPV) administration during pregnancy. The cohort was comprised of women 12-27 years potentially exposed to 4vHPV during three exposure windows, 30-31 (30-31 to 31-32 weeks prior to last menstrual period (LMP), pre-LMP (42 days prior to LMP) and during pregnancy (up to 19 completed weeks gestation). Seven sites conducted structured chart reviews for SAB, identified exclusions, and finalized LMP dating. Case adjudication was performed by two ob/gyns for eligible pregnancies. Adjudicators recorded the range of fetal demise dates and GA at which fetal demise could have occurred. From a cohort of 3,695 pregnancies, 843 (23%) potential SABs were identified. 30% (37%) of SABs were adjudicated. In total, 66% of episodes were confirmed as a SAB occurring at 26 weeks gestation, 7% did not have records to confirm the pregnancy outcome, and 21% had other etiologies such as ectopic or molar pregnancy. Pregnancy loss was 6 weeks or other study exclusions. 29% were not exposed to 4vHPV, based on LMP dating. Overall, we estimated 30% for SABs, with 30% for SABs not excluded. In an annual healthcare system, 26% were not exposed to 4vHPV, with LMP dating of 26 weeks. In order to study vaccine SAB associations, chart abstraction and adjudication are needed to refine estimates.
Lower vitamin D levels have been associated with reduced birth weight, but it is not known how early in pregnancy vitamin D might affect fetal growth. We used data from a prospective time to pregnancy study, Time to Conceive, to examine the association between 25OH and crown-rump length (CRL) at 7-9 weeks gestation. Participants enrolled early in their pregnancy attempt and CRL was measured with vaginal ultrasound. 25OH was measured in baseline blood spots and early pregnancy samples using liquid chromatography-tandem mass spectrometry. Ovulation was identified with ovulation predictor kits, cervical mucus monitoring or basal body temperature. Gestational age was based on ovulation. To account for missing data on gestational age (due to missing ovulation dates), we modeled the joint distribution of CRL and gestational age in a Fully Bayesian framework, with a log-normal model for CRL and a Weibull model for gestational age (conditional on constraints). Baseline 25OH was measured in 294 pregnancies and early pregnancy 25OH was measured in 142 pregnancies. The two measures were highly correlated (r=0.8) with moderate agreement (weighted kappa=0.6 (0.5, 0.7)). Baseline 25OH was not associated with CRL, for a 10 ng/ml increase the estimated percent change was 3% (Crl: -10, 19%). However, early pregnancy 25OH of ≤30ng/ml, increased the estimated percent change was 6% (Crl: -6, 12%). Ovulation was identified with ovulation predictor kits, cervical mucus monitoring or basal body temperature. Gestational age was based on ovulation. To account for missing data on gestational age (due to missing ovulation dates), we modeled the joint distribution of CRL and gestational age in a Fully Bayesian framework, with a log-normal model for CRL and a Weibull model for gestational age (conditional on constraints). Baseline 25OH was measured in 294 pregnancies and early pregnancy 25OH was measured in 142 pregnancies. The two measures were highly correlated (r=0.8) with moderate agreement (weighted kappa=0.6 (0.5, 0.7)). Baseline 25OH was not associated with CRL, for a 10 ng/ml increase the estimated percent change was 3% (Crl: -10, 19%). However, early pregnancy 25OH of ≤30ng/ml, increased the estimated percent change was 6% (Crl: -6, 12%). Ovulation was identified with ovulation predictor kits, cervical mucus monitoring or basal body temperature. Gestational age was based on ovulation. To account for missing data on gestational age (due to missing ovulation dates), we modeled the joint distribution of CRL and gestational age in a Fully Bayesian framework, with a log-normal model for CRL and a Weibull model for gestational age (conditional on constraints). Baseline 25OH was measured in 294 pregnancies and early pregnancy 25OH was measured in 142 pregnancies. The two measures were highly correlated (r=0.8) with moderate agreement (weighted kappa=0.6 (0.5, 0.7)). Baseline 25OH was not associated with CRL, for a 10 ng/ml increase the estimated percent change was 3% (Crl: -10, 19%). However, early pregnancy 25OH of ≤30ng/ml, increased the estimated percent change was 6% (Crl: -6, 12%). Ovulation was identified with ovulation predictor kits, cervical mucus monitoring or basal body temperature. Gestational age was based on ovulation. To account for missing data on gestational age (due to missing ovulation dates), we modeled the joint distribution of CRL and gestational age in a Fully Bayesian framework, with a log-normal model for CRL and a Weibull model for gestational age (conditional on constraints). Baseline 25OH was measured in 294 pregnancies and early pregnancy 25OH was measured in 142 pregnancies. The two measures were highly correlated (r=0.8) with moderate agreement (weighted kappa=0.6 (0.5, 0.7)). Baseline 25OH was not associated with CRL, for a 10 ng/ml increase the estimated percent change was 3% (Crl: -10, 19%). However, early pregnancy 25OH of ≤30ng/ml, increased the estimated percent change was 6% (Crl: -6, 12%). Ovulation was identified with ovulation predictor kits, cervical mucus monitoring or basal body temperature. Gestational age was based on ovulation. To account for missing data on gestational age (due to missing ovulation dates), we modeled the joint distribution of CRL and gestational age in a Fully Bayesian framework, with a log-normal model for CRL and a Weibull model for gestational age (conditional on constraints). Baseline 25OH was measured in 294 pregnancies and early pregnancy 25OH was measured in 142 pregnancies. The two measures were highly correlated (r=0.8) with moderate agreement (weighted kappa=0.6 (0.5, 0.7)). Baseline 25OH was not associated with CRL, for a 10 ng/ml increase the estimated percent change was 3% (Crl: -10, 19%). However, early pregnancy 25OH of ≤30ng/ml, increased the estimated percent change was 6% (Crl: -6, 12%). Ovulation was identified with ovulation predictor kits, cervical mucus monitoring or basal body temperature.
CONFLICT-INDUCED MATERNAL STRESS AND BIRTH OUTCOMES: A NATURAL EXPERIMENT Eva Laura Siegel* Eva Laura Siegel, Pam Factor-Litvak, Doron Mandel, Ronit Luch테시, Amalit Levy, Elkan Kohn, Rimona Keidar, Revital Shemtov, Josef Toobias, Matildah Berkovich. (Mailman School of Public Health)

Background: Stressful events during pregnancy may have negative effects on birth outcomes. War broke out in 2014 in northern Israel during birth cohort enrollment, creating a natural experiment to study this phenomenon. Methods: Women enrolled in a hospital-based birth cohort (n=174) in northern Israel were divided into three groups: no exposure to conflict-induced stress during pregnancy, exposure during 1st half of pregnancy, and exposure during 2nd half. Conflict-induced stress and birth outcomes were looked at using adjusted-regression models. Results: Babies exposed to conflict-induced stress had lower birth weights and shorter gestation times. Mothers who were pregnant during the conflict were more likely to diagnosed with gestational diabetes and have incidence of infection during pregnancy. Conclusion: This study supports the association between conflict-induced stress and negative birth outcomes. Well-designed, randomized studies are warranted to conclusively test the effectiveness of S2S on PPD prevention.

PRETERM BIRTH, FIREARM VIOLENCE, AND INFECTION: A STUDY OF MEDIATION IN CALIFORNIA Duti Goin* Duti Goin, Jennifer Altshuler, (UC Berkeley)

Preterm birth contributes to infant morbidity and mortality in the United States, and stark disparities exist by maternal race/ethnicity. Living in a neighborhood with high levels of firearm violence may increase risk of preterm birth. Maternal infection may mediate this relationship, through behavioral or immune dysregulation mechanisms. This study assesses whether infection during pregnancy mediates the association between high firearm violence and preterm birth among mothers in California. We used data from the California Vital Statistics and Office of Statewide Health Planning and Statistics (OSHPD) to measure firearm violence, infection, and preterm birth for all singleton births in California from 2007-2011. We used inverse odds ratio weighting to estimate the total and direct and indirect effects of firearm violence on risk of preterm birth. We examined whether the association differed by spontaneous versus induced preterm birth and assessed whether the association differed by race/ethnicity. We found a total effect (Risk Difference (RD) = 0.015) and a direct effect (DEF) of living in a higher-violence neighborhood with high firearm violence was 0.031 and the indirect effect (IDE) was 0.002. The total effects were of comparable size to spontaneous versus induced preterm birth (RD=0.0075 and RD=0.0066, respectively), but the indirect effect was seen exclusively in the spontaneous group (0.0016 vs. -0.0003). The total effects on spontaneous preterm birth were stronger for black (RD=0.013), Hawaiian/Pacific Islander (RD = 0.013), and other or multiracial women (RD=0.011). These results suggest firearm violence may be an important contributor to risk of preterm birth and the effects among women with spontaneous preterm birth may be partially mediated by risk of infection during pregnancy.

THE EFFECT OF SKIN-TO-SKIN CARE ON POSTPARTUM DEPRESSION AMONG MOTHERS OF PRETERM OR LOW BIRTH WEIGHT INFANTS: A SYSTEMATIC REVIEW Natalie V. Schreiber Natalie V. Schreiber, Adam C. Gavankov, Kathleen H. Chapat, (Department of Community Health Sciences, University of Calgary)

Background: Mothers of preterm or low birth weight (LBW) infants are at 2-3 times higher risk of postpartum depression (PPD) than mothers in the general population which may be partially due to separation of the mother-infant dyad at birth and during hospitalization. Regular skin-to-skin (S2S) care between mothers and infants could potentially prevent PPD in this vulnerable population. Objective: To examine the effect of S2S on PPD among mothers of preterm or LBW infants through a systematic review. Methods: We systematically searched 6 peer-reviewed databases for prospective studies of S2S interventions that took place in neonatal intensive care units, and included PPD as an outcome. We published in English between 1979 and 2017. Multiple hand searching strategies were used. Two reviewers independently performed data extraction and critical appraisal. Results: Forty-four articles were located through searching, and 8 studies detailing 7 interventions met inclusion criteria. Substantial heterogeneity was observed across studies. Intervention duration ranged from 1 week to 32 months, S2S sessions ranged from 15 minutes to 1 hour (or as per maternal preference), and S2S frequency ranged from three daily to thrice weekly. The latency period between birth and S2S initiation was largely unreported. Five different tools were used to measure PPD (mainly the Edinburgh Postnatal Depression Scale) and few studies reported follow-up beyond infant discharge. Tools were frequently used as continuous measures rather than dichotomous measures with a validated cut-off score. Of the 4 moderate-quality studies, 3 reported a significant reduction in depressive symptoms among mothers in the S2S group compared to controls. Conclusion: Despite positive findings, studies differed markedly in terms of S2S dose, outcome measurement, and overall quality. Further well-designed, randomized studies are warranted to conclusively test the effect-size of S2S on PPD prevention.
EXPOSURE TO MALTREATMENT IN CHILDHOOD AND EXCESS WEIGHT GAIN IN PREGNANCY: RESULTS FROM A PILOT STUDY

Susan Mason*, Susan Mason, Lisa Bodnar, Suzanne Claeys, Rich MacLehose, Diane Nenervik-Szatmary, (University of Minnesota School of Public Health)

Background: Childhood exposure to maltreatment (abuse and/or neglect) is associated with obesity in adulthood. However, few studies have examined whether maltreatment is related to pregnancy weight gain, such as excess gestational weight gain (EGWG) and whether this depends on prepregnancy weight status. Links between childhood maltreatment and EGWG might indicate a need for targeting EGWG interventions to women with maltreatment histories. Methods: A pilot survey assessing self-reported prepregnancy weight gain and pregnancy weight gain was sent to 162 parents of women aged 27-33 participating in Project EAT (Eating and Activity in Teens), a 15-year longitudinal study of weight-related health in which exposure to childhood maltreatment (neglect and physical, sexual, and emotional abuse) had been previously assessed. EGWG was defined using body mass index-specific Institute of Medicine guidelines. Modified Poisson regression was used to model first pregnancy. EGWG as a function of the number of maltreatment types experienced (0, 1, or 2+), adjusted for maternal age and race. Results: The response rate to the survey was 79% (n=129). Over half of participants had prepregnancy and 33% reported maltreatment. All maltreatment types were associated with increased EGWG risk. Adjusted RRs for EGWG in those with 1 and 2+ maltreatment types were 1.34 (95% CI: 0.92-1.93) and 1.55 (95% CI: 1.08-2.22) respectively, relative to no maltreatment. In women who were non-overweight prior to pregnancy, RRs for 1 and 2+ types of maltreatment were 1.55 (95% CI: 0.86-2.80) and 1.90 (95% CI: 1.10-3.28) respectively. In overweight women, RRs were close to the null. Conclusions: In this small pilot study, maltreatment history was associated with elevated risks of EGWG in non-overweight women who might otherwise be considered low risk. Women with maltreatment may be an unrecognized high-risk group for EGWG.

S/P indicates work done while a student/postdoc
EXPOSURE TO TETRACHLOROETHYLENE-CONTAMINATED DRINKING WATER AND THE RISK OF STILLBIRTH

Ann Aschengrau, Lisa G. Gallagher, Michael R. Winker, Lindsey J. Butler, M. Patrick Fibili, Veronica M. Vieira, (Boston University)

Background. Residents in Massachusetts and Rhode Island were exposed to tetrachloroethylene (PCE)-contaminated drinking water from 1968 through the early 1990s when the solvent was used to apply a vinyl liner to the interior of drinking water pipes to solve taste and odor problems. While PCE is a common drinking water contaminant, its effects on developing fetuses are not well-understood. The present case-control study was undertaken to determine if the risk of stillbirth is increased among pregnant women exposed to PCE-contaminated drinking water. Methods. Cases comprised of stillborn infants delivered between 1968 and 1995 to mothers who resided in 28 cities and towns with affected drinking water (N=290). Cases whose cause of death was placental abruption and/or placental insufficiency were included. Controls were randomly selected live-born infants who were delivered in the same time period and geographic area as cases (N=783).

Prenatal PCE exposure was estimated using USEPA water distribution system modeling software that incorporated a teaching and transport algorithm for PCE. Results. Mothers in any PCE exposure had a 1.7-fold increase in the adjusted odds of stillbirth (95% CI: 1.2-2.4). The adjusted OR increased as a woman's exposure level increased: 1.7 (95% CI: 1.1-2.5) for low exposure (≤ median=90th percentile) and 1.9 (95% CI: 1.1-3.2) for high exposure (> median=90th percentile). Conclusions: We observed a dose-dependent increase in the risk of stillbirth with higher levels of PCE exposure. These findings highlight the importance of considering pregnant women and their developing fetuses when planning and implementing strategies to mitigate exposure to PCE-contaminated drinking water.

PHYSICAL ACTIVITY AND PREGNANCY OUTCOMES IN WOMEN WITH PRIOR PREGNANCY LOSS

Lindsey M. Rusto, Lindsey M. Rusto, Brian W. Whitcomb, Joshua R. Freeman, Sanna L. Marmod, Lindsey A. Sjaarda, Robert W. Silver, Jagdishwar Grewal, Karen C. Schliep, Neil J. Perkins, Enrique F. Schisterman, (Department of Biostatistics & Epidemiology, University of Massachusetts Amherst, Amherst, MA)

Data regarding the relationship between physical activity (PA) and pregnancy loss are conflicting. While some studies have observed a linear relationship between PA and pregnancy loss, others have suggested an increased risk of very low exposures with high physical strain, potentially through mechanisms such as elevated body temperature and energy availability. We examined the relationship between PA with pregnancy loss among women ages 21-45 years, trying to conceive, and not using fertility treatments. Women completed a baseline questionnaire about recent exposure to heat variables, particularly use of hot baths, laptops, and seat heaters.

Methods: Cases were comprised of stillborn infants delivered between 1968 and 1995 to mothers who resided in 28 cities and towns with affected drinking water (N=290). Cases whose cause of death was placental abruption and/or placental insufficiency were included. Controls were randomly selected live-born infants who were delivered in the same time period and geographic area as cases (N=783). Prenatal PCE exposure was estimated using USEPA water distribution system modeling software that incorporated a teaching and transport algorithm for PCE. Results. Mothers in any PCE exposure had a 1.7-fold increase in the adjusted odds of stillbirth (95% CI: 1.2-2.4). The adjusted OR increased as a woman's exposure level increased: 1.7 (95% CI: 1.1-2.5) for low exposure (≤ median=90th percentile) and 1.9 (95% CI: 1.1-3.2) for high exposure (> median=90th percentile). Conclusions: We observed a dose-dependent increase in the risk of stillbirth with higher levels of PCE exposure. These findings highlight the importance of considering pregnant women and their developing fetuses when planning and implementing strategies to mitigate exposure to PCE-contaminated drinking water.

HEAT EXPOSURES AND MALE FECUNDABILITY: A PRECONCEPTION COHORT STUDY

Crain J. McKimmon, Craig J. McKimmon, Elizabeth E. Hatch, Kenneth J. Rothman, Michael J. Eisenberg, Lauren J. Wise, (Boston University School of Public Health)

Objective. We examined the association between recent heat exposures and male fecundability in a North American preconception cohort study (2013-2017). Methods: Men aged ≥21 years completed a baseline questionnaire about recent exposure to heat including use of saunas or hot baths, type of underwear worn, time spent sitting, laptop use on one's lap, and seat heater use. Couples were followed via bimonthly follow-up questionnaires completed by the female partner for up to 12 months or until pregnancy, whichever came first. Analyses were restricted to L24 couples attempting conception for ≥6 cycles at entry. We used proportional hazards regression to estimate fecundability ratios (FR) and 95% CIs, adjusted for demographic and lifestyle factors, reproductive and medical history, and all other heat factors. Results. A total of 892 couples were included in the analysis (55.1% of the total sample). The FR comparing sitting on a seat heater use vs. no seat heater use was 0.91 (95% CI: 0.69-1.14). The FR for alternating slim-fit/loose boxers, as compared with loose boxers/no underwear, was 0.88 (95% CI: 0.74-1.07) for sitting on a seat heater use vs. no seat heater use. Conclusions. Randomized control trials of home pregnancy tests on women with preconception cohort may increase cohort retention and SAB detection.

S/P indicates work done while a student/postdoc.
ASSOCIATIONS BETWEEN URINARY PHYTOESTROGENS AND PREGNANCY LOSS AND LIVE BIRTH

Keewan Kim* Keewan Kim, Germaine M. Buck Louis, Rajeshwari Sundaram, Enrique F. Schisterman, Matthew T. Connell, Carrie J. Nobles, Lindsay D. Levine, Elizabeth De-Vilbiss, Tiffany L. Holland, Sunni L. Mumford, (NICHD/NIH)

Background: Phytoestrogens, which are abundant in soy products and oilseeds, have estrogenic and antioxidant effects and possible associations with reproductive health outcomes have been observed. However, their role in influencing pregnancy outcomes, such as loss and live birth, is unknown. Thus, our aim was to evaluate the association between urinary phytoestrogen levels and prospectively assessed pregnancy loss and live birth among couples attempting pregnancy. Methods: We used data collected in a prospective preconception cohort, the Longitudinal Investigation of Fertility and the Environment (LIFE) Study, which enrolled and followed 501 couples for 12 months or until pregnancy. We measured urinary genistein, daidzein, O-desmethylangolensin, equol, enterodiol, and enterolactone at baseline and by quartile. Using log-binomial regression, we estimated relative risks (RR) and 95% confidence intervals (CI) for couples' levels of phytoestrogens separately and jointly. Models were adjusted for both partners' age, BMI, race, urinary creatinine, supplement use, physical activity, and study site. For pregnancy loss, inverse probability weights were used to account for potential selection bias by restricting to pregnant women. Results: Higher female genistein levels were associated with higher probability of live birth (4th quartile RR 1.36, 95% CI 0.99, 1.88), compared to the lowest quartile. The results were consistent in the couple-based joint models. No associations were observed for pregnancy loss. We did not find associations between male phytoestrogen levels and loss or live birth. Conclusions: Preconception female urinary genistein levels were positively associated with live birth, though no associations were observed for male levels or with pregnancy loss. This is the first study highlighting the importance of dietary phytoestrogens as a continuum of reproductive endpoints, including a couple's ability to ultimately achieve a live birth.
Rationale: Anxiety is a common co-morbidity of Chronic Obstructive Pulmonary Disease (COPD) that is associated with higher morbidity and mortality. We evaluated three anxiety screening questionnaires, the Generalized Anxiety Disorder (GAD-7) questionnaire, the Hospital Anxiety and Depression Scale (HADS), and the Anxiety Inventory for Respiratory Disease (AIR). Objectives: Evaluate and compare the test performance characteristics of 3 anxiety screening questionnaires using the Mini International Neuropsychiatric Interview (MINI) version 7.0 as the gold standard. Methods: Individuals with COPD were recruited at 16 centers. The MINI interview and questionnaires were administered by trained coordinators at an in-person visit and re-administered by telephone 2 to 4 weeks later. A composite score for the presence of any anxiety disorder was computed based on a participant screening positive on at least one of the anxiety scales and used as the gold standard comparator for these analyses. Results: 220 eligible individuals were enrolled; 219 completed the study, 11% were identified as having a DSM-5 anxiety disorder based upon the MINI. Elevated anxiety symptoms based on questionnaires were 38% for the AIR, 30% for the GAD-7, and 20% for the HADS-A. Area under the receiver operating curve (AUC) was highest for the GAD-7, followed by the HADS-A and the AIR. AUC for the GAD-7 was significantly greater than for the AIR (P=0.014). Sensitivity was not statistically different among the questionnaires: 77% for the GAD-7; 63% for the HADS-A; and 66% for the AIR. The HADS-A had the highest specificity, 85%, which was significantly higher than the GAD-7 (77%, P<0.001) and the AIR (65%, P=0.001); the GAD-7 specificity was higher than the AIR (P<0.001). Conclusions: The GAD-7, the HADS and the AIR questionnaires had acceptable diagnostic properties as screening tools for anxiety in individuals with COPD. Symptoms of anxiety among COPD patients as identified by screening questionnaires were common.
PREVALENCE OF PREVENTIVE HEALTH SERVICES USE AMONG US ADULTS: COMPARISONS BETWEEN TWO NATIONAL HEALTH SURVEY FINDINGS, 2016
Guixiang Zhao* Guixiang Zhao, Jason Hsia, Catherine A. Okoro, Jun Li, Machell Town, (Centers for Disease Control and Prevention)

Purpose: To compare the prevalence estimates for selected preventive health services use among US adults using data from two national health surveys. Methods: In 2016, both the Behavioral Risk Factor Surveillance System (BRFSS) and the National Health Interview Survey (NHIS) collected data on the following preventive health services received by US adults at varying ages: mammogram, Pap test, colorectal cancer (CRC) screening, HIV test, influenza and pneumococcal vaccinations. Absolute differences in the prevalence estimates between the 2 surveys were calculated overall and by demographic characteristics. Adjusted prevalences were estimated by conducting log-linear regression analyses while adjusting for demographic characteristics, general health, and health insurance status. Results: The prevalence estimates for mammogram and CRC screening were similar between BRFSS and NHIS (absolute difference: -0.4% for mammogram and -0.9% for CRC screening). The prevalence estimates for Pap test, HIV test, and influenza vaccination were lower from BRFSS than from NHIS (absolute difference: -6.6%, -2.0%, and -3.9%, respectively), whereas the prevalence of receiving pneumococcal vaccination was 7% higher (P<0.001) from BRFSS. Conclusions: Some degree of discrepancy in the prevalences of preventive health services use existed between the 2 surveys. Nonetheless, both surveys provide useful information on health care utilization at national level as well as at state or local level by BRFSS.

S/P indicates work done while a student/postdoc

BREAST AND CERVICAL CANCER SCREENING PARTICIPATION OF WOMEN WITH CHRONIC DISEASES IN KOREA: ANALYSIS OF THE 2012 KOREAN NATIONAL HEALTH AND NUTRITION EXAMINATION SURVEY
Laurence Twizeyimana* Laurence Twizeyimana, Yeol Kim, Lim Jun tae, (National Cancer Center Graduate School of Cancer Science and Policy, Korea)

Background: Chronic disease morbidity is a concern for cancer research. Contradictory results have been reported concerning adherence to screening programs among patients with chronic diseases. Study Objective: To assess the adherence to breast and cervical cancer screening of women with chronic diseases. Methods: Using data from Korean National Health and Nutrition Examination Survey in 2012, participation in cervical and breast cancer screening were analyzed among women who had nine chronic diseases (hypertension, diabetes, cancer, dyslipidemia, stroke, obesity, depression, osteoarthritis and asthma) adjusting for screening determinants. Pearson's chi-squared test and multiple logistic regression analysis were performed using STATA version 14. Results: A total 2,404 women aged 40 years or older were included, 74.61 % and 69.91 % had taken breast and cervical cancer screening, respectively. In logistic regression model, women with asthma had 66% lower chance of participating in breast cancer screening (OR, 0.34; 95% CI, 0.18 - 0.64). Likewise, the OR of those with diabetes mellitus is 0.48 (95% CI, 0.33 - 0.69). Women with hypertension had 14% lower chance of participating in cervical screening compared to non-hypertensive (OR, 0.86; 95% CI, 0.67 - 0.93). Likewise, the OR of those with diabetes mellitus is 0.48 (95% CI, 0.33 - 0.69). Women with hypertension had 14% lower chance of participating in cervical screening compared to non-hypertensive (OR, 0.86; 95% CI, 0.67 - 0.93). Asthma (OR, 0.74; 95% CI, 0.58 - 0.95) and diabetes mellitus (OR, 0.65; 95% CI, 0.44 - 0.95) were associated with lower odds of cervical cancer screening. Conclusion: In most chronic diseases, those with the illness had the lower chance of participating in either breast or cervical screening. The results from this study may provide an important contribution for helping to increase participation in cancer screening among patients with some chronic diseases.
ESTIMATING A DYNAMIC EFFECT OF SUPPORTIVE HOUSING PLACEMENT ON EMERGENCY DEPARTMENT VISITS IN NEW YORK CITY

Supportive housing has a positive impact on health among chronically homeless people. Yet, little is known about how this impact differs by when persons are placed in the program and how long they remain housed. In this evaluation, we tested the hypothesis that chronically homeless persons with immediate and continuous placement are less likely to have emergency department (ED) visits. We used matched administrative data for 7612 adults who were eligible for a New York City supportive housing program and had 100% Medicaid coverage during a 2-year follow-up period. Treatment was defined as being placed in the housing program for >7 days after the first eligibility date; the outcome was defined as having an ED visit. Time-varying covariates included incarceration, homelessness, hospitalization, and other supportive housing placement events while time-invariant covariates included demographics and clinical and behavioral characteristics at eligibility. Data on treatment, outcome, and time-varying variables were collected in 6-month intervals. A dynamic effect was estimated by comparing various treatment patterns with continuous non-placement via targeted maximum likelihood estimation using R package MT. During the 18-month follow-up, 35% were placed in the program; most (71%) were continuously placed immediately after eligibility, followed by continuous placement after 7-12 months delayed (14%) or 13-18 months delayed (7%). Continuous placement was associated with a smaller number of ED visits (Additive effect = -0.22, 95% CI = -0.37, -0.07) during months 19-24 post-eligibility, compared with continuous non-placement. Delayed placement for >6 months or early move-out was not associated with ED visits. These findings highlight the importance of immediate and continuous placement in supportive housing to reduce the risk of ED visits among chronically homeless people.

DO ALCOHOL OUTLETS MEDIATE THE EFFECTS OF THE MOVING TO OPPORTUNITY HOUSING VOUCHER EXPERIMENT ON ADOLESCENT EXCESSIVE DRINKING? Spruha Joshi*, Spruha Joshi, Nicole M. Schmidt, Therese L. Ory, Jaiden Singh, Sarah Walters, Sara Miller-Archie, L. Haiman Gusk, (New York City Department of Health and Mental Hygiene)

Adolescent excessive alcohol use is associated with negative social and health outcomes. Neighborhood's built environment may impact alcohol use, but few prior research has been conducted. The Moving to Opportunity (MTO) study randomly assigned housing vouchers allowing low-income families to move from public housing to private apartments in lower poverty neighborhoods. The policy decreased binge drinking and alcohol use among girls, but increased risk among boys. No studies have examined mediation effects. We examined whether the effect of MTO housing voucher receipt (vs. public housing control) on youth (N=2976, age 12-19 in 2001-02) drinking (past 30-day number of drinks per day on days drank) reported in 2001-02 was mediated by objective measures of density (per square mile) of on- and off-premise alcohol outlets (M=1.89, SD=3.1) at the census tract where the family lived in the first post-randomization follow-up (2007). We estimated gender-stratified Poisson mediation models to estimate controlled direct effects (CDE). In 1997, MTO randomized to receive vouchers lived in census tracts with lower density of off-premise outlets but higher density of on-premise outlets vs. controls. MTO treatment (vs. control) resulted in lower drinking for girls via alcohol outlet density, but only at higher levels of the mediator. The RR of drinking on drinking when mediator=15 off-premise outlets per sq mile was RR=1.10, 95%CI (0.93, 1.27) when mediator=0. RR=0.83 (0.79, 0.87) MTO treatment generated harmful effects on boys' drinking at lower levels of off-premise outlet density, but results were mixed for boys' on-premise outlet density. The boys' treatment effect on drinking when mediator=15 off-premise outlets per sq mile was RR=1.41 (1.39, 1.43) for mediators 15, the RR=2.17 (1.30, 3.61). Policies that include ongoing services may be important to help boys navigate changes in housing and the surrounding alcohol environment to prevent alcohol use.

WILL THE RISE OF FOR-PROFIT COLLEGES ERODE THE POPULATION HEALTH ADVANTAGES ASSOCIATED WITH HIGHER EDUCATION? Theresa L. Ory*, Theresa L. Ory, Nicole M. Schmidt, Naomi H. Thylén, Anton Berger, John Robertson, M. Maria Glymour, (University of Minnesota School of Public Health, Division of Epidemiology & Community Health)

In the past 2 decades, for-profit colleges have proliferated. However, evidence suggests that education quality at for-profit colleges may be inferior to public or nonprofit colleges. There is no prior evidence on whether for-profit colleges influence health. Using National Longitudinal Survey of Youth, a nationally-representative cohort, we tested whether attending any college, and the sector of the college (for-profit, nonprofit, public vs. no college) was associated with obesity (BMI>=30) in young adulthood (mean age=31, N=7095). We also evaluated mediation specifically: the direct effects of for-profit (and other sector) college attendance for individuals who did or did not receive a Bachelor's degree. Logistic regression models were adjusted for race, sex, age, non-college related experiences. Among respondents who reported moving recently, we conducted regression models to test for associations between having been previously evicted and indicators of current housing and neighborhood quality. Results: Overall, 8.9% of US renters (901/11,909) reported a high risk of eviction. Households with higher risk were more likely to pay ≥30% of their income on rent (47.3% vs. 40.7%, p<0.001) and more likely to live below the federal poverty level (33.2% vs. 26.3%, p<0.001). Single parents with children were more likely to report higher eviction risk than all other household structures (14.0% vs. 8.9%, p<0.001). Among recent movers, 15% past eviction was associated with worse housing quality following a move (OR=2.1, 95% CI: 1.0, 4.2) and increased rates of health-related housing deficits, including peeling paint and water leaks. Eviction was also associated with worse neighborhood quality (OR=23.9, 95% CI: 1.1, 4.8) and lower neighborhood social capital (coefficient =-.03 on a 0.5 scale, 95% CI=-0.8, 0.1). Conclusion: Eviction is most prevalent among impoverished households with single parents and children and may lead to poor quality housing and neighborhood environments linked to decrements in health.

S/P indicates work done while a student/postdoc
FEELINGS VERSUS FACTS: USING NEIGHBORHOOD DATA AND PERCEPTIONS OF NEIGHBORHOODS TO STUDY HOW PLACE AFFECTS SELF-REPORTED HEALTH OF URBAN BLACK MEN

Background: To understand neighborhood influences on health, we must measure neighborhood environments appropriately. We explored whether the physical and mental health of urban black men is related to neighborhood characteristics as measured through objective data or through men’s perceptions of their neighborhoods. Methods: We used data from 486 black men age ≥ 18 years living in Philadelphia admitted to a trauma center with an injury between January 2013 and February 2017. Neighborhood-level measures of the social, economic, and built environment were obtained from multiple sources. At study entry, participants answered questions of perceived neighborhood environment and self-reported poor physical and mental health 30 days before injury. We conducted factor analysis of neighborhood variables to identify neighborhood factors and compute factor scores, then used logistic regression to estimate the odds of poor physical or mental health, accounting for spatial correlation of participants. Results: Poor physical and mental health was reported by 12% and 22% of subjects, respectively. In participants’ neighborhoods, median household income was $29,000 and 29% of adults lived in poverty. Individual: 73% of men reported abandoned buildings and 31% reported not feeling safe walking around their neighborhood. Physical health varied based on neighborhood poverty (deprivation, vacancy, and victimization) and neighborhood connectedness factors. Mental health varied based on neighborhood economics (spending, income, and education) and two individual perception factors (social disorder, safety concern). Conclusions: We identified neighborhood components of importance to this vulnerable population. Both neighborhood-level and individual-level measures of neighborhood influence health, but may operate through different mechanisms.

PERCEIVED RACISM IN RELATION TO TELOMERE LENGTH

Yvette C. Cozier, Yvette C. Cozier, Darline Lu, Lynne Rosenberg, Julie R. Palmer, (Slone Epidemiology Center at Boston University)

Telomere length is considered a biomarker of human aging and premature morbidity and mortality. Chronic stress is associated with shorter telomere length. Perceived racism is a chronic psychosocial stressor in the lives of black women. We assessed the relationship between perceived racism and telomere length in the Black Women’s Health Study (BWHS) a follow-up of US black women begun in 1995. The 1997 and 2009 biennial questionnaires asked about the frequency of “daily racism” (e.g., “you receive poorer service than other people in restaurants or stores”) and about “lifetime racism” (e.g., “treated unfairly due to your race”). Relative telomere length (RTL) was determined for 992 women using the exponentiated ratio of telomere repeat copy number to a single gene copy number (T/S) from quantitative real-time PCR telomere assay, log-transformed to improve normality (log-RTL). Multivariable linear regression was used to estimate the relationship between log-RTL and racism adjusting for age at blood draw and demographic and behavioral factors. Mean age of the women assessed was 55.6 (range: 40-70) years, and the mean telomere length was 0.77(range: 0.21-1.38). Overall, log-RTL was not associated with measures of perceived racism. However, in analyses stratified on race (white vs. black) and gender, the relationship between daily and lifetime racism and log-RTL among women who did not discuss racism with others (b = -0.0598, SE = 0.03, p = 0.03). Women who kept racism to themselves and reported higher measures of daily racism had shorter RTL. These findings suggest that experiences of racism plus style of coping may together have an effect on the health of black women.

DOES BANKRUPTCY RISK PREDICT NEW HIV CASES? A SPATIOTEMPORAL ANALYSIS OF THE LOCAL CREDIT ECONOMY AND HIV IN PHILADELPHIA, PA

Lorraine T. Dean, Lorraine Dean, Hai (Henry) Luan, Kathleen A. Brady, Yustif Kannisto, (Department of Epidemiology, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD, USA)

Introduction: Previous studies have evaluated local credit economy indicators to predict infectious diseases such as flu, but have not applied this to HIV. We assessed whether local credit economy indicators operate independently of other social and economic factors (race, income, poverty) that have been previously associated with new HIV cases. Methods: This longitudinal spatiotemporal analysis examined new HIV cases in 2011-2015 reported by the Philadelphia Health Department for 45 Philadelphia zip codes. Prior year local credit economy was measured by (1) Equifax’s Bankruptcy Navigator Index 4.0 (BLI), rating the likelihood of bankruptcy within the next 24 months on a scale of 1-600, with lower values indicating higher bankruptcy risk, and (2) the sum of derogatory credit accounts (i.e., bankruptcies, foreclosures, and collections). Population demographics were from American Community Survey 2011 5-year estimates. Hierarchical Bayesian Poisson models with spatial, temporal, and space-time interaction random effects were fitted for new HIV cases. All models adjusted for population size, median income, and percent age 18-24, male, Black, and below 200% poverty. Zip codes with a high probability (≥0.9) of relative risk exceeding 1 were considered HIV hotspots. Results: Across the 5-year period, BLI scores ranged from 273.1 to 925. HIV cases ranged from 6 to 62 in the zip codes. Three HIV clusters were identified in central and southern Philadelphia. New HIV cases decreased from 2011-15. Each unit increase in BLI and derogatory account in the previous year predicted 48% (95% credible interval: 0.17, 0.87) and -15% (95% CI: -0.1, -0.29) change in HIV risk, respectively. Conclusion: Philadelphia zip codes with more favorable credit economies had lower HIV risk than those with less favorable credit economies. While new HIV cases decreased, local credit economy indicators may further refine which hotspots should be targeted for prevention efforts.

S/P indicates work done while a student/postdoc
PAST YEAR ARRESTS AMONG PRESCRIPTION PAIN RELIEVER MISUSERS IN THE UNITED STATES, 2002-2014 Abby Hagemeyer* Abby Hagemeyer, Alejandro Azofeifa, Margaret Mattson, (CSTE Applied Epidemiology Fellow)

Background: Prescription pain reliever misuse is a driving factor in the U.S. opioid crisis which has had adverse consequences to health, economic, and social welfare. Little is known about the impact on the criminal justice system. The goals of this study are to estimate, characterize, and assess the overall trend of the national prevalence of past year arrests among persons who misused prescription pain relievers using data from the National Survey on Drug Use and Health (NSDUH) 2002-2014. Methods: NSDUH data from 2002-2014 were used to estimate the national prevalence of past year arrests among prescription pain reliever misusers aged 12 years and older, overall and by sociodemographic characteristics. Prescription pain reliever misusers were defined as persons with past year use of any prescription pain reliever not prescribed or taken only for the experience of feeling it caused, and excluded heroin users. A logistic regression model was used to assess the overall trend of past year arrest prevalence among prescription pain reliever misusers from 2002-2014. Results: From 2002-2014, 10.9% of people who misused prescription pain relievers reported a past year arrest (approximately 1.2 million people each year). Overall, data show higher past year arrest prevalence among prescription pain reliever misusers who were white (67.0%), male (70.5%), aged 25-29 years of age (43.6%), high school graduates (50.6%), unemployed (39.6%), and have an annual household income of $20,000-$49,999 (38.6%). The overall trend of past year arrest prevalence among prescription pain reliever misusers significantly decreased from 2002-2014 (0.038, 95% CI: 0.07,0-0.00). Conclusions: Every year, more than 1.2 million prescription pain reliever misusers are arrested placing burden on the criminal justice system. Identifying and understanding this population will help inform intervention efforts, drug court eligibility criteria, and substance use treatment referral programs.

PATTERNS OF FORMER DRINKING AND THEIR RELATIONSHIP WITH HOSPITALIZATIONS, CARDIOVASCULAR DISEASE, AND DEATH IN THE ARIC (ATHEROSCLEROSIS RISK IN COMMUNITIES) STUDY Natalie R. Daya* Natalie R. Daya, Casey M. Rehblotz, Lawrence J. Appel, Elizabeth Selvin, Mariana Lazo, (John Hopkins University)

Excessive alcohol consumption is a risk factor for poor health outcomes but moderate consumption may reduce the risk of cardiovascular disease (CVD). Few studies have examined the association of patterns of alcohol consumption prior to quitting with subsequent health outcomes. We seek to understand if patterns of prior drinking modified the risk of hospitalizations, CVD and death among former drinkers. Participants from the ARIC Study were followed from 1985-2015. Participants were categorized into moderate (0.5-4 drinks/day for women and 2 drinks/day for men), and heavy episodic drinkers with or without a history of heavy episodic drinking (self-report consumption of 5 or more drinks almost every day). We used Cox models adjusted for established risk factors to examine the associations with all-cause and cause-specific hospitalizations, CVD, and death. Among 12,732 participants (mean age 60 years, 56% female, 23% black), 24% were former drinkers and 15% of them reported history of heavy episodic drinking. Over a median follow-up of 20.5 years, former drinkers had a higher risk of all-cause hospitalizations, external causes of injuries and poisonings, death and heart failure compared to moderate drinkers. Furthermore, former drinkers with a history of heavy episodic drinking had a significantly higher risk of hospitalization and death compared to former drinkers without a history of heavy episodic drinking [hospitalization: HR (95% CI), 1.36 (1.23-1.52) vs. 1.16 (1.09-1.22), p<0.003; death: 1.60 (1.40-1.83) vs. 1.30 (1.20-1.41), p=0.004]. Among former drinkers, those who experienced a hospitalization or died during follow-up drank for a longer period and reported higher consumption in the past. Former drinking is associated with poor health outcomes, whether or not there was a history of heavy drinking. Former drinkers with a history of heavy drinking had a greater risk of adverse health outcomes after cessation than those without a history of heavy drinking.

EXAMINING THE ASSOCIATION BETWEEN LONG-TERM ALCOHOL RISK AWARENESS AND ALCOHOL DRINKING PATTERNS AND ALCOHOL USE DISORDERS AMONG UNIVERSITY STUDENTS Nicole Khalil* Nicole Khalil, Silvia S. Martinez, Lilian Ghandour, Shire Anouti, (Columbia University Mailman School of Public Health)

Background: While alcohol remains one of the leading risk factors for noncommunicable diseases and injuries worldwide, knowledge of its long-term harmful effects as well as enforcing a minimum BAC of 0.05% has been shown to reduce alcohol consumption. The current study aimed to examine the association between long-term alcohol risk awareness and alcohol drinking patterns among university students from 8 private and public universities in Lebanon. The survey assessed respondents’ patterns of alcohol use, awareness of health risks caused by alcohol consumption as well as policy-relevant variables. This study aims to investigate the association between long-term alcohol risk awareness and alcohol drinking patterns among university students.

DEATH IN THE ARIC (ATHEROSCLEROSIS RISK IN COMMUNITIES) STUDY

LINKING DSM-V ALCOHOL USE DISORDERS WITH POLICY-RELEVANT CORRELATES IN YOUNG ADULTS: IMPLICATIONS FOR AN EVIDENCE-INFORMED NATIONAL ALCOHOL HARM REDUCTION POLICY Lilian Ghandour* Lilian Ghandour, Shire Anouti, (American University of Beirut)

A total of 1155 university students from 8 private and public universities from Lebanon participated in a survey in May 2016 aimed at understanding the association between policy-relevant factors and alcohol consumption. Among past-year drinkers (n=582), 15% were screened with DSM-V moderate to severe alcohol-related problems. Compared to drinkers with an AUD, they were more likely to purchase their alcohol beverages mostly from pubs [OR=2.43 (1.16, 5.08)] and to recall seeing alcohol ads worn by sports players [OR=2.8 (1.70, 4.61)]. Drinkers with moderate/severe alcohol problems (versus no AUD) also believe that earlier closing times for pubs [OR=2.23 (1.48-3.53)] harm all forms of alcohol marketing [OR=1.8 (1.00, 3.24)], pricing promotions [OR=2.21 (1.33, 3.65)], as well as enforcing a minimum BAC [OR=2.11 (1.07, 4.13)] would decrease their alcohol consumption levels. All probable points of entry for a national alcohol harm reduction policy also supported by additional data including (1) 40% of past-year drinkers reported driving through drinking stores that sell cheap low quality alcohol as their source of alcohol; in addition to music concerts/events; (2) only 8% of past year drinkers (who reported drink-driving) were pulled over for a breath test; (3) 98% reported an alcohol outlet near school/home; 88% perceived alcohol as easily accessible; 92% had never been asked for ID when purchasing alcohol, and less than 1% have been refused alcohol after they have had too much to drink.

S/P indicates work done while a student/postdoc
EFFECTS OF GOOD SAMARITAN LAWS ON PRESCRIPTION OPIOID AND HEROIN OVERDOSE FATALITIES
Nicole Kravitz-Wirtz, Corey Davis, Bill Ponicki, Paul Grunewald, David S. Fink, Silvia Martino, Brandon DL Marshall, Garen Wintemute, Magdalena Cerda, (University of California, Davis)

Good Samaritan laws (GSLs), which provide legal protection to anyone who seeks medical assistance in the event of a drug overdose, have been advanced as part of larger efforts to reduce opioid-related harm. The only studies to examine the impacts of these laws have done so at the state level; however, state-level studies may mask critical variation at the local level. The aim of this study was to examine the immediate and longer-term effects of GSLs on county-level incidences of fatal overdose involving prescription opioids (POs) and heroin. County-by-year mortality data were drawn from the National Vital Statistics System for 49 states and the District of Columbia for 2002-2015. We used Bayesian space-time Poisson models with cumulative lag effects estimated for the year of GSL implementation and up to three successive years. These models utilize a conditional autoregressive random effect that accounts for spatial dependence between adjacent counties, a non-spatial random effect that accounts for residual county-level variation, and a zero-centered, non-spatial random time trend to capture changes in overdose between counties. Models also include a fixed-effect linear time trend to account for changes in overdose common to all states and state dummy variables to correct for differences in the propensity for states to adopt a GSL. GSLs were increasingly associated with decreases in fatal PO overdose. By year three of operation, GSLs were linked to a 19% reduction in the relative risk of PO mortality (95% CI=0.77-0.84). Legal immunity for possession of controlled substances or drug paraphernalia was a particularly important feature of these laws. Conversely, GSLs were increasingly associated with increases in fatal heroin overdose. By year three of operation, GSLs were linked to a 19% reduction in the relative risk of PO mortality (95% CI=0.77-0.84). Legal immunity for possession of controlled substances or drug paraphernalia was a particularly important feature of these laws. Conversely, GSLs were increasingly associated with increases in fatal heroin overdose. (RR=1.29, 95% CI=1.18-1.40 by year three). These findings suggest that GSLs may reduce overdose fatalities involving POs but not heroin. Additional research is needed to determine how the effectiveness of GSLs could be further improved.

DIFFERENCES IN MARIJUANA USE DISORDER AMONG USERS OF DIFFERENT TYPE OF MARIJUANA IN CHILE SINCE 2014 TO 2016
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Background: Marijuana use more than tripled between 2010 and 2016 in Chile (4.6% vs. 14.5% in past year use). A recent report showed variations in the composition of the type of marijuana that is consumed in Chile, which may affect rates of marijuana use disorders in the population. We investigated the change in marijuana use disorder between 2014 and 2016 among users of different type of marijuana. Method: We used data from the National Survey on Drug Use in Chile of 2014 and 2016. The survey has a three-stage random sample (n 2014=20,113, n 2016=19,147), and considers people between 12-65 years of age. We estimated the proportions of people who meet criteria for marijuana dependence among respondents who declared the use of marijuana in the last year, based on the tenth revision of the International Classification of Diseases. We stratified results by three different types of marijuana most frequently consumed: resin, flowers of low-medium potency, and flowers of high-potency (skunk). We used Wald test to determine changes in marijuana dependents between 2014 and 2016, and by type marijuana. Results: 15.8% met criteria for marijuana dependence in 2016 and 17.3% in 2014. The proportion of people who use high-potency marijuana went from 5.7% in 2014 to 9.7% in 2016. There was no change in the proportion of marijuana dependence among resin users between 2014 and 2016 (31.6% vs. 32.8%), as well as for those who mainly use low-medium potency marijuana (14.6% vs. 12.1%). In the group that used high-potency marijuana, however, there is a significant increase in the proportion of subjects that meet dependence criteria, passing from a 10.9% in 2014, to 29.0% in 2016 (p=0.0059). Conclusion: There is a change in the kind of marijuana that is being used in Chile within those who meet criteria for dependence. High-potency marijuana may increase the risk for substance use disorder and should be considered in future public health interventions.
THE CRCS-WISDM PROJECT: A MULTILEVEL, SHARED DECISION MAKING INTERVENTION TO INCREASE COLORECTAL CANCER SCREENING. Resa M. Jones*, Resa M. Jones, Keighly Bradbrook, Pamela J. Mink, David C. Wheeler, Diane L. Bishop, (Department of Epidemiology and Biostatistics, College of Public Health, Temple University and Fox Chase Cancer Center)

Background: Colorectal cancer screening (CRCS) prevalence is suboptimal and barriers exist at the health system-, clinician-, and patient-level. Thus, multilevel interventions hold promise to increase adherence. Methods: The CRCS with Improved Shared Decision Making (CRCS-WISDM) Project aimed to increase CRCS among average-risk adults, 50-75 years, using an evidence-based intervention (N=6 communities; 2 intervention, 4 comparison). CRCS-WISDM embedded shared decision making (SDM) in community-based primary care in a large MN health system using a non-obtrusive system enhancement involving clinicians and patients. Specifically, an electronic health record (EHR) algorithm identified non-adherent patients and custom best-practice-alerts enabled CRCS orders or SDM delivery to patients by trained nurse clinicians. We obtained annual cross-sectional EHR data (2010-2014: baseline, Times 1-3) for eligible patients seen in participating clinics (N range: 12,430-15,465). Intention-to-treat logistic regression, adjusting for model-specific confounders (e.g., gender, age, insurance) and baseline screening, determined the intervention effect on overall CRCS adherence (i.e., stool test in last year, sigmoidoscopy in last 5 years, colonoscopy in last 10 years). Results: Overall, the population was 52.3% female, 34.1% ≥65 years, and 58.1% had private insurance. During baseline, adherence increased more significantly in the intervention condition compared to the comparison (33.3% vs. 28.6%, p<0.001). After adjustment, the odds of adherence were significantly higher in the intervention compared to the comparison: Time 1 adjusted odds ratio (aOR)=1.34, 95% confidence interval (CI): 1.12-1.50; Time 2 aOR=1.33, CI: 1.18-1.49; Time 3 aOR=1.27, CI: 1.11-1.44). Conclusions: A translational, multilevel intervention designed to address health system-, clinician-, and patient-level barriers to CRCS results in meaningful increases in CRCS adherence, which could ultimately decrease mortality.

S/P indicates work done while a student/postdoc
WHO'S AT RISK? ADJUSTED ESTIMATES OF HYSTERECTOMY INCIDENCE AMONG WOMEN WITH BENIGN GYNECOLOGIC CONDITIONS IN NORTH CAROLINA

Background: Because hysterectomy (uterus removal) is the second most common surgical procedure among nonelderly American women, failure to exclude women with previous hysterectomy from rate denominators may underestimate incidence rates. Estimates of racial/ethnic difference may be particularly biased due to differential prevalence of hysterectomy by race/ethnicity. Purpose: We aim to estimate racial/ethnic-specific hysterectomy incidence rates after removing from the denominators women not at risk due to previous hysterectomy. Methods: We used surveillance data from the 2014 North Carolina (NC) Hospital Discharge and NC Ambulatory Surgery Visit databases to estimate racial/ethnic-specific hysterectomy counts for women aged <45 years with benign gynecologic conditions (N=7,098). Denominator data were derived from 2014 age-, race-, and sex-specific NC population estimates from the American Community Survey. We then applied NC racial/ethnic-specific hysterectomy prevalence estimates from the 2012 Behavioral Risk Factor Surveillance System to remove women with previous hysterectomy from rate denominators. Rates were age-adjusted to the 2000 Decennial Census. Results: After denominator correction, age-standardized hysterectomy rates varied by race/ethnicity (range: 6.1 [non-Hispanic [NH] Asian] to 7.65 [NH American Indian [AI]) per 10,000 women-years [WY]). Although lowest, the highest rate increase attributable to denominator correction was among NH AI women (corrected 76.5 per 10,000 WY [95% CI, 13.2-249.8] vs. uncorrected 64.5 per 10,000 WY [95% CI, 10.9-118.0]). The denominator-corrected NH White rate was 45.1 per 10,000 WY (95% CI, 38.3-51.9) (vs. uncorrected 42.4 per 10,000 WY [95% CI, 36.0-48.7]). All racial/ethnic rate differences (ref: NH White women) increased after correction. Conclusion: By not accounting for the appropriate at-risk populations, hysterectomy incidence rates are likely underestimated, as are the magnitudes of racial/ethnic disparities.

THE RELATIONSHIP BETWEEN URINARY BISPHENOL A CONCENTRATIONS, ESTROGEN RECEPTOR GENE AND BREAST CANCER

Introduction: Breast cancer is one of the most common diseases in women. Compared to other western countries, there is a younger trend in Taiwan. The gene expression of estrogen receptor plays an important role in breast cancer pathogenesis. Environmental hormones such as bisphenol A (BPA) have been suspected that they had estrogen effects. The aim of present study is to explore the relationship between the environmental hormones, gene expression of estrogen receptor and breast cancer by a case-control study. Materials and Methods: Breast cancer patients were recruited from Kaohsiung Medical University Hospital and health controls were recruited from communities in Kaohsiung. Cases were diagnosed by physicians, and were confirmed by the pathological lesion examination. 224 cases and 30 health controls were included for further analysis. We categorized the cases according to the diagnosis age of 40 into two groups of early onset and non-early onset patients. Finally, we measured the bisphenol A concentrations in urine and gene expression levels of estrogen receptor (ESR2). Results: The present study found that early onset patients have the highest concentrations of bisphenol A in urine. Although the statistical analysis didn't show a significant difference, the results showed the significant trend effect. Gene expression level of ESR2 is significantly different between early onset and non-early onset groups, and the health controls have the highest ESR2 levels among all groups. We found that the odds ratio is 8.1 in upper tertile concentration of BPA for breast cancer. The BPA concentrations of early onset breast cancer are higher than non-early onset breast cancer. Conclusion: The present study found that bisphenol A exposure may increase the risk of breast cancer and even the early onset breast cancer. Bisphenol A may regulate gene expression of estrogen receptor and influence the pathogenesis of breast cancer.

DETRARY LONG-CHAIN OMEGA-3 FATTY ACIDS AND RISK OF UTERINE FIBROIDS IN THE STUDY OF ENVIRONMENT, LIFESTYLE, AND FIBROIDS (SELF)

Uterine fibroids are a common, often painful, benign neoplasm diagnosed in women of reproductive age and are responsible for significant medical expenditure. In the U.S., rates of fibroid diagnoses among black women are at least twice that of white women. In a recent cohort study of black women, we reported positive associations between long-chain omega-3 polyunsaturated fatty acid (PUFA) intake and fibroid risk. Here, we examine these associations in a separate cohort of black women in the DART area. During 2010-2012, we recruited 1,969 premenopausal women aged 25-34 years, without a history of uterine fibroids, autoimmune disease, or cancer. Based on ultrasonography at enrollment, 20, and 40 months of follow-up, 1,232 women were eligible for analysis of fibroid incidence, among whom 199 incident cases were identified. Women answered a baseline self-administered questionnaire with questions on demographics, reproductive and medical history, and lifestyle, including a 104-item food frequency questionnaire, from which dietary intake of n-6, n-3, and total trans fatty acids (TFA) was estimated. Fatty acid intakes were energy-adjusted and categorized into quintiles. We calculated a composite variable representing long-chain n-3 PUFA intake by summing intakes of EPA, DHA, and ALA. We used Cox models to estimate adjusted HRs and 95% CIs for associations between n-3 PUFA and fibroid risk. Overall, intakes of individual n-3 PUFA were not consistently or appreciably associated with fibroid risk. However, HRs for the highest versus the lowest quintiles of DHA (2.98, 95% CI: 0.85, 9.36) and total long-chain n-3 PUFA (1.17, 95% CI: 0.77, 1.78) were similar in magnitude to those previously reported. These data are suggestive of a possible relation between dietary long-chain n-3 PUFAs and fibroid risk; further follow-up in the cohort will be conducted to confirm these findings.

INSIGHT INTO BLADDER HEALTH: THE RELATION BETWEEN LOWER URINARY TRACT SYMPTOMS AND INTERFERENCE IN WOMEN

BACKGROUND: Little research has focused on lower urinary tract symptoms (LUTS) prevalence and bladder health promotion. To address this gap, the Prevention of Lower Urinary Tract Symptom Research Consortium developed a working bladder health definition as a “complete state of physical, mental and social well-being related to bladder function that permits daily activities [and] allows optimal well-being.” We used existing data from the Boston Area Community Health (BACH) Survey to begin to quantify the distribution of this definition, drawing upon extensive LUTS data and unique LUTS-specific interference with activities data. METHODS: At baseline, participants reported their frequency of 15 LUTS and interference with 7 activities (e.g., drinking fluids before bed; adapted from the validated Epstein scale). Prevalence estimates were weighted, and prevalence ratios (PRs) were calculated by log-link generalized linear models with robust variance estimation, adjusting for known LUTS risk factors and individual LUTS RESULTS: Of the 2,697 women with complete data, 11,93% reported no LUTS or interference, 2.7% reported at least a little interference but no LUTS, 44% reported rare or greater LUTS but no interference, and 29.5% reported both LUTS independently associated with interference were weak stream, urgency incontinence, urgency nocturia, perceived frequency, and frequency (PRs = 1.3-1.5; p < 0.05). CONCLUSIONS: Our findings begin to inform and quantify the spectrum of bladder health demonstrating a sizeable group of women without LUTS or interference who might be considered to have optimal bladder health, a larger group of women with LUTS but no interference, or interference but no LUTS, who might be considered to have good/intermediate health, and another sizeable group of women with worse health i.e., those with both LUTS and interference.
Yellow fever (YF) is a zoonotic infection, endemic to parts of Africa and South America, with 50% fatality rates among symptomatic cases. US service members deployed/stationed in regions endemic to YF require vaccination against this potentially fatal infection. YF vaccination is precautionary in pregnancy, as it may lead to adverse pregnancy and birth outcomes, and inadvertent vaccination may occur among women unaware of their pregnancy status. We conducted a descriptive analysis of the occurrence of YF vaccination preconceptionally/in pregnancy among active duty military mothers. The study population included 163,596 pregnancies ending in live deliveries to military mothers from 2003–2014. Pregnancies were captured by the Department of Defense Birth and Infant Health Research program and linked to vaccine records. Descriptive analyses compared women who received YF vaccine 28 days prior to their last menstrual period (LMP)—since this vaccine is live attenuated—through date of delivery with those who did not receive the vaccine preconceptionally/in pregnancy. Out of the 163,596 mothers, 1,195 were vaccinated preconceptionally/in pregnancy: 467 in the 28 days prior to LMP, 625 in the first trimester, and 103 in the second/third trimester. Most (861 of 1,195) received their initial dose in pregnancy; 29 (of 1,195) received >1 vaccine in pregnancy.

Vaccinated mothers were more likely to be younger, unmarried, of enlisted rank, and in a combat role (but not health care occupation). These mothers were also more likely to receive other vaccines in pregnancy, including hepatitis A. Army mothers accounted for most YF vaccinations preconceptionally/in pregnancy from 2003–2005, which shifted to Navy mothers from 2006–2014. Understanding the characteristics of women who receive YF vaccination preconceptionally/in pregnancy may help guide future policy. Given the increasing number of military women, vaccine safety in pregnancy is a priority for protecting military families.

S/P indicates work done while a student/postdoc
EFFECTS OF FINE PARTICULAR MATTER AND BLACK CARBON ON MARKERS OF OVARIAN RESERVE AND RESPONSE AMONG WOMEN UNDERGOING IN VITRO FERTILIZATION

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Background: Although studies suggest that air pollution may decrease fecundity, the specific mechanisms are still unclear. We examined the association between maternal exposure to fine particle matter (PM2.5) and black carbon (BC) on markers of ovarian reserve and response among women undergoing in vitro fertilization (IVF) in New England. Methods: Our analysis included 343 women for the PM2.5 analysis (2005-2016) and 224 women for the BC analysis (2005-2011) enrolled in a prospective cohort study of couples undergoing a fresh IVF cycle at an academic fertility center. Using georeferenced residential addresses, we used spatiotemporal models to estimate PM2.5 and BC exposure during the 3 months prior to IVF and during controlled ovarian stimulation (â¼ 12 days). We used multivariable generalized linear mixed models to evaluate the associations. Results: As presented in the absolute or% change (95% CI) in the outcome per interquartile range (IQR) increase in PM2.5 or BC. Results: An IQR increase in exposure to PM2.5 in the 3 months prior to IVF was associated with slightly higher day 3 FSH (0.9, 95% CI 0.6-1.3), and slightly higher day 3 FSH in the 3 months prior to IVF was associated with slightly higher day 3 FSH (0.9, 95% CI 0.6-1.3). During controlled ovarian stimulation, an IQR increase in PM2.5 was associated with a higher number of follicles (7.4% (2.4, 12.7%)) while an IQR increase in BC was associated with a higher number of mature oocytes (13.6% (5.4, 22.4%)) and fertilized oocytes (18.9% (9.0, 29.7%)). Neither PM2.5 nor BC exposure was associated with endometrial thickness or total oocyte counts. Conclusions: Higher residential exposure to PM2.5 prior to IVF was associated with lower ovarian reserve and may be one mechanism linking air pollution to reduced fecundity. Paradoxically, higher exposure to PM2.5 in the 3 months prior to IVF was associated with slightly higher day 3 FSH and slightly higher day 3 FSH in the 3 months prior to IVF was associated with slightly higher day 3 FSH. This study examined the association of prenatal exposure to PM2.5 and BC with ovarian reserve and response among women undergoing IVF. We found that higher exposure to PM2.5 and BC was associated with lower ovarian reserve and response, which may explain the observed relationship between air pollution and reduced fecundity. Further studies are needed to explore the specific mechanisms by which air pollution affects ovarian reserve and response.
Background: Experimental studies suggest that prenatal exposure to endocrine disrupting chemicals interferes with developmental processes in the fetal brain. Yet, evidence is inconclusive. Methods: In a birth cohort (2008-2010, upstate New York) we quantified concentrations of bisphenol A (BPA), perfluorooctane sulfonic acid (PFOS) and perfluorooctanoic acid (PFOA) in banked newborn dried blood spots using liquid chromatography tandem mass spectrometry. Mothers reported on children's behavior using the Strength and Difficulties Questionnaire at age 7 (650 singletons and 138 twins). Difficulties in behavior (i.e., emotional, conduct, hyperactivity, and peer problems) and prosocial skills were classified at validated cut-offs. We used logistic regression with generalized estimating equations to estimate the odds of having difficulties per exposure category. Models were adjusted for maternal and child characteristics, e.g., ethnicity, smoking, parity, and pre-pregnancy body mass index (and preterm delivery for BPA). Results: 111 children (12.1%) had behavioral difficulties and 55 had problems in prosocial skills. The median (interquartile range) of PFOS, PFOA, and BPA were 1.74 ng/ml (1.33), 1.12 ng/ml (0.96), and 7.93 ng/ml (10.79), respectively. Higher PFOS levels were associated with increased odds of having behavioral difficulties (OR per SD of log PFOS=1.33, 95%CI: 1.05-1.67). We observed associations between PFOS in the high relative to the lowest quartile and behavioral difficulties (OR for PFOS 1.14-1.74=1.73, 95%CI:0.87-3.44; PFOS 1.75-2.48=1.83, 95%CI:0.93-3.57; and PFOS >2.48=2.56, 95%CI:1.34-4.91 compared to PFOS<0.71). Higher PFOA levels were linearly associated with problems in prosocial skills (OR=1.36, 95%CI:1.05-1.76). We found no association of child behavior with BPA, nor interactions with sex or plurality. Conclusion: Increasing prenatal exposure to PFOS and PFOA, as reflected in neonatal concentrations, may pose risk of child behavioral difficulties.
SCREENING PREGNANT WOMEN FOR SUICIDAL BEHAVIOR IN ELECTRONIC MEDICAL RECORDS: DIAGNOSTIC CODES VS. CLINICAL NOTES PROCESSED BY NATURAL LANGUAGE PROCESSING Qiu-Yue Zhong* Qiu-Yue Zhong, Elizabeth W. Karlson, Bria Gelage, Sean Finn, Paul Avilchék, Jordan W. Smoller, Tianxi Cai Michelle A. Williams, (Harvard)

Objective: We examined the comparative performance of structured, diagnostic codes vs. natural language processing (NLP) of unstructured text for screening suicidal behavior among pregnant women in electronic medical records (EMRs). Methods: Women aged 10-64 years with at least one diagnostic code related to pregnancy or delivery (N=27,568-43) from Partners HealthCare were included as our “dataset.” Diagnostic codes related to suicidal behavior were applied to the dataset to screen women for suicidal behavior. Among women without any diagnostic codes related to suicidal behavior (n=273,410), 5,880 women were randomly sampled, of whom 1,120 had at least one mention of terms related to suicidal behavior in clinical notes. NLP was then used to process clinical notes for the 1,120 women. Chart reviews were performed for subsamples of women. Results: Using diagnostic codes, 196 pregnant women were screened positive for suicidal behavior, among whom 146 (76%) had confirmed suicidal behavior by chart review. Using NLP among those without diagnostic codes, 486 pregnant women were screened positive for suicidal behavior, among whom 146 (30%) had confirmed suicidal behavior by chart review. Conclusions: The use of NLP substantially improved the sensitivity of screening suicidal behavior in EMRs. However, the prevalence of confirmed suicidal behavior was lower among women who did not have diagnostic codes for suicidal behavior but screened positive by NLP. NLP should be used together with diagnostic codes for future EMR-based phenotyping studies for suicidal behavior.

EVALUATING PREDICTIVE MODEL DISCRIMINATION USING MULTIPLE SOURCES OF ELECTRONIC HEALTH DATA: HOW MUCH DATA DO WE NEED? Craig S. Meyer* Craig S. Meyer, Ning Zhang, Mary Whooley, (San Francisco VA Health Care System)

Electronic health records are used to define health conditions used for risk adjustment in clinical epidemiologic research, but the accuracy of electronic health records is often unknown. We sought to determine the extent to which predictive model discrimination would improve when data from the Centers for Medicare and Medicaid Services (CMS) was combined with data from the Veterans Affairs (VA) Corporate Data Warehouse. We calculated model performance for 12-month mortality after hospitalization for heart failure (HF) using inpatient data files from the VA alone vs. combined data from VA and CMS. We assessed discrimination using additional inpatient files from the VA to identify 44,753 Veterans over age 65 who were discharged from VA hospitals with a primary diagnosis of HF between 2007 and 2011. Among these patients, 1,134 (25%) also had inpatient data available from CMS National Claims History Files. We compared the prevalence of 14 common health conditions including hypertension, diabetes, and ischemic heart disease in the 12 months prior to their index hospitalization for HF based on ICD-9-CM code sets in VA-only to combined VA-CMS data. Chi-squared tests statistics compared the distributions of each health condition between the VA-only and the combined VA-CMS data. Two logistic regression models were used to model 12-month mortality using HF and calculate the C-statistic using each set of comorbidities. Patients were predominantly male (88%) and white (76%) with a mean age of 77 years. As compared with VA data, the prevalence of health conditions was on average 6.5% (range: 3.9% to 10.5%) higher based on combined VA-CMS data. The C-statistic for the model using VA-only data was 0.598 while the model using combined VA-CMS data had a C-statistic of 0.602 [Difference 0.004, 95% CI (0.001, 0.007)]. When available, researchers may need to consider multiple sources of electronic health data for accurate risk adjustment variables in clinical research.


Background: Further improvements in population health in low- and middle-income countries demand high-quality health systems to address increasingly complex burden of disease. Health facility surveys provide an important but costly source of information on health system readiness to provide care. We apply unsupervised learning methods in a novel attempt to improve the efficiency of health system assessment. Methods: We drew data from the national representative Service Provision Assessment surveys conducted in 10 countries between 2007 and 2015. We extracted 649 items in domains such as infrastructure, medication, and management to calculate a score using all possible information and classified facilities into quintiles. We used backwards selection to successively discard indicators, using a cross-validated kappa statistic to assess performance against the 649-item index. We compared three approaches: a 49-item service readiness index (SRI) predefined by the World Health Organisation, a new index based on backwards selection alone, and an enriched SRI. Results: 9238 facilities were fully assessed. A new 50-item index outperformed the SRI with a kappa statistic of 0.71 as compared to the score using all possible indicators vs. 0.35 for the SRI. The enriched SRI with 100 items performed similarly to a new 100-item index, with kappa statistics 0.75 and 0.81, respectively. The new index and enriched SRI achieved kappa over 0.90 (compared to the 649-item index) with 300 items included. Conclusions: A facility readiness measure developed by global health experts performed poorly in capturing the totality of readiness information collected during facility surveys. Using machine learning approaches to identify the most informative items dramatically improved performance, particularly with 100 or more of the 649 available items. Machine learning approaches can make assessment of health facility readiness more efficient and enhance understanding of health system performance in LMIC.
Open science requires sharing data. However, removing the 18 variables that HIPAA considers personally identifying (e.g., name, phone number) may be insufficient to ensure individual privacy in many datasets. For example, the date, time, and physician code of a clinic visit uniquely identifies a patient. Generally, improvements in probabilistic matching algorithms increase the risk of deductive disclosure, where in merging of two de-identified datasets permits identification of an individual. We consider two approaches to privacy-protecting data sharing: 1) data perturbation and 2) blind analysis. Data perturbation algorithmically modifies potentially identifying observed variables to prevent study participants from being identified while maintaining bounds of information loss. For example, the Shift and Truncate algorithm first selects a single random integer for each individual, then shifts all clinical visit dates for that subject by that integer number of days, then removes visits whose dates could reveal the shift. This prevents identification by visit date while preserving within-person time-to-event relationships. Perturbed datasets might be considered de-identified where unperturbed data would not be. Blind analysis is a change to the research process rather than to the data. In blind analysis, an analyst develops and verifies analytic code using a mock dataset with variable fields matching those of the analytic dataset. She then sends that code to a person with approval to access raw data, who can review the code, run it, and return results – thus maintaining subject privacy. Blind analysis is often used by consortia with similarly formatted data but site-specific privacy requirements and not only preserves privacy but also encourages deliberate and reproducible data analysis. Data perturbation and blind analysis each have a history in collaborative research. Epidemiologists should be familiar with recent developments in these techniques.
CANNABIS SMOKING AND RISK OF CANCER: A META-ANALYSIS OF OBSERVATIONAL STUDIES Park, Sung Hoon* Park, Sung Hoon, Myung Seung Kwon, (Department of Cancer Control and Population Health, National Cancer Center Graduate School of Cancer Science and Policy, Goyang, Gyonggi-do, Korea.)

Background. Cannabis (also called marijuana) is one of the most widely used illicit substances in the world. While cigarette smoking is a well-known risk factor for many cancers, effect of cannabis smoking on the risk of developing cancer has remained unclear. This study aimed to evaluate the association between cannabis smoking and risk of cancer. Methods. We searched PubMed, EMBASE to locate relevant publications and the bibliographies of those articles were also reviewed in October 2017. Two evaluators independently reviewed and selected eligible studies based on the predetermined selection criteria. We included observational studies such as cross-sectional, case-control, and cohort studies reporting odds ratios (OR) or relative risks (RR) for the association between cannabis smoking and any type of cancer. Subgroup analysis was conducted by cancer type (lung, oropharynx, testicle, head and neck, and others) and by smoking duration (10 years). Results. We included a total of 31 observational studies, with two cohort studies and 18 case-control studies. These studies involved a total of 13,664 cancer patients and 151,572 participants without cancer. The random-effects meta-analysis of all 20 studies showed no significant association between cannabis smoking and the risk of cancer. (OR or RR, 1.07; 95% CI, 0.88-1.31; I²=72.6%). Subgroup meta-analysis by type of cancer showed that cannabis smoking increased the risk of cancer of lung, testicle, and head and neck, although these results were not statistically significant. Subgroup meta-analysis did show a statistically significant increased risk of cancer when duration of cannabis smoking exceeded 10 years (OR or RR, 1.43; 95% CI, 1.11-1.82; I²=52.8%). Conclusion. The current meta-analysis found a statistically significant increased risk of cancer when duration of cannabis smoking exceeded 10 years. Subgroup analysis by type of cancer did not reach statistical significance.

INTRODUCTION: Socio-demographic differences in electronic cigarette use among cigarette smokers have not been previously characterized in the US adult population. Methods. We analyzed longitudinal data from Waves 1 and 2 of the nationally representative Population Assessment of Tobacco and Health (PATH) study. Differences by income (based on the federal poverty limit (FPL)) and race/ethnicity in e-cigarette uptake at Wave 2 among cigarette smokers who were exclusive cigarette non-users at Wave 1 were assessed using multivariable logistic regression. We differentiated exclusive cigarette users who quit cigarettes (exclusive users) from those who did not quit cigarettes (dual users). E-cigarette-related attitudes and beliefs were evaluated to understand their potential contribution to socio-demographic differences in e-cigarette uptake and use patterns. Results. Among 6,592 cigarette smokers at Wave 1, 13.5% began to use e-cigarettes at Wave 2, of whom 91.3% were dual users. Compared to non-Hispanic Whites, non-Hispanic Blacks and Hispanics were less likely to become exclusive e-cigarette users (OR [Blacks] = 0.27, 95% CI 0.09-0.82; OR [Hispanics] = 0.44, 95% CI 0.19-0.98). Low-income smokers were less likely than higher-income smokers to become exclusive e-cigarette users (OR [200% FPL] = 0.58, 95% CI 0.33-0.91). Black, Hispanic, and low-income smokers were more likely than White and higher-income smokers to begin using e-cigarettes in the context of quitting cigarettes, which may be partly explained by perceived harm and social norms of e-cigarettes. These findings suggest that socio-demographic differences in e-cigarette uptake may contribute to widening disparities in cigarette smoking.

INVISTIGATING THE RELATIONSHIPS BETWEEN PERCEIVED AVAILABILITY OF MARIJUANA, PERCEIVED RISK OF MARIJUANA USE, AND USE OF MARIJUANA AMONG ADOLESCENTS IN CHILE, ARGENTINA, AND URUGUAY OVER TIME: Julia Schleimer* Julia Schleimer, Adelina Rivero-Aguirre, Alvaro Castillo-Carrignan, Hanah Syb Liagueur, Kari Rudolph, Silvia S. Martinez, Magdalen Gorki, (Columbia University)

AIM Permissive marijuana laws have prompted concerns about increased access to marijuana and the normalisation of marijuana use among adolescents. In light of evolving drug policies, we estimated trends in associations between adolescent perceived availability and perceived risk of marijuana and past-month marijuana use in Uruguay (UY), Argentina (AR), and Chile (CL) and examined how the relationships changed from 2001-2015. METHODS Using biennial, cross-sectional data from students (grades 8-12) in 2001, 2007, we modeled the relationship of perceived risk of regular marijuana use (low vs. moderate/great) and perceived availability of marijuana (easy vs. difficult/not able to obtain) with any past-month marijuana use by country. To test if the relationships changed over time, we used weighted time-varying effect models. RESULTS Students who perceived a low risk from marijuana use (AR OR=1.81, 95% CI (7.5, 8.3; UY OR=10.89 (9.4, 12.7; CL OR=6.0 (5.7, 6.3)) and who perceived marijuana as easily available (AR OR=15.92, 95% CI (13.5, 17.1); UY OR=18.93 (13.1, 27.3; CL OR=46.43 (4.3, 49.4)) had higher odds of past-month marijuana use in AR, the association between risk and use weakened from 2001 (OR=7.1 to 2011 (OR=6). While the link between availability and use grew from 2005 (OR=8) to 2017 (OR=20) and remained stable thereafter. In UY, the association between risk and use decreased from 2008 (OR=3) to 2014 (OR=10), while the link between availability and use remained stable (OR=25 from 2005-2014). In CL, the association between risk and use weakened from 2001 (OR=7.5) to 2015 (OR=6), while the link between availability and use peaked in 2008 and 2013 (OR=6). CONCLUSION The relationship of perceived risk and marijuana use weakened over time, while availability became a stronger determinant of use, particularly in Uruguay and Argentina. Future studies should examine factors that moderate these relationships across and within countries.

SOCIO-ECOLOGICAL AND RACIAL/ETHNIC DIFFERENCES IN E-CIGARETTE UPTAKE AMONG CIGARETTE SMOKERS: LONGITUDINAL ANALYSIS OF THE POPULATION ASSESSMENT OF TOBACCO AND HEALTH (PATH) STUDY Alyssa F. Harlow* Alyssa F. Harlow, Andrew Stokes, (Boston University School of Public Health)

Introduction: Sociodemographic differences in electronic cigarette use among cigarette smokers have not been previously characterized in the US adult population. Methods. We analyzed longitudinal data from Waves 1 and 2 of the nationally representative Population Assessment of Tobacco and Health (PATH) study. Differences by income (based on the federal poverty limit (FPL)) and race/ethnicity in e-cigarette uptake at Wave 2 among cigarette smokers who were exclusive cigarette non-users at Wave 1 were assessed using multivariable logistic regression. We differentiated exclusive cigarette users who quit cigarettes (exclusive users) from those who did not quit cigarettes (dual users). E-cigarette-related attitudes and beliefs were evaluated to understand their potential contribution to socio-demographic differences in e-cigarette uptake and use patterns. Results. Among 6,592 cigarette smokers at Wave 1, 13.5% began to use e-cigarettes at Wave 2, of whom 91.3% were dual users. Compared to non-Hispanic Whites, non-Hispanic Blacks and Hispanics were less likely to become exclusive e-cigarette users (OR [Blacks] = 0.27, 95% CI 0.09-0.82; OR [Hispanics] = 0.44, 95% CI 0.19-0.98). Low-income smokers were less likely than higher-income smokers to become exclusive e-cigarette users (OR [200% FPL] = 0.58, 95% CI 0.33-0.91). Black, Hispanic, and low-income smokers were more likely than White and higher-income smokers to begin using e-cigarettes in the context of quitting cigarettes, which may be partly explained by perceived harm and social norms of e-cigarettes. These findings suggest that socio-demographic differences in e-cigarette uptake may contribute to widening disparities in cigarette smoking.

NEIGHBORHOOD SOCIOECONOMIC DISADVANTAGE, DISORDER, AND ALCOHOL AVAILABILITY ASSOCIATED WITH BINGE DRINKING FROM ADOLESCENCE INTO EARLY ADULTHOOD Brian Fairman* Brian J. Fairman, Bruce Simons-Morton, Denise L. Haynie, Kang Liu, Rhee B. Goldberg, Ralph W. Hingson, Stephen E. Gilman, (Eunice Kennedy Shriver National Institute of Child Health and Human Development)

Whether or not neighborhood-level factors such as poverty and density of alcohol outlets lead to higher rates of problem alcohol use remains unclear. Although social disorganization theory posits that poverty and crime influence adolescent deviant behaviors like drinking, the evidence is mixed, and most studies relied on cross-sectional and ecological designs. Therefore, we examined if neighborhood socioeconomic disadvantage, disorder, and alcohol outlet density are associated with binge drinking in a multilevel study of adolescents following to early adulthood. Data were from six annual waves of the NEXT Generation Health Study, a nationally-representative cohort of 10th graders (mean age=16.2 years) followed into early adulthood (mean age=21.2 years; n=2750). Binge drinking within the last 30 days was based on self-report. We measured neighborhood factors by linking participants’ geocoded addresses to census tract data on income, education, employment, crime, and alcohol outlets. We used multilevel mixed effects logistic regression to relate binge drinking over time to neighborhood-level exposures controlling for individual-level demographics and family affluence. Neighborhood socioeconomic disadvantage was related to a higher odds of binge drinking in adolescence, but statistically inconclusive. However, a lower disadvantage in early adulthood was associated with a higher odds of binge drinking (OR = 0.7). Participants who lived within 1 km of a single alcohol outlet were more likely to binge drink (OR = 1.9), those who lived close to 2 or more outlets was related to a higher (but not statistically significant) odds of bingeing. The impact of neighborhood crime was inconclusive. Adolescents from socioeconomically disadvantaged neighborhoods may be at a greater risk for binge drinking, especially as they transition into early adulthood. Alcohol availability might contribute to this relationship, but differences in community alcohol norms, parental, and peer influences should be investigated.

S/P indicates work done while a student/postdoc
HARM REDUCTION PRACTICES AND OTHER CORRELATES ASSOCIATED WITH EXPERIENCING A FENTANYL-RELATED OVERDOSE AMONG YOUNG ADULTS WHO USE DRUGS


Background: From 2011-2016, the United States experienced a 55% increase in overdose deaths and a 260% increase in fentanyl-related overdose. Uptake of overdose prevention strategies may be higher among those who have previously experienced an overdose. This study sought to examine harm reduction uptake and practices among those who had previously experienced a fentanyl-related overdose.

Methods: From May-October 2017, we interviewed 93 young adults (age 18-35) with recent heroin, cocaine, or non-medical prescription opioid use residing in Rhode Island. We assessed socio-demographic characteristics, drug use patterns, overdose history, and participants' use of harm reduction practices, as well as other behaviors associated with experiencing a suspected fentanyl-related overdose.

Results: Of the 93 people in our sample, 37% (n=34) reported ever having experienced an overdose, of whom 53% (n=18) reported having previously experienced a fentanyl-related overdose. Participants who had ever experienced a fentanyl-related overdose were more likely to use heroin (prevalence ratio [PR]=2.27, 95% confidence interval [CI]=1.96-3.79) and use injection drugs (PR=2.53, CI=1.85-3.46), compared to those who had not experienced a suspected fentanyl-related overdose. When asked “what do you do to avoid an accidental overdose?”, those who had previously experienced a fentanyl-related overdose were more likely to report keeping naloxone nearby (PR=2.85, CI=1.76-4.62) and using with someone else around (PR=1.64, CI=1.12-2.41). Polysubstance drug use was high among our study sample and did not differ between those who experienced an fentanyl-related overdose and those who had not (PR=0.97, CI [0.61,1.53]).

Conclusion: Findings suggest that those who previously overdosed on a drug containing fentanyl are engaging in effective harm reduction practices. Future harm reduction interventions should aim to reduce other behaviors that increase the risk of overdose, including polysubstance use.
ASSESSING MISCLASSIFICATION IN RECORDS AND PROXY INTERVIEWS TO CATEGORIZE DEMENTIA IN THE CARDIOVASCULAR HEALTH STUDY (CHS): A PROBABILISTIC BIAS ANALYSIS
Andreea M. Rawlings* Andrea M. Rawlings, Adina Zeki Al Hazmari, Anne R. Newman, Alice M. Arnold, Bruce M. Pasy, Mary J. Biggs, Chenchai Wu, Lindsey M. Miller, Oscar Lopez, Kenneth J. Muckart, Michelle C. Odden, (School of Biological and Population Health Sciences, Oregon State University, Corvallis, OR, Department of Epidemiology, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD)

Background: Data routinely collected in observational studies from phone calls, medical records, and death certificates can be used to categorize dementia, though these may be misclassified. Probabilistic bias analyses can assess the magnitude, direction, and uncertainty of the error associated with misclassification. Methods: We categorized dementia among all CHS participants (n=5888) using medications, medical records, and death certificates can be used to categorize dementia, though these may be misclassified. Probabilistic bias analyses can assess the magnitude, direction, and uncertainty of the error associated with misclassification. Methods: We categorized dementia among all CHS participants (n=5888) using medications, medical records, and death certificates. In probabilistic bias analyses, we reclassified participants from the full study by drawing from biomarker distributions using estimated PPPs and NNPs in 10,000 replicates. We used Cox regression to estimate the hazard ratio (HR) of dementia associated with age, race, sex, hypertension, diabetes, and APOE4 genotype for each replicate and pooled the results. We compared these results to those from a Cox model using original data. Results: ICD-9 codes had low specificity and were excluded in further analyses. The PPP was differential by race (50% for blacks, 68% for whites) and NPV by sex (60% for females, 80% for males). In bias analyses, the HR for black race was attenuated from 1.51 (95%CI:1.24-1.85) to 1.41 (95%CI:1.14-1.75), the HR for male sex showed a directional bias, changing from 0.93 (95%CI:0.84-1.02) to 1.13 (95%CI:1.03-1.24). Estimates and inferences for the other covariates were substantially different in bias analyses; standard errors for covariates were 3-10% larger. Conclusion: Differential misclassification may lead to non-conservative biases that reversion the direction of selected risk factors, but can be recognized and addressed using probabilistic bias analyses.

LONG TERM PATTERNS OF NEIGHBORHOOD-LEVEL RACIAL SEGREGATION AND MIDLIFE COGNITIVE PERFORMANCE: CORONARY ARTERY RISK DEVELOPMENT IN YOUNG ADULTS (CARDIA) STUDY
Michéle R. Canuca* Michelle R. Canuca, Marijke Geyer, Ted Falany, Katri Kerns, Stephen Sidney, Katerine Yaffe, Lenore Launer, Adria Zeki Al Hazmari (University of Miami Miller School of Medicine)

Neighborhood-level racial segregation strongly predicts poor health and may influence cognitive function. We examined the association of segregation patterns over 25 years and cognitive performance in black participants from CARDIA (N=1569). Segregation was quantified by the GI-statistic; is a score representing the racial composition in focal and neighboring census tracts relative to the greater metropolitan area. A GI score was computed at baseline and at years 7, 10, 15, 20, 25. At each year, segregation exposure was classified as high (GI>190), low (GI<160), or medium (GI=160-190). Segregation patterns over 25 years were classified as living in a long high, increasing, always medium/low or decreasing, and fluctuating segregation. Scores were obtained on the Digit Symbol Substitution (DSST), Stroop Interference, and Rey Auditory Verbal Learning Test (RAVLT) tests at year 25 and standardized. We used multiple linear regression models adjusted for year 25 covariates, age, sex, site, education and marital status (Model 1), and further adjusted for body mass index, smoking, systolic blood pressure, and physical activity (Model 2). At year 25, mean age was 50 (SD=4) years, 80% were female; 27% always lived in high segregation, 25% always lived in moderate or decreasing segregation, and remaining 44% lived in fluctuating segregation. Compared to always living in long/medium or decreasing segregation, always living in high segregation was associated with worse Stroop (Be=0.26, 95%CI=0.12-0.40), DSST (Be=0.12, 95%CI=0.02-0.24), RAVLT scores (Be=0.12, 95%CI=0.02-0.24), in sociodemographic adjusted model. Associations were attenuated after adjustment for health factors (Stroop: Be=0.24, 95%CI=0.04-0.08, DSST: Be=0.08, 95%CI=0.02-0.14, and RAVLT: Be=0.09, 95%CI=0.02-0.22). Greater exposure in high segregation was associated with worse cognition. Future work is needed to examine mechanisms and associations with cognitive change.

SLEEP DURATION AND DISRUPTION AS RISK FACTORS FOR MORTALITY: COMPARISON OF SUBJECTIVE AND OBJECTIVE SLEEP MEASURES IN A NATIONAL COHORT OF OLDER ADULTS
Dane S. Lauderdale* Dane S. Lauderdale, L. Philip Schmarr, (University of Chicago)

Many cohort studies have found that sleep duration predicts mortality, usually in a U-shape with shorter and longer sleepers having higher risk than intermediate sleepers. Almost all of these studies assessed sleep with a survey question (e.g., "How much sleep do you usually get at night?"). The accuracy of such questions is routinely acknowledged as a limitation and the increased risk for long sleepers is controversial. Wrist actigraphy offers an objective way of estimating sleep and has been added to a few cohorts. The discrepancy between survey and actigraphy duration is low to moderate. Limited findings about actigraphy sleep and mortality have mostly been negative, including cohorts of older adults (Rotterdam, 1990-2006). Here we examine survey and actigraphy measures of sleep duration and disruption in a nationally representative cohort of US adults born 1920-1947, the National Social Life, Health and Aging Project. In 2010, an ancillary sleep study (n=727) collected 3 nights of actigraphy. We examined whether sleep duration measured by (1) survey question, (2) calculated from reported usual bedtime and wake time, and (3) actigraphy predicts 5-year mortality in logistic regression models, using linear plus quadratic terms to test for U-shape and adjusting for demographics. We also examine whether sleep disruption predicts mortality, with a survey-based insomnia symptom score and several actigraph measures of disruption. Although the three duration variables correlations with each other ranging only from 0.29 to 0.38, they all have some U-shaped associations with mortality, with nadirs at different durations. The survey question has a much stronger long sleep effect than the other two. Insomnia score did not predict mortality, but actigraphy disruption measures all did. We found actigraphy sleep time does predict mortality in a U-shape, although the long sleep effect is relatively weak. Actigraphy disruption measures are highly predictive of mortality risk.

CAN BIOLOGICAL AGE PREDICT MORTALITY AND MORBIDITY MORE ACCURATELY THAN CHRONOLOGICAL AGE? FINDINGS FROM THE ROTTERDAM STUDY
Reem Wazi* Reem Wazi, Luuk Gis, Sienz Sadighat, Henning Tiemeier, Gerit J. Wensing, Mohsen Ghahremani, Jaco Klip, Frank De Wolf, Albert Hofman, M. Arjan Beek, Jaap Goodarzian (Harvard T.H. Chan School of Public Health, Boston, MA, USA; Erasmus Medical Center, Rotterdam, Netherlands)

Background: The burden of age-related disease and disability is on the rise with remarkable growth rates of aging populations globally. However, aging rate is not universal and chronological age alone is not a sufficient indicator of susceptibility to morbidity and mortality, at some late age, in healthy individuals. A better understanding of the biological aging process and indicators of healthy aging is needed. Aim: We aimed to assess biological age as a predictor of mortality and morbidity in the Rotterdam study. Methods: Nine physiological parameters were tested in plasma samples of 2000 individuals from the Rotterdam study, reflecting six body domains: metabolic, cardiac, lung, kidney, liver, immune function and inflammation. Biological age was calculated using structural equation modelling based on validated algorithms. Results: The sample included 1699 individuals with complete data, among which 57% were females, with mean age=70 (QR 65-76). In adjusted cox-regression models, biological age was better predictor than chronological age for mortality (aHR=1.13 vs 1.01) and all-cause morbidity (aHR=1.06 vs 1.00). Biological age was also a better predictor for stroke (aHR=1.15 vs 0.94), cancer (aHR=1.06 vs 1.04), diabetes mellitus (aHR=1.12 vs 0.91) and COPD (aHR=1.06 vs 1.04). Individuals biologically younger than their chronological age had lower incidences of stroke (3% vs 8%, P<0.001), cancer (15% vs 20%, P=0.01), diabetes mellitus (6% vs 9%) and COPD (7% vs 11%, P<0.001) compared to those who were biologically older. Those who were biologically younger also had a lower BMI and smoking less at the time of examination. Conclusions: Biological age could predict, more accurately than chronological age, risk of mortality, all-cause morbidity, and specific age-related diseases. Further research is needed to refine the clinical applications of biological age.
TRENDS IN INCIDENCE OF DEMENTIA AND ALZHEIMER'S DISEASE

Background Several studies have recently reported a decline in the incidence of dementia by up to 20% per decade, which may have large implications for the projected burden of disease, and provide important guidance to preventive efforts against dementia. However, individual studies are often hampered by limited sample size, and prior studies have therefore not been able to provide conclusive results regarding gender differences, and underlying causes of a declining trend.

Methods

We aggregated data from 7 population-based cohorts from the United States and Europe to determine changes in the incidence of dementia since 1990. Included cohorts are the Framingham Heart Study, the AGES-Reykjavik Study, the Rotterdam Study, the Gothenburg studies, the Three-City Study, the Personnes Agees Quid study, and the Cognitive Function and Ageing Studies. We first calculated age- and sex-specific incidence rates per study, and then defined non-overlapping 5-year epochs within each study to determine within study trends in incidence. Estimates of change per 10-year interval were pooled using fixed effects meta-analysis. Results Of 46,976 individuals (60% women), 4719 developed dementia in the 5-year intervals. The incidence of dementia increased steeply with age, similar across studies, from about 5 per 1000 person years in individuals aged 65-69, to roughly 60 per 1000 person years for those aged 85-89. The incidence of dementia consistently declined with on average 22% per decade (95% confidence interval 16-27%; I² [95%CI]=56% [0-85%]). Estimates were somewhat lower for Alzheimer's Disease only (17% [8-25%]), but did not materially differ between men and women. Conclusion The incidence of dementia in Europe and North America has declined by 22% per decade over the past 25 years, consistent across available studies and similar for men and women. Within this collaboration we further seek potential causes of these trends, including educational attainment and cardiovascular risk.
MEASUREMENT OF CURRENT SUBSTANCE USE IN A COHORT OF HIV-INFECTED PERSONS IN CONTINUITY HIV CARE

Catherine Lesko


Accurate, routine measurement of recent illicit drug use, alcohol use, and cigarette smoking among persons with HIV engaged in clinical care is challenging. The Johns Hopkins HIV Clinical Cohort collects two imperfect but routine measurements of recent substance use: medical record review (MRR) and self-interview (SI). We used Bayesian latent class modeling to estimate sensitivity and specificity of each measurement, and prevalence of substance use among 2,064 patients engaged in care from 2007 to 2015. Sensitivity of MRR was higher than sensitivity of SI for cocaine and heroin use. Median posterior estimates of sensitivity of MRR ranged from 44% to 76% for cocaine use and from 39% to 67% for heroin use, depending on model assumptions and priors. In contrast, sensitivity of SI was higher than sensitivity of MRR for any alcohol use, hazardous alcohol use, and cigarette smoking. Median posterior estimates of sensitivity of SI were generally around 80%, 85%, and 87% for each substance, respectively. Specificity was high for all measurements. From our model, we estimated prevalence of recent substance use in the study sample to be 13% for cocaine, 9% for heroin, 49% for alcohol, 21% for hazardous alcohol, and 55% for cigarette smoking. Prevalence estimates from other models were generally comparable. Measurement error of substance use is non-trivial and should be accounted for in subsequent analyses.

PERCEIVED STRESS AND INCIDENT SEXUALLY TRANSMITTED INFECTIONS IN A PROSPECTIVE COHORT STUDY

Rodman Tarpin, Rodman Tarpin, Rebecca Brodtman, Mark Kleiman, Xin He, Natalie Stepens, (University of Maryland, College Park)

Background: Psychosocial stress is associated with susceptibility to a number of infectious diseases. We hypothesized that stress may increase vulnerability to sexually transmitted infections (STIs) by suppressing immune function and increasing infection susceptibility. We sought to test the association between perceived stress and incident STIs. Methods: We conducted a secondary data analysis of 2,450 women enrolled in the Longitudinal Study of Vaginal Flora which followed women at quarterly visits for one year. Perceived stress was measured at baseline using Cohen's 10-item Perceived Stress Scale (PSS), a measure of stress in the past 30 days. We fit Cox proportional hazards models to test the association between perceived stress and incident STI (Chlamydia trachomatis, Neisseria gonorrhoeae, and Trichomonas vaginalis genital infections). We also tested bacterial vaginosis (BV), a high pH and low Lactobacillus spp state associated with Nugent's Grattin stain score in this study, and sexual behavior risk factors (condom use, multiple sexual partners, and partner sexual concurrency) as mediators using VanderWeele's difference method, with bootstrapping to test indirect effects. Results: The highest quartile of perceived stress was significantly associated with incident STI in an unadjusted model (HR = 6.3, 95% CI 1.27-20.4) and a model adjusted for race, marital status, educational attainment and income (HR = 4.8, 95% CI 1.16-1.88). Nugent score and sexual behavior significantly mediated 60% of this association (indirect effect p = 0.235; 95% CI 0.167-0.321). Nine percent of this association was mediated through Nugent score independent of sexual behaviors, while 37% was mediated through sexual behaviors independent of Nugent score. Conclusion: This study indicates that perceived stress is associated with STI acquisition. High risk sexual behaviors and development of BV—both known risk factors for STI—are potential mechanisms underlying this association.

S/P indicates work done while a student/postdoc.
CD4 DECLINE AND ASSOCIATED MORTALITY FOLLOWING CANCER TREATMENT AMONG PEOPLE WITH HIV IN THE ERA OF ANTIRETROVIRAL THERAPY. Keri L. Calkins*, Geetanjali Chander, Corinne E. Joshu, Kala Vivanathan, Catherine R. Lesko, Anthony T. Fojo, Richard D. Moore, Bryan Lau (Department of Epidemiology, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD)

Background: Cancer treatment in people with HIV (PWH) presumably results in a sharp decline and delayed recovery of CD4 cell counts. The extent to which these declines increase mortality is unknown. The objectives of this study are 1) to quantify the effect of cancer treatment on CD4 in PWH and 2) to estimate the association between treatment-related CD4 changes and all-cause mortality independent of mortality risk attributed to demographic characteristics, cancer type and stage. Methods: We included 219 PWH from the Johns Hopkins HIV clinic diagnosed with an incident cancer. There were 2186 CD4 measures. Initial cancer treatment was classified as immunosuppressive [chemotherapy/radiation, (IT)] or non-immunosuppressive [surgery/no treatment (NIT)]. Joint longitudinal survival models with shared random effects were used to estimate CD4 trajectories and the association between CD4 and all-cause mortality. The longitudinal model was a mixed effects model. A proportional hazards model was used for all-cause mortality. Models adjusted for confounders, including expected 5-year mortality using SEER estimates based on cancer type and stage. To reduce heterogeneity in types of IT, a sensitivity analysis was conducted only among solid tumor cancers. Results: IT resulted in an initial decline of 106 CD4 cells (95% CI=-134, -78) as compared to no change for those receiving NIT. Separation in CD4 trajectories between IT and NIT persists throughout follow-up. Following initial cancer treatment, every 100 CD4 cell increase, lagged by 6 months, resulted in a 27% reduction in mortality (HR=0.73, 95%CI=0.63, 0.84). The results among solid tumors were similar including a 39% reduction in mortality (HR=0.61, 95% CI=0.48, 0.78) for every 100 CD4 cell increase. Conclusions: IT significantly reduces CD4 cell count in PWH. CD4 cell count declines following cancer treatment are associated with increased hazard of mortality independent of demographic characteristics, cancer type, and stage.

S/P indicates work done while a student/postdoc
NEIGHBORHOOD GREEN SPACE ACCESS AT BIRTH, CHILDHOOD AND ADULTHOOD ASSOCIATED WITH BLOOD PRESSURE TRAJECTORIES ACROSS THE LIFE COURSE: Marica P. Jimenez*, Marica P. Jimenez, S.V. Subramanian, Gregory A. Wolk, Eric R. Loucks, (Brown University School of Public Health)

Background: Neighborhood access to green space is increasingly investigated as a determinant of cardiovascular disease (CVD) However, longitudinal studies on neighborhood are rare, hampering the ability to address questions on causality and critical stages in the life course. This research aims to evaluate the life course association between green space and systolic blood pressure (SBP), a major CVD risk factor, and assess vulnerable periods of life in which individuals might be more susceptible to the surrounding environment. Methods: We used longitudinal data from the New England Family Study with a 48-year follow-up to evaluate how access to green space at birth, childhood, and adulthood is associated with SBP across the life course. Access to green space at each time point was evaluated using 3 measures: distance to the closest green space, average area of green space, and green space density in the neighborhood. Multilevel models were used to examine the longitudinal association between time-varying markers of neighborhood accessibility to green space and SBP. We consider two-level structures arising from longitudinal studies where there are repeated measurements nested within individuals. Results: Preliminary results suggest that living 0.5 miles closer to a green space at childhood, is associated with a 1.14 mm Hg lower rate of growth in SBP across the life course (95% CI: 0.51, 1.77), adjusting for proximity to green space at birth and adulthood, age, sex, individual and parental socioeconomic status. Green space density and area of green space within the neighborhood did not show statistically significant associations with SBP growth rate. Conclusion: Results suggest that childhood may be a critical time period when closer proximity to green space can reduce the burden of CVD risk. Studies across diverse populations are needed to confirm or refute these novel findings.

COMPARING THE IMPACT OF POSITIVE PSYCHOSOCIAL RESOURCES ON FAVORABLE CARDIOVASCULAR HEALTH IN YOUNG ADULTHOOD: Farah Qureshi*, Farah Qureshi, Latta Kibizansky, Scott Deloney, (Harvard T.H. Chan School of Public Health)

Prior work has found associations between positive psychosocial factors in childhood and favorable cardiovascular health (FCH) in adulthood. Most studies group diverse factors to assess cumulative impacts, but positive youth development literature suggests the impact of internal assets (e.g. psychosocial skills, positive identity) vs external assets (e.g. family relationships) may differ. This study examined if youth internal and external assets independently predict FCH in young adulthood using data from the National Longitudinal Study of Adolescent to Adult Health (n=14,796). Assets were measured via self-report at Wave 1 (mean age 15.6 years) and FCH components were evaluated at Wave 4 (mean age 28.5 years). Standard covariates were assessed at Wave 1, and included socioeconomic factors and baseline health status. FCH (yes/no) was defined as being healthy on 5 factors following American Heart Association recommendations: no hypertension, diabetes, or hyperlipidemia, healthy BMI, and non-smoking. Parameters were derived from direct measures of cholesterol, glucose, HDL, blood pressure, and BMI, and self-reported relevant diagnoses, medication use, and smoking history. Assets were measured by 29 items used to derive separate indices for internal and external assets (range 0-5 each). After multiple imputation missing covariates and predictor data, associations of assets with FCH were examined using logistic regression. At Wave 4, only 5.0% (n=537) of the sample had favorable FCH. Total assets at Wave 1 predicted subsequent FCH (linear trend OR=1.08, p=0.005), but when disaggregated, internal assets maintained a strong association with FCH (linear trend OR=1.22, p<0.001) and external assets did not (linear trend OR=0.95, p=0.3). Findings suggests youth assets are not equally protective, but interpersonal factors may be particularly influential identifying the differential impact of internal and external assets is critical to design effective preventive interventions.

JOB STRAIN AND THE PREVALENCE OF UNCONTROLLED HYPERTENSION AMONG WHITE COLLAR WORKERS: Mathilde Lavigne-Robichaud*, Mathilde Lavigne-Robichaud, Xavier Trudel, Alain Mbrt, Maire Gilbert-Caume, Caroline Dachaine, Chantal Brison, (CRCHUQ-ULaval)

Background: High blood pressure (HBP) increases significantly cardiovascular disease risks. Hypertension may affect more than 90% of individuals over the life course. Nearly 15% of Canadians treated for HBP still have uncontrolled hypertension. Objectives: To examine the association between job strain and the prevalence of uncontrolled hypertension among white-collar workers from a large cohort in Canada. Methods: The study relies on a repeated cross-sectional design involving three waves of data collection over a 5-year period. The study sample was composed of 473 white-collar workers treated for hypertension, measured every 15 minutes during the working day. Uncontrolled hypertension was defined as daytime ABP ≥135/85 mmHg. Job strain was evaluated with the demand-control model/strain model method using validated scales. Adjusted prevalence ratios (PR) and 95% confidence intervals (95% CI) were estimated using generalised estimating equations (GEE). Results: Man exposed to active jobs (1.43 [95% confidence interval: 1.07-1.92]) had a higher prevalence of uncontrolled hypertension compared to unexposed men. In women, the prevalence was higher in those exposed to the highest tertile of high psychosocial demands (1.77 [95% confidence interval: 1.07-2.29]). These results were observed after adjustment for sociodemographic and lifestyle factors. Conclusion: The present study showed a deleterious effect of adverse psychosocial work factors from the demand-control model on BP control in men. Reducing these frequent exposures at work might lead to substantial benefits on BP control at the population level.

LONGITUDINAL ASSOCIATIONS OF NEIGHBORHOOD CRIME AND SAFETY WITH BLOOD PRESSURE: THE MULTI-ETHNIC STUDY OF ATHESCLEROSIS (MESA) Stephanie Mayne*, Stephanie Mayne, Kari Koren, Tiffany M. Powell-Wiley, Kelly R. Everson, Richard Block, Kirsti Kendzwar (Northwestern University)

Introduction: High neighborhood crime and low perceptions of safety may influence cardiovascular health through chronic stress. Few studies have evaluated longitudinal associations of neighborhood crime/safety with blood pressure. Methods: We included 833 participants of the Multi-Ethnic Study of Atherosclerosis aged 45-84 who lived in Chicago, Illinois. Outcomes included systolic and diastolic blood pressure (SBP, DBP) assessed 5 times from 2000-2002 (antihypertensive medication use accounted for; by adding 10 mm Hg to SBP and 5 mm Hg to DBP). Exposure included individual-level perceived safety, aggregated neighborhood-level perceived safety, and past-year rates of police-recorded crime per 1,000 population within a 1-mile buffer of participants' residences. We used fixed-effects linear regression to estimate associations of changes in crime/safety with changes in blood pressure. Models were adjusted for time since baseline (piecewise linear splines with 2 knots) and time-varying covariates including marital status, income, alcohol use, smoking, physical activity, waist circumference, diabetes, and neighborhood socioeconomic status. We assessed differences overall and by sex. Results: A standard deviation increase in individual-level perceived safety was associated with a 1.76 mm Hg within-person reduction in SBP (95% CI: 0.49, 3.02). Patterns were similar between men and women (p-interaction for sex: 0.9). Neighborhood-level perceived safety was not associated with blood pressure changes. An increase in police-recorded crime rate by 10 crimes was associated with reductions of 0.70 (0.22, 1.19) mm Hg in SBP and 0.25 (0.03, 0.47) mm Hg in DBP among women only (p-interaction for sex =0.001 and 0.006, respectively). Conclusion: Results suggest individual perception of neighborhood safety may be particularly salient for SBP reduction relative to more objective neighborhood exposures. Findings for police-recorded crime were unexpected and warrant further examination.
Social relationships are strongly associated with longevity. Social integration, i.e., participation in a variety of social relationships, is inversely associated with all-cause mortality. However, less is known about the association of social integration with cause-specific mortality, particularly in diverse population-based samples. This study examined the association of social integration and cardiovascular disease (CVD) mortality (heart disease and stroke) in a probability sample of US adults (N=27,689). Social integration was assessed by tallying affirmative yes/no responses to questions regarding recent (past two weeks) in-person or phone contact with family members or friends; participation in group social activities; religious attendance; and going out to eat. Marital status was also included in the composite. Social integration categories were collapsed into four groups to ensure sufficient CVD events for analysis. Vital status was ascertained ten years after the baseline survey (N=867 CVD events). Proportional hazards assumptions for Cox regression models were satisfied by stratifying on 5-year age cohort, race/ethnicity and education. When controlling for age, sex, race/ethnicity, social support and education, the two highest social integration categories were associated with lower CVD mortality rates (HRs=0.62 [95%CI 0.47-0.82] and 0.46 [0.35-0.59], respectively). These cause-specific hazards were attenuated but remained statistically significant when further adjusting for work force status, home ownership, smoking, and prior diagnosis of heart disease, stroke or diabetes (HRs=0.73 [95%CI 0.56-0.95] and 0.59 [95%CI 0.44-0.78], respectively). These data suggest that a larger number of social contacts is associated with reduced risk of CVD mortality. Examining behavioral and biological CVD risk factors could help illuminate the mechanisms through which social integration alters CVD mortality risk.
DEATHS OF DESPAIR IN AN ICONIC INDUSTRIAL COHORT OF AUTOWORKERS
Stianne M. Difrat* Stianne M. Difrat, Holly Stewart, Ellen A. Eiben, (UC Berkeley School of Public Health)

Between 1999 and 2014, the US suicide rate rose by 24%, and deaths from drug overdoses nearly tripled. Deaths from suicide and drug overdoses, along with alcohol-related liver diseases—collectively described as “deaths of despair”—have been increasing sharply for working age Whites with only a high school education. However, little evidence exists regarding the specific nature of these trends within the manufacturing sector. We examined trends in deaths from suicide and alcohol-related liver disease in an iconic cohort of predominantly white male industrial autoworkers. The cohort includes 38,636 subjects who worked at least three years in one of three Michigan plants, followed for mortality from 1941 to 2010. Suicide and deaths due to alcohol-related liver diseases were identified based on ICD-9 and ICD-10 codes. We estimated the association between dates of birth and deaths from despair with hazard ratios (HR) using Cox proportional hazards models where follow up starts at leaving work, adjusting for sex and race. There was a spike in suicides within one year of leaving work accounting for 36% of all suicides with 64% occurring among employees who left work before age 55. The HR for all deaths of despair combined was 1.3 (95% CI [1.09, 1.62]) compared to the most recent birth cohort (born after 1950) to the earliest (born before 1930). When examined separately, the HR increased for the most recent birth cohort for both suicide and alcohol-related liver diseases (HR = 2.36, 95% CI [1.66, 3.34], HR = 2.68, 95% CI [1.96, 3.66], respectively). These rising rates from deaths of despair among autoworkers born after 1950 are consistent with national trends. However, failure to examine the trends among its components of suicide and alcohol-related liver disease may obscure the association.

CUMULATIVE OCCUPATIONAL EXPOSURE TO DIESEL ENGINE EXHAUST AND HEMATOLOGIC PARAMETERS IN THE UK BIOBANK
Jason Y.Y. Wong* Jason Y.Y. Wong, Brian Bagli, Rem Jones, Jinming Zhang, Wei Hu, Bu-Tian Ji, Debra Silverman, Nathaniel Rothman, Qing Lan, (National Cancer Institute)

Diesel engine exhaust (DEE) is a known human lung carcinogen. Previous studies have found associations between immune cell counts and markers in workers exposed to DEE. We further investigated associations between occupational DEE exposure and hematologic parameters. We analyzed data from 119,255 volunteers aged 40-69 years who enrolled in the UK Biobank in 2006-2010 and provided an occupational history. DEE exposure was self-reported at baseline as: 'never' (inactivity coefficient (IC) -1), 'seldom' (IC=2), 'often' (IC=3) for each job. Cumulative exposure was calculated by multiplying IC and years at each job, and summing across all jobs. Blood was collected at baseline and complete 4 consecutive hemoglobin (Hb) measurements were used to calculate hemoglobin (Hb) levels. Linear regression models were used to estimate associations between quinones (Q) of cumulative exposure (Q: 0-55 [ref]; Q: 56-97; Q: 98-154; Q: 155) and log-transformed hematologic parameters, adjusted for center, age, sex, race, body mass index, smoking status/intensity, and Townsend deprivation index. Incremental cumulative DEE exposure was non-linearly associated with elevated lymphocyte counts (Q: 0.01E+2: 2.1E-2; p=3.7E-4; Q: 0.01E+3: 2.1E-2; p=2.3E-2; Q: 0.01E+4: 2.1E-1; p=5.5E-3; p-fail=0.18). There was evidence of increased creatinine (Q: 1.1E-2: 5.5E-3; p=3.8E-2; Q: 2.1E-3: 5.5E-3; p=7.0E-4; Q: 4.1E-2: 5.5E-3; p=5.6E-2; p-trend=0.15) and decreased neutrophil counts (Q: 4.6E-3: 2.7E-3; p=8.9E-2; Q: 7.3E-3: 2.7E-3; p=5.4E-3; Q: 4.2E-3: 2.8E-3; p=1.4E-1; p-trend=0.03) with higher exposure. No associations were found for basophil, monocytes, and total white blood cell counts. Similar trends were found in never-smokers, excluding those with prevalent immune/hemod conditions, and comparing years of effort/months exposure to rarely/never exposed. Our findings provide further evidence that DEE exposure may alter immune processes, which are increasingly recognized for their mechanistic roles in lung carcinogenesis.
ESTIMATING COUNTERFACTUAL RISK OF CHRONIC OBSTRUCTIVE PULMONARY DISEASE MORTALITY UNDER HYPOTHETICAL INTERVENTIONS ON OCCUPATIONAL EXPOSURE TO DIESEL EXHAUST
Sadie Costello* Sadie Costello, Andreas Neophytou, Sally Picciotto, Jacqueline Ferguson, Holly Stewart, Debra T Silverman, Ellen Eisen. (University of California, Berkeley)

Diesel exhaust particles are designated as definite human carcinogens, appear to have acute thrombotic and ischemic effects, and may play a role in respiratory and allergic diseases. However, we do not have compelling epidemiological evidence linking diesel exposure at work to any chronic respiratory disease. Studying the respiratory health effects of occupational exposures is complicated by the fact that workers with respiratory symptoms leave work and accrue less exposure compared to their healthier counterparts, i.e. the healthy worker survivor effect. To address the gap in understanding, we examined diesel-based risks of chronic obstructive pulmonary disease (COPD) in the Diesel Exhaust in Miners Study (DEMS) using the parametric g-formula, a method which handles the healthy worker survivor effect and allows for the estimation of counterfactual risks of disease under hypothetical interventions on exposure. Analyses were performed on 11,687 blue collar male workers at 8 non-metal mines in the US including 130 deaths from COPD. Follow up began at dieselization of each mine, between 1947 and 1967, and ended in 1997. We applied the parametric g-formula to assess hypothetical interventions on respirable elemental carbon (REC, a surrogate for diesel exhaust) and cumulative COPD mortality risk at age 90. The risk ratio comparing cumulative COPD mortality risk under a hypothetical intervention completely eliminating average daily REC to the observed risk was 0.87, with wide confidence intervals. Our findings indicate that reducing the occupational exposure to diesel exhaust may have resulted in a reduction in COPD mortality in this cohort of workers.

ASSOCIATIONS BETWEEN TRAUMATIC BRAIN INJURY AND SELF-REPORTED LISTENING DIFFICULTY IN COMPLEX ACOUSTIC ENVIRONMENTS AMONG POST-9/11 WAR VETERANS
Kelly M. Reavis* Kelly M. Reavis, Kathleen F. Carlson, M. Samantha Lewis, Cody Blankenship, Jane S. Goodwin, Wendy Helt, James A. Henry. (VA Portland Health Care System, Oregon Health & Science University)

Traumatic brain injury (TBI) is the signature injury among post-9/11 war veterans, with blast exposure as the leading cause. Despite having normal hearing, it is common for veterans with TBI to experience difficulty understanding speech in complex acoustic environments. It is unknown if this difficulty is due to TBI itself, or to confounding factors such as physiologic effects of veterans' blast exposures beyond TBI. The objective of this analysis was to examine associations between TBI and self-reported listening difficulty among post-9/11 veterans while accounting for blast exposure and other potential confounders. Participants in the Longitudinal Noise Outcomes in Servicemembers Epidemiology Study completed baseline questionnaires to assess demographic and military service characteristics, blast exposure, military TBI history, and listening difficulty in competing acoustic backgrounds. We examined associations between number of reported military TBIs (0, 1, or ≥2) and mean Speech, Spatial, and Qualities of Hearing Scale (SSQ12) scores (lower scores indicate greater difficulty) using multivariable linear regression. Based on an a priori causal model, regression models were adjusted for self-reported blast exposure as well as demographic and military service characteristics. Of 309 participants, 71% had no TBI, 15% had one TBI, and 14% had ≥2 TBIs. Nearly all participants had normal hearing (93%) and almost half (46%) had blast exposure. After multivariable adjustment, veterans with one TBI (mean score=5.8; 95% CI: 5.1–6.4) and ≥2 TBIs (mean score=5.2; 95% CI: 4.5–5.6) had significantly lower SSQ12 scores compared to veterans without TBI (mean score=6.6; 95% CI: 6.2–7.1). We identified greater listening difficulty in complex acoustic environments among normal-hearing veterans with versus without TBI, while accounting for blast and other potential confounders. This has significant implications regarding the rehabilitation needs of veterans with TBI.

S/P indicates work done while a student/postdoc
EDUCATIONAL MOBILITY ACROSS GENERATIONS AND DEPRESSIVE SYMPTOMS OVER 10 YEARS AMONG US LATINOS

Julia B. Ward, Whitney R. Robinson, Brian W. Pence, Joanna Muskelko, Sandra S. Albrecht, Mary N. Haan, Allison E. Aiello, (UNC-Chapel Hill)

In the US, Latinos suffer a disproportionate burden of depression. Low educational attainment has been associated with depression among Latinos, and recent data suggests that parental educational attainment may also influence mental health. However, few studies have collected intergenerational data to assess the joint impact of educational mobility across multiple generations on depressive symptoms. Using data from the Sacramento Area Latino Study on Aging (1998-2008), we assessed the influence of intergenerational education on depressive symptoms over 10 years among 1,786 Latino individuals (mean age=70.6 years). Educational mobility was classified as stable-low (low parent and low offspring education), upwardly mobile (low parent and high offspring education), stable-high (high parent and high offspring education), or downwardly mobile (high parent and low offspring education). Depressive symptoms were measured with the Center for Epidemiological Studies Depression Scale (CES-D), with higher scores indicating more depressive symptoms. To quantify the association between educational mobility and CES-D scores over follow-up, we fit marginal models using generalized estimating equations to account for repeated CES-D measurements and adjusted for identified confounders. Multiple imputation was employed to account for missingness. Within individuals, depressive symptoms remained relatively stable over follow-up. Compared to stable-low education, stable-high education and downwardly mobile (high parent and low offspring education) were associated with significantly lower CES-D scores (Beta=-2.75 95% CI: -3.74, -1.76) and improved educational opportunities in under-resourced communities may counteract the adverse impacts of low parental education on Latino mental health.

RACIAL RESIDENTIAL SEGREGATION AND RACIAL DISPARITIES IN STILLBIRTH IN THE UNITED STATES

Andrew Williams, Andrew Williams, Marie Wallace, Carrie Nobles, Pauline Mendola, (Epidemiology Branch, Division of Intramural Population Health Research, Eunice Kennedy Shriver National Institute of Child Health and Human Development)

Background: Although stillbirth rates are declining, blacks experience two-fold higher rates of stillbirth compared to whites. It remains unclear whether current and/or persistent racial residential segregation is associated with black-white stillbirth disparities. Methods: We examined 49,969 black and 71,785 white births from 14 hospitals in the Consortium on Safe Labor (2002-2008). We measured black-white segregation for each hospital referral region using the dissimilarity index (how blacks and whites are distributed in an area). Using the isolation index (the probability that blacks and whites interact), we categorized into populations-based tertiles. Current segregation was based on birth year segregation levels. Persistent segregation was measured by comparing the 1990 segregation level to birth year segregation. Results: Stillbirth was fetal death ≥23 weeks gestation reported in medical records. Hierarchical logistic regression models estimated race-specific associations between current and persistent segregation and stillbirth, adjusted for maternal demographic and clinical factors, and area-level poverty. Results: For current segregation, low segregation was more beneficial to blacks (Dis similarity OR: 0.43 95% CI: 0.29, 0.63; Isolation OR: 0.25 95% CI: 0.16, 0.41) than whites (Dis similarity OR: 1.42 95% CI: 0.77, 2.59; Isolation OR: 0.33 95% CI: 0.21, 0.53). For persistent segregation, decreasing segregation was also more beneficial to blacks (Dis similarity OR: 0.53 95% CI: 0.32, 0.89; Isolation OR: 0.19 95% CI: 0.10, 0.38) than whites (Dis similarity OR: 0.75 95% CI: 0.41, 1.37; Isolation OR: 0.82 95% CI: 0.46, 1.48). Approximately 900 stillbirths among blacks could be prevented annually in the US by decreasing residential segregation. Conclusions: Low and decreasing levels of segregation were associated with reduced odds of stillbirth, with blacks benefiting more than whites. Reducing structural racism, like segregation, may help reduce black-white stillbirth disparities.
THE ASSOCIATION BETWEEN IMMIGRATION HISTORY AND INFLAMMATORY MARKER PROFILES AMONG OLDER MEXICAN AMERICAN ADULTS Chantel Martin* Chantel Martin, Mary Haan, Lindsay Fernandez-Rhodes, Anne Lee, Allison Aiello, (UNC Chapel Hill)

Foreign-born Hispanics have healthier cardiometabolic profiles upon arrival in the US than their US-born counterparts, yet this advantage diminishes as length of residence increases. Underlying mechanisms explaining this paradox have been understudied. Using baseline data from 1,290 predominantly older Mexican Americans in the Sacramento Area Latino Study on Aging (SALSA), we examined the association between immigration history and biomarkers of inflammation, including interleukin-6 (IL-6), soluble forms of type 1 and 2 receptors of tumor necrosis factor-alpha (sTNF-RI and sTNF-R2), C-reactive protein (CRP), leptin, and adiponectin using linear regression models. Immigration history was derived from measures of immigrant generation and duration of US residence: 1) 1st generation in the US <15 years (reference group); 2) 1st generation in the US ;:>:15 years; 3) 2nd generation; and 4) ;:>:3rd generation. Compared to the reference group, IL-6 levels were 19.6% (95% CI: 2.3, 39.8) higher for 2nd generation and 30.6% (95% CI: 8.7, 56.8) higher for ;:>:3rd generation Mexican Americans after adjusting for age, gender, education, and income. Similar associations were observed for STNF-R1, sTNF-R2, and CRP in relation to immigration history. Furthermore, when compared to the reference group, leptin levels were higher among 1st generation Mexican Americans with ;:>: 15 years of US residence, 2nd generation, and ;:>:3rd generation Mexican Americans. Additional adjustment for selected health and behavioral factors attenuated the associations; however, IL-6 and leptin levels remained higher for ;:>:3rd generation than 1st generation immigrants with <15 years (IL-6 percent difference= 22.1, 95% CI: 1.7, 46.7; leptin percent difference: 20.6, 95% CI: 3.4, 40.8). We found that Mexican Americans with longer US immigration histories had poorer inflammatory profiles. Additional research is warranted to understand the factors that shape trajectories of biological risk across generations of Hispanics.

SOCIOECONOMIC MOBILITY AND OFFSPRING TYPE 2 DIABETES: A CASE FOR A MULTI-GENERATIONAL VIEW ON HEALTH Lindsay Fernandez-Rhodes* Lindsay Fernandez-Rhodes, Chantel Martin, Penny Gordon-Larsen, Mary N. Haan, Allison E. Aiello. (fernandez-rhodes@unc.edu)

While studies of mobility in socioeconomic status (SES) have mainly focused on change in SES across two generations (2-gen), few have collected historical data to assess the impact of SES across additional generations. Herein, we provide a methodological approach for accounting for 2-gen and three generations (3-gen) of SES mobility to demonstrate the potential biases associated with using only 2-gen of SES mobility. We used 608 primarily US-born adult Mexican American offspring (18-80 yrs) with Type 2 Diabetes (T2D) status as part of the Ninos Lifestyle and Diabetes Study (2013-2014) to identify 390 participants who could be linked to both parental and grandparental data from the Sacramento Area Latino Study on Aging baseline and follow up. Within each generation we defined high SES as an educational attainment above the US/foreign-born median, to create four 2-gen and eight 3-gen SES categories. We used log-linear regression to estimate the association between 2-gen and 3-gen SES categories and offspring T2D (based on self-report, medication, elevated fasting glucose or glycated hemoglobin), after accounting for familial clustering, education location of each generation, and offspring age and sex. Although the three effect estimates between 2-gen categories and T2D were more precise than the seven effect estimates for the 3-gen categories (CLR=2.3-2.9 versus 3.0-19.7), the effect of stable high versus stable low 2-gen SES on T2D was attenuated by 67% (PR=0.5, 95% CI: 0.3, 0.7) as compared to the stable high versus stable low 3-gen effect (PR=0.3, 95% CI: 0.1, 0.9). The estimated 2-gen effects suggested that offspring T2D was patterned mainly by offspring SES (e.g. social mobility), whereas the 3-gen effects revealed the added importance of grandparental SES (e.g. accumulation of risk). Our preliminary results suggest that despite the challenges to collecting information on grandparental SES, it may reduce bias and better explain SES patterns of health disparities.
ARE ASSOCIATIONS BETWEEN PRENATAL ANTIDEPRESSANT EXPOSURE AND TODDLER BEHAVIOR MEDIATED BY GESTATIONAL AGE AT BIRTH? Mollie Weed* Mollie Weed, Sonia Hernandez-Diaz, Hedvig M.E. Nordeng (University of Oslo)

Studies have linked prenatal selective serotonin reuptake inhibitor (SSRI) exposure and internalizing behavior problems in childhood, but none have examined the role of potential mediators of this association, such as gestational age at birth. Controlling unmeasured confounding in such studies is challenging. Previous simulation show that applying sibling designs, a method for controlling familial confounding, to mediation analysis out-performs standard analyses in the presence of shared unmeasured confounding. We conducted mediation analyses comparing a standard cohort and a sibling design. We included 21,908 births from Norwegian Mother and Child Cohort Study that were part of a sibling group and were present at 18-month follow-up. Exposure to SSRIs was assessed within self-report, and internalizing behavior was rated using the Child Behavior Checklist; gestational age (GA) came from birth registry linkage. We used effect decomposition to quantify total (TE), natural direct (NDE) and natural indirect (NIE) effects of prenatal SSRI exposure on behavioral outcomes, adjusting for confounders. Results are reported as odds ratios; additional analyses will include bootstrapping of confidence intervals. Cohort models showed a small increased risk of internalizing behavior problems associated with SSRI exposure (OR=1.29, OR-NDE=1.28) and a NIE of 1.01, suggesting that about 5% of the risk was due to shortened gestational age at birth. The sibling design showed stronger associations (OR-TE of 2.60, OR-NDE 2.63), and NIE of 1.05, suggesting no indirect effect (proportion mediated=0.54%). The sibling analysis showed a substantial increased risk of internalizing problems in 18-month-old children associated with SSRI exposure; this was not mediated through gestational age. Cohort estimates resulted in lower TE and larger NIE, which might be explained by unmeasured shared confounding. The sibling design may help control for unmeasured chronic common causes in mediation analyses.

INTEGRATING METHODS FOR ENVIRONMENTAL MIXTURES IN MEDIATION ANALYSIS: A STATISTICAL TOOL FOR EVALUATING ENVIRONMENTAL HEALTH DISPARITIES Andrea Bellavia* Andrea Bellavia, Paige Williams, Tamarra James-Todd, (Harvard T.H. Chan School of Public Health)

Mediation analysis has emerged as a primary statistical tool for evaluating health disparities. A growing body of literature suggests that environmental factors may be involved in current health disparities, arising from differences in social patterning that can impact biological processes related to health outcomes. However, methodological complexities specific to environmental mediators may make standard mediation techniques inadequate. For example, factors are simultaneously exposed to a mixture of environmental exposures that should be jointly evaluated. Methods for mixtures are available but have not been applied in a mediation context to address health disparities. To such end, standard methods such as multiple regression may prove challenging and inadequate. This presentation will describe how available methods for environmental mixtures can be integrated in a mediation analysis framework to evaluate the contribution of the mixture in a given disparity. Potential approaches are to 1) apply statistical methods that reduce the mixture to a single summary score (e.g. weighted quantile regression) and evaluate the score as a single mediator; 2) reduce the dimension of the mixture by using classification approaches (e.g. principal component analysis), integrating the resulting factors as multiple independent and uncorrelated mediators; and 3) use other methods for mixtures (e.g. LASSO, Bayesian kernel machine regression) to identify and integrate these specific mixture components that are associated with the outcome of interest into the mediation model. Through the use of examples from simulated data we will present the advantages and disadvantages of each approach in terms of both implementation and interpretation, discussing the most suitable approach. Integrating chemical mixtures in mediation analysis would provide considerable benefits for evaluating environmental health disparities, with potential implications for public health policies and interventions.

THE USE OF AN INSTRUMENT FOR A MEDIATOR IN MEDIATION ANALYSIS: A SIMULATION STUDY AND APPLICATION TO AN ENVIRONMENTAL EPIDEMIOLOGY EXAMPLE Laura Corlin* Laura Corlin, Mark Woodin, (Tufts University)

We propose using an instrument for the mediator in mediation analysis. Assuming that the instrument and exposure are independent, this method avoids concern about unmeasured confounding of the mediator-outcome relationship and of the exposure-mediator relationship. It also avoids issues where mediator-outcome confounders are affected by exposure. To understand how violations of the instrumental variable assumptions affect this method, and to understand the limitations of applied epidemiologic contexts, we 1) conducted a simulation study, and 2) applied this method in a real environmental health data set (the Boston Puerto Rican Health Study, BPRHS) considering the mechanisms of action of a specific traffic-related air pollutant on changes in blood pressure. The coefficients for all parameters were based on empirical relationships among the exposure, mediator, instrument, and outcome in the BPRHS motivating example. Using realistic coefficients, an effective sample size of at least 100 participants was necessary to obtain consistent estimates. Varying the strength of the instrument-mediator relationship did not substantially change the direct or indirect effect estimates, though the weakest instruments (beta=0.15), the indirect effects could be consistently estimated even if the exposure-mediator relationship was weak. Instruments that had a covariate with the outcome had indirect effect estimates that appeared substantially weaker than they actually were (e.g. >20-fold weaker when using coefficients from the BPRHS example). The bias was amplified with stronger instruments. Using an instrument for a mediator allows mechanistic questions to be addressed within an observational environmental epidemiology study with small sample and effect sizes, although the method is not robust against violations of the instrumental-outcome no-confounding assumption.

COMPARISON OF METHODS FOR LONGITUDINAL MEDIATION ANALYSIS USING COGNITIVE HEALTH DATA Judith Rijsbergen* Judith Rijsbergen, Jen Twisk, Annie Robitaille, Martijn Huisman, Martijn Heymans, (Department of Epidemiology and Biostatistics, Amsterdam Public Health Research Institute, VU University Medical Center, Amsterdam, The Netherlands)

Throughout the years, several methods for longitudinal mediation analysis have been proposed, such as multilevel analysis, multilevel structural equation modeling, the MacArthur approach, cross-lagged panel models, latent-growth curve models, and latent difference score models. However, comparison of these methods using real-life data is still lacking. Therefore, the aim of this study is to compare the results of these methods using real-life data, and to subsequently review the strengths and limitations of these methods. We compared the six methods for longitudinal mediation analysis using real-life data from the Longitudinal Aging Study Amsterdam (n = 2,485). Three waves of data were used to analyze processing speed as a mediator of the relationship between age and cognition. Overall, the six methods for longitudinal mediation analysis led to the same conclusion, i.e. that processing speed mediated the effect of age on cognition. However, big differences were observed in the magnitude and interpretation of the indirect effect estimates between the compared methods. As each method has its own hypothesis regarding the underlying mechanism of the mediated effect, it is very important to choose the appropriate method for longitudinal mediation analysis. A choice that should be based on the data at hand and the research question to be answered.
MECHANISTIC MODELS REQUIRE INPUT PARAMETERS THAT OFTEN CANNOT BE ESTIMATED WITHOUT BIAS

Eleanor Murray

Mechanistic models such as agent-based, or individual-level, simulation models are increasingly popular tools for assessing the effects of complex interventions in epidemiology and health policy research. These models require, by definition, some specification of the mechanism by which the interventions of interest operate. However, such mechanisms involve separating the direct and indirect components of the total effect of an intervention of interest on a downstream variable. For example, a model for the effect of antiretroviral therapy among persons living with HIV/AIDS could require specification of the indirect effect of ART on opportunistic infections through changes to CD4 counts as well as the direct effect not mediated through these changes. As we have shown previously, even when all other model inputs are unbiased, the model inference will be biased if the direct effect is misspecified. However, obtaining an unbiased estimate of the direct effect, especially in the setting of treatment-mediator feedback, requires strong, untestable assumptions. Furthermore, even when an unbiased estimate of the direct effect can be obtained for some population, for example a trial where both intervention and mediator are randomized, additional strong assumptions are required to transport this estimate to the target population. Here, we describe these assumptions, as well as common scenarios under which they are expected to be violated. We demonstrate the potential for bias in the direct effect estimates using simulation, and discuss sensitivity analyses for estimating direct effects when the treatment-mediator feedback does not exist.
MEDICAL USE OF NEWLY MARKETED ER OPIOID ANALGESICS TENDS TO FOCUS ON BACK AND JOINT PAIN, NOT CANCER PAIN.

Jessica C Young, Jessica C Young, Michelle Jenson Funk, Nabanit Dasgupta,
(University of North Carolina at Chapel Hill)

Background: Amidst the opioid epidemic, the introduction of abuse-deterrent extended-release opioids (EROs) aims to reduce risk associated with these medications. As newer drugs seek approval, understanding the intended use and defining the relevant patient population is vital in assessing safety and effectiveness of these drugs. Few studies have focused on pain diagnoses among long-term ERO patients, a population of high interest in understanding the opioid crisis. We describe diagnostic patterns prior to initiation as a proxy for indication. Methods: We used Truven Analytic's MarketScan Commercial Claims and Medicare Supplemental Data (2006-2014) to identify long-term users of EROs, defined as at least 90 days' supply with ≥ 2 prescriptions. We examined pain-related diagnoses in the 82 days prior to initiation of EROs, and the proportion with varying pain diagnoses, stratified by active ingredient and years since approval. Results: We identified 330,029 long-term users, with a mean age of 54 years, 43% were male. The most common ERO prescribed was oxycodone (26% of initiators) followed by fentanyl (23%). Among long-term users, 16% had a diagnosis of cancer in the baseline period and 90% had a non-cancer chronic pain diagnosis. The most common pain diagnoses were back pain (65%) and arthritis (48%). We observed substantial variation in type of pain managed across different opioid compounds. Patients that had been on the market for over ten years were more likely to have a diagnosis of cancer, compared to opioids that were newer to the market Conclusion: In a national sample of adults with new opioid analgesic prescriptions, we observed substantial variation in pain diagnoses among long-term users of EROs, which was related to the length of time on the market. These findings suggest that future research should focus on understanding the mechanisms behind this variation, and how it may impact the effectiveness of these drugs.

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TRENDS IN OPIOID AND NON-OPIOID PRESCRIPTION ORAL ANALGESIC USE BY HIV STATUS Chelsea Canan, Chelsea Canan, G Caleb Alexander, Richard Moore, Ireni Marini Gecaitanji, Jander, Bryan Lau,
(University of Virginia)

Background: People living with HIV (PLWH) have a higher prevalence of pain compared to HIV-uninfected individuals and have a higher prevalence of risk factors for opioid misuse. Detailed, nationwide trends in prescription analgesic use by HIV status are not well described. Methods: We analyzed Medicaid pharmacy claims from adults in 14 US states from 2001-2009 to identify opioid and non-opioid analgesic prescriptions. We compared trends in prescribing rates by HIV status. Then to reduce heterogeneity by HIV status we 1) standardized the sample to characteristics of PLWH using inverse probability weights and 2) restricted the sample to a subgroup who shared a common comorbidity, diabetes, chosen for its relatively high prevalence and association with chronic pain. We estimated the incidence of chronic opioid therapy (COT) (>90 consecutive days with an opioid prescription) among opioid-naive patients and estimated the association between HIV and COT. Results: Rates of both opioid and non-opioid analgesic prescriptions increased from 2001-2009. PLWH received a prescription twice as many analgesic prescriptions than those without HIV. In an unadjusted Cox regression, PLWH had 3.06 (95% CI 2.76-3.39) times the hazard of COT compared to those without HIV. When restricting to patients with diabetes, rates of all analgesic prescriptions were approximately equal by HIV status and the unadjusted HR for COT decreased to 1.61 (95% CI 1.25-2.09). After adjusting for age, sex, state, comorbidity score, depression, bipolar disorder, and schizophrenia, the HR in the weighted subsample decreased to 1.26 (95% CI 0.97-1.63). Conclusions: From 2001-2009 PLWH received more analgesic prescriptions than patients without HIV, due primarily to differences in demographics and health status. Regardless of differences in these adjustment factors, COT is high among PLWH. HIV providers must adhere to good prescribing practices and monitor patients for misuse.

0491 SIP

A NOVEL CLAIMS-BASED ALGORITHM TO PREDICT OPIOID OVERDOSE IN THE US Jentry Sun, Jenny Sun, Jessica Franklin, Kathryn Rough, Richa Desai, Nina Hernandez-Diaz, Krista Huerta, Brian Bektan, (1. Department of Epidemiology, Harvard T.H. Chan School of Public Health, Boston, Massachusetts, USA; 2. Division of Pharmacoepidemiology and Pharmacoeconomics, Department of Medicine, Brigham and Women's Hospital and Harvard Medical School, Boston, Massachusetts, USA)

Background: With the increasing rate of fatal opioid overdoses in the US, a surveillance tool to predict high-risk patients would be valuable for facilitating early intervention. We developed a claims-based algorithm to detect patients at high risk of opioid overdose. Methods: Patients with ≥ 1 opioid prescription from the Optum Clinformatics insurance claims database (2011-2015) were identified and randomly sampled from an electronic healthcare data. Elastic net regularization was used for variable selection. Logistic regression was used to predict the odds of opioid overdose at each month in the test set, the model achieved a c-statistic of 0.89 and was well calibrated with an interaction term and a 6-parameter Schoenfeld global goodness-of-fit test. Results: Among eligible cases, the model identified 80+ clinically-relevant candidate predictors including demographics, medical diagnoses, and prescriptions. The most common ERO prescribed was oxycodone (26% of initiators), followed by fentanyl (23%). Among long-term users, 16% had a diagnosis of cancer (18% vs. 8% of patients) as likely to be prescribed for cancer pain, compared to opioids that were newer to the market. Conclusions: In a national sample of adults with new opioid analgesic prescriptions, we observed substantial variation in pain diagnoses among long-term users of EROs, which was related to the length of time on the market. These findings suggest that future research should focus on understanding the mechanisms behind this variation, and how it may impact the effectiveness of these drugs.

0492 SIP

CASE-CROSSOVER DESIGN IN PHARMACOEPIDEMIOLOGIC STUDIES OF DRUG INTERACTIONS Kathryn Bykov, Kathryn Bykov, Murray A. Mattmann, Robert J. Glynn, Sebastian Schneeweiss, Joshua J. Gagne, (Harvard T. H. Chan School of Public Health)

Purpose: The case-crossover may be useful for studying the clinical outcomes of drug-drug interaction (DDI) in electronic healthcare data; however, experience with the design in the DDI context is limited. Methods: Using five US databases (1998-2013), we conducted case-crossover analyses of two DDI examples with prior evidence of harm: (1) cytochrome P450 (CYP)3A4-metabolized statins + CYP3A4-inhibiting antibiotics (clarithromycin, erythromycin) and ranibizudoxigenic and (2) clopidogrel + CYP2C9-inhibiting selective serotonin reuptake inhibitors (fluoxetine, fluvoxamine) and ischemic events. We considered the exposure histories of all eligible cases and conducted analyses with (1) a 3-parameter model with an interaction term and a 6-parameter saturated model that distinguished the ordering and chronology of drug exposure and (2) with or without active comparators. Results: In the statin example, the simpler, 3-parameter model produced estimates consistent with prior evidence with the active comparator (interaction term odds ratio [OR] 2.05, 95% confidence interval [CI] 1.00-4.23) and without (OR 1.99, 95% CI 1.04-3.81). In the clopidogrel example, this model produced results opposite of expectation (OR 0.83, 95% CI 0.68-0.89) unless the active comparator was used (OR 1.03, 95% CI 0.90-1.19). The saturated model showed considerable heterogeneity across strata with consistent clopidogrel exposure likely produced the least biased estimates. Conclusion: A simpler model with the interaction term can be useful in evaluating outcomes of concurrent drug exposure in case-crossover studies, but a more complex saturated model can help identify heterogeneity across strata. Restriction of use of active comparators may be necessary in the presence of time-varying confounding.

0493 SIP
Use of acid-suppressive medications for stress ulcer prophylaxis is common in ventilated patients. However, sustained use may increase risk of infectious ventilator-associated complications (iVACs) including pneumonia. Prior observational studies of these medications on pneumonia failed to appropriately account for time-varying confounders, such as gastrointestinal bleeding, which are affected by past treatment. We used a retrospective cohort of ventilated patients to estimate the effect of time-varying stress-ulcer prophylaxis strategies on cumulative risk of iVACs and ventilator mortality, accounting for time-varying and baseline confounders, as well as competing risks. Using electronic health records, we identified 6333 patients aged 18+ on mechanical ventilation for 3+ days at Brigham and Women's Hospital (2009-2014). From ventilation day 3, we considered sustained treatment strategies that treat patients with proton pump inhibitors (PPIs), H2 blockers, or sucralfate.

We estimated the 30-day risk ratio (RR) under each strategy relative to never receiving prophylaxis using the parametric g-formula, an extension of standardization for time-varying treatments and confounders, to appropriately control for time-varying confounding affected by past treatment. Compared to never receiving prophylaxis, we estimated a harmful yet non-statistically significant effect of nearly all prophylaxis strategies on iVACs. The effect estimate was strongest for H2 blockers' RR and 95% CI: H2 blockers 1.45 (0.93-2.37), PPIs 1.41 (0.87-2.42), sucralfate 0.97 (0.34-2.35). Secondary analysis showed different estimates for low and high dose PPI strategies: high 1.59 (0.89-2.85), low 1.29 (0.67-2.39). We found a protective effect on ventilator mortality that was strongest for sucralfate and weakest for high dose PPIs. Despite the consistent direction of effect estimates, we had no sufficient evidence to conclude that sustained use of stress ulcer prophylaxis increases iVACs risk.

S/P indicates work done while a student/postdoc
ADMINISTRATION OF ANTI NEOPLASTIC DRUGS, USE OF PERSONAL PROTECTIVE EQUIPMENT, AND FECUNDITY IN FEMALE NURSES

Objective: To examine the association between administration of antineoplastic drugs (AD) and fecundity among female nurses. Methods: AD administration and use of personal protective equipment (PPE) were self-reported at baseline among 2649 participants of the Nurses' Health Study 3 who were trying to get pregnant. Women were asked if they were actively trying to become pregnant and if the duration of their pregnancy attempt longitudinally. Multivariable-adjusted failure time models were used to estimate time ratios (TR) and 95% confidence intervals (CI) adjusted for age, race, body mass index (BMI), smoking, marital status, hours of work, and other job factors (e.g., heavy loads, kneeling, radiation, disinfectants, anesthetic gases, and aerosolized drugs). Results: Mean (standard deviation) age and BMI at baseline were 30.7 years (4.7) and 26.0 kg/m² (6.4). Forty-one percent reported administering AD (29.7% only in the past and 11.0% currently). Current AD administration (TR = 1.02, 95% CI 0.93, 1.12) were unrelated to the ongoing duration of pregnancy attempt. Among women currently administering AD, those who administered AD for �6 years had a 27% (95% CI 6%, 55%) longer duration of pregnancy attempt than women who never handled AD in unadjusted analysis. This difference disappeared in adjusted analyses (TR = 1.01, 95% CI 0.85, 1.21). Women who currently administer AD but did not consistently use PPE (n=21) had a 25% (95% CI 21%, 96%) longer median duration of pregnancy attempt than those who never handled AD. Conclusion: In a cohort of nurses planning pregnancy with a high prevalence of consistent use of AD, administration of AD does not appear to have an impact on fecundity.

INFERTILITY AMONG AFRICAN AMERICAN WOMEN WITH SYSTEMIC LUPUS ERYTHEMATOSUS COMPARED TO HEALTHY WOMEN: A PILOT STUDY
Meghan Angley, Meghan Angley, S. Sam Lim, Jessica B. Spencer, Penelope P. Howards, (Emory University)

Background: Some treatments for systemic lupus erythematosus (SLE) can cause infertility, but the effect of SLE itself on fertility is less clear. We examined infertility experiences in women with SLE compared to healthy women. Methods: We enrolled women ages 22-40, living in the Atlanta metro area, diagnosed with SLE after age 17 who had not had a hysterectomy before diagnosis. Women ever treated with cyclophosphamide were excluded. African-American women ages 22-40 from the same area recruited from a marketing list were used for comparison. Women were interviewed about their reproductive histories and goals. Including how many children they would expect to have in late stages of pregnancy, the period of infertility was identified as times they had regular, unprotected sex for >12 months without conceiving after age 20. We used logistic regression to examine the association between SLE and meeting reproductive goals and Cox proportional hazards regression to examine the association between SLE and time to first period of infertility. All models controlled for age, nulliparity and ever smoked on a regular basis. Results: Our sample included 76 women with SLE and 163 women without SLE. Both women with and without SLE had given birth to a median of 1 child. Compared to healthy women, women with SLE were less likely to have fewer children that they eventually wanted (odds ratio = 0.64, 95% confidence interval: 0.32, 1.35). However, women with SLE and SLE had a greater hazard of experiencing infertility after age 20 (hazard ratio: 2.23, 95% CI: 1.41, 3.46). When only periods of infertility while attempting pregnancy were considered, the association moved towards the null (HR: 1.48, 95% CI: 0.68, 3.20). Conclusion: This analysis suggests that women with SLE may be more likely to experience infertility than vanish without SLE, but this may not translate to an inability to meet reproductive goals among women with SLE.

PHYTOESTROGEN INTAKE AND FECUNDABILITY IN A NORTH AMERICAN COHORT OF PREGNANCY PLANNERS
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Phytoestrogens are plant-derived compounds that have estrogenic and antiestrogenic effects, which may influence hormone activity and reproduction. We examined the association between intake of isoflavones, a class of phytoestrogens found in soy products, with fecundability in a web-based preconception cohort of female pregnancy planners from the U.S. and Canada. Eligible women were age 21-45 years, in a stable relationship with a male partner, and attempting to conceive spontaneously. Participants completed a baseline questionnaire on demographic, behavioral, and reproductive factors, and a food frequency questionnaire, which we used to estimate intake of five isoflavones. For the analysis of fecundability using data from bi-monthly follow-up questionnaires that ascertained pregnancy status. Women were followed until pregnancy, initiation of fertility treatment, loss to follow-up, or completion of 12 menstrual cycles, whichever came first. We restricted our analysis to 2069 females who had been attempting to conceive for >6 menstrual cycles at study entry. We used proportional probabilities regression models to estimate fecundability ratios (FR) and 95% confidence intervals (CI). The mean estimated intake of isoflavone was 1.85 mg/day (range=0.08-5.97). Isoflavone intake was not substantially associated with fecundability. FRs for 0.75-0.99 mg/day = 1.13 (95% CI 0.99, 1.29), 1.05 (95% CI 0.94-1.18), 1.02 (95% CI 0.98, 1.17), and 1.10 (95% CI 0.91,1.34), respectively. FRs were slightly greater among women with low body mass index <25 kg/m² (FR for 0.75 vs. >0.75 mg/day=1.18, 95% CI 0.92-1.51) and women aged >30 years (FR for 0.75 vs. >0.75 mg/day=1.21, 95% CI 0.94, 1.57). No substantial associations were observed between individual isoflavone intake and fecundability. Our results indicate little association between isoflavone intake and fecundability.

CADMIUM EXPOSURE AND OVARIAN RESERVE IN WOMEN AGES 35-49 YEARS: THE IMPACT OF URINARY CREATININE STANDARDIZATION METHOD ON RESULTS
Kristen Upton, Kristen Upton, Katie M. O'Brien, Janet E. Hill, Donna D. Baird, (Epidemiology Branch, National Institute of Environmental Health Sciences)

Several animal studies have demonstrated ovarian follicle depletion with exposure to cadmium, indicating a detrimental effect on ovarian reserve. In humans, urinary cadmium (uCd) characteristics longitudinal exposure, since the kidney is a major cadmium storage compartment. However, prior human studies of uCd and serum follicle stimulating hormone (FSH), a biomarker of ovarian reserve, had inconsistent findings. We used data from the National Health and Nutrition Examination Survey III, 1988-94, to investigate the association between uCd (collected using spot urine samples) and serum FSH among 1692 women ages 35-49 years with at least one intact ovary and not pregnant, breastfeeding, or a chronic use of oral contraceptives, or exhibiting a lactating hormone (LH)FSH ratio <2 (indicative of ovulation). We used a recently developed method to correct for urinary dilution using creatinine, creatinine-adjusted standardization with a variable adjustment (CAS-C), and compared our results to those obtained using two common methods, standardization and creatinine-adjusted standardization (CA). Adjusted relative risks (RR) and 95% confidence intervals (CI) for the associations between quartiles of uCd and serum FSH concentrations ≥10 IU/L (indicating declining ovarian reserve) were estimated using Poisson regression. Our analysis using CAS-C suggested a positive association of uCd concentrations and FSH (4th vs. 1st quartile RR 1.4, 95% CI 0.9-2.0, P trend=0.03). However, we observed estimates closer to the null with standardization (4th vs. 1st quartile RR 1.2, 95% CI 0.8-1.9, P trend=0.07) and larger in magnitude with CA (4th vs. 1st quartile RR 1.8, 95% CI 1.1-2.8, P trend=0.05). The difference in estimates may be due to the lack of appropriate adjustment for factors, such as fat-free mass, that can affect creatinine independent of hydration effects. After accounting for these factors using the CAS-C method, our data suggest that cadmium exposure may contribute to ovarian aging in women.
Dairy consumption and risk of early natural menopause

Alexandra Purdue-Smith*, Alexandra Purdue-Smith, Brian Whitcomb, JoAnn E. Manson, Susan E. Hankinson, Lisa M. Troy, Bernard A. Rosner, Elisabeth R. Bertone-Johnson, (University of Massachusetts Amherst)

Early natural menopause, defined as the cessation of ovarian function prior to age 45, affects approximately 10% of women and is associated with increased risk of cardiovascular disease and other conditions. Early menopause may also interfere with family planning due to early fertility loss. Biologic evidence suggests a potential role of the hormones in dairy foods in the ovarian aging process. Importantly, the concentration and bioavailability of these hormones depend largely upon the fat content of dairy foods. Despite biologic plausibility, no prior epidemiologic studies have evaluated how dairy intake is associated with risk of early menopause. We therefore evaluated how intakes of total, low-fat, high-fat and individual dairy foods are associated with early menopause in the Nurses' Health Study II. Premenopausal women were followed from 1991 until incident early natural menopause, age 45, oophorectomy, hysterectomy, death or 2011, whichever came first. Food-frequency questionnaires administered every 4 years were used to assess usual dairy intake. In Cox proportional hazards models adjusting for age, BMI, smoking, vitamin D and other behavioral and dietary factors, total baseline dairy intake of ≥2 servings/day versus <4 servings/week was associated with 23% lower risk of early menopause (95% confidence interval (CI) = 0.64, 0.93; P-trend = 0.08). Associations appeared to be limited to low-fat dairy foods (≥2 servings/day versus <3 servings/month HR= 0.83, 95% CI= 0.68, 1.01; P-trend = 0.02). Skim/low-fat milk, in particular, was associated with lower risk of early menopause (each 1 serving/d increase HR= 0.94; 95% CI= 0.89-0.99). In contrast, high-fat dairy intake was not associated with early menopause. Low-fat dairy foods including skim/low-fat milk may represent modifiable risk factors to reduce risk of early menopause. Findings should be replicated in future epidemiologic studies.
While social disparities in health are well established, the biological mechanisms by which social factors, such as socioeconomic status (SES) and race/ethnicity, impact downstream health are not well understood. Prevalent, persistent infections may be one explanatory mechanism given the disproportional burden among disadvantaged groups and the long-term adverse health consequences associated with infection. Using data from 17,651 participants from 8 waves of continuous NHANES, we examined trends in pathogen burden disparities over 16 years. We created a measure of burden for each participant equal to the sum of seropositivies to persistent pathogens, divided by the number of tested persistent pathogens, resulting in a proportion that served as our pathogen burden score. We calculated cross-sectional age-adjusted mean pathogen burden scores for each category of poverty-to-income ratio (PH), educational attainment, and race/ethnicity. Across all years, the highest age-adjusted mean pathogen burden score was consistently in the lowest SES category, while the highest category had the lowest mean score. In 1999-2000, those with a PH<3. By 2013-14, this gap had increased to 1.8 times the mean score, though the increase was not consistent across years. We also found persistent disparities by racial and ethnic categories. Those identifying as Non-Hispanic White had lower mean pathogen burden scores across all years compared to Mexican Americans. Other Hispanics and Non-Hispanic Blacks, with an age-adjusted mean pathogen burden score in 1999-2000 of 29% compared to 46% for other groups. This gap broadly stayed the same across years. In a nationally-representative sample, we found disparities in pathogen burden by income, educational attainment, and race/ethnicity that persisted across 16 years. Using socioeconomic indicators, this disparity increased over the study period.

The potential impact of interventions to reduce enteropathogen infection early in life on child growth results from the MAL-ED study

Background In low-resource settings with inadequate access to clean water and sanitation, early exposure to enteropathogens has been associated with poor linear growth, even in the absence of diarrhea. Vaccines and improvements in water and sanitation have been proposed as interventions to improve growth, but their potential impact is unknown. Methods Among 1,469 children in the birth cohort study, MAL-ED, we used the parametric g-formula to estimate the impact of interventions that would reduce pathogen infection on linear growth at 2 years of age. We considered two interventions: 1) a perfect quadrivalent vaccine that prevented infections by Campylobacter, Shigella, Giardia, and enteropathogenic E. coli (FAEC), and 2) universal access to improved water and sanitation. We compared the average length-for-age z-score (LAZ) at 2 years before the hypothetical intervention (with the observed pathogen exposures) and after (with reduced exposures). Results Campylobacter (28% stool positive), Shigella (11%), Giardia (30%), and FAEC (51%) were highly common in this cohort. A perfect quadrivalent vaccine would be expected to raise the average LAZ at age 2 from -1.69 LAZ to -1.43 LAZ (difference 0.25, 95% CI 0.11, 0.38). Conversely, individual-level provision of improved water and sanitation did not meaningfully reduce pathogen infection, such that this intervention would be expected to have no effect on average LAZ at 2 years (LAZ difference 0.00, 95% CI -0.02, 0.02). Conclusions It is unlikely that increasing individuals’ water and sanitation access, while maintaining community-wide change in the environment, will sufficiently reduce pathogen exposure to cause population-level improvements in linear growth. The potential impact of a perfect vaccine was similar to effects of nutritional interventions, but the impact of a perfect vaccine would be smaller and likely insufficient to reverse the population-level deficit in linear growth faced by children in low-resource settings.

The total number of cases of Lyme disease in Pennsylvania using electronic health records

We identified incident Lyme disease cases using diagnosis codes, laboratory test orders, and antibiotic orders. In exploratory analyses, we further classified cases into subgroups requiring positive serology and/or with symptoms after treatment consistent with post-treatment Lyme disease syndrome (PTLDS). We first compared EHR-identified Lyme disease rates to surveillance rates by year, age, sex, and county. We next examined associations with sociodemographic factors, season, and comorbidities in a case-control analysis of Lyme disease cases and randomly selected controls (5:1) frequency-matched on year, age, and sex. We identified 9,657 Lyme disease cases, of whom 7,191 had positive serology. In addition, 1897 (0.95%) cases had an encounter with an incident diagnosis of fatigue, pain, or cognitive difficulties within 52 weeks of their Lyme incident date, including 310 (3.2%) with encounters both before and after 30 weeks. EHR-derived annual incidence rates by county were sometimes or always vs. never (OR, 95% CI) were 2.19, 1.86-2.58. Receipt of Medical Assistance (OR, 95% CI), white non-Hispanic race/ethnicity was associated with higher odds of Lyme disease (2.19, 1.86-2.58) and higher community socioeconomic deprivation (quartile 4 [0.48, 0.41-0.57] and quartile 3 [0.72, 0.64-0.82] vs. quartile 1) were associated with lower odds of Lyme disease. These results highlight the utility of EHR-based epidemiology, with rich longitudinal data on encounters, diagnoses, and laboratory test results, to improve surveillance and evaluation of Lyme disease risk factors and outcomes.

Relation of occupational facemask usage on influenza virus carriage and self-reported influenza in industrial hog operation (IHO) workers in North Carolina, 2013-2014

Background: IHO workers who reported never wearing a facemask were 3.6 (95% CI: 2.7, 4.9) times as likely to report influenza-like symptoms (ILS) and facemask usage. Baseline data asked IHO workers to recall behaviors and symptoms during the past year, while bi-weekly follow-ups asked about weekly recall of behaviors and symptoms. Nasal swabs from each study visit were assayed for influenza virus RNA presence by real-time RT-PCR. Self-reported facemask usage among IHO workers varied: 38% always, 44% sometimes, and 18% never. At baseline, compared to IHO workers who reported never wearing a facemask, IHO workers who sometimes wore a facemask were 0.68 (95% CI: 0.50, 0.94) and always wore a facemask were 1.03 (95% CI: 0.86, 1.24) the odds of a PCR-positive influenza vi...
CANCERS ATTRIBUTABLE TO INFECTIONS IN THE UNITED STATES IN 2014

Karena Volesky* Karena Volesky, Mariam EI-Zein, Darren R. Bremmer, Christine M. Friedenreich, Yibing Ruan, Stephen Walker, Abbey F. Poirier, Paul J. Villenesse, Will King, Paul Demers, Prithwish De, Robert Nuttall, Leah Smith, Dylan O'Sullivan, Elizabeth Holmes, Perry Hystad, Eduardo L. Franco (McGill University)

Introduction: Public awareness of the role of infectious agents in cancer etiology is low. Yet, in developed regions of the world, an estimated 9.2% of cancers diagnosed in 2012 were attributable to infections, while specific estimates for the USA are lacking. Cancer-causing infections can be avoided with current interventions, for example: hepatitis B virus (HBV) and human papillomavirus (HPV) with vaccination, and Helicobacter pylori with antibiotic therapy. The considerable untapped potential for primary prevention of carcinogenic infections makes quantifying their role in cancer etiology a priority.

Objective: To estimate the proportion of incident cancer cases in 2014 attributable to infections among those aged 20 and older in the USA.

Methods: Population attributable risks (PARs) were used to estimate the possible reduction in cancer incidence if infections were eliminated in the population. PARs were applied to cancer incidence data from the Centers for Disease Control and Prevention and the National Cancer Institute. Systematic literature searches for each infection provided the prevalence and relative risk estimates required to calculate PARs. Measurement error in earlier H. pylori prevalence estimates was corrected for a more sensitive assay.

Results: The estimated number of infection-attributable cancer cases for 2014 was: 32,300 for HPV, 11,400 for H. pylori, 7,800 for HCV, 3,800 for Epstein-Barr virus, 2,500 for HBV, 1,200 for Kaposi sarcoma, and 100 cases for human T-cell lymphotropic virus. These 7 infections were responsible for 3.7% (95% CI: 2.8-4.6%) of the cancers diagnosed among adults in the USA in 2014; 4.0% among women and 3.4% among men. This results in 59,100 potentially avoidable cases among 19 associated cancer sites.

Conclusion: Of the 1.5 million cancer cases diagnosed in 2014 among USA adults, 3.7% were attributable to infections—representing an important target for primary prevention to reduce the burden of infection-associated cancers.

HELICOBACTER PYLORI SERO-POSITIVITY AND ITS ASSOCIATION WITH INCIDENT ALL-CAUSE AND ALZHEIMER DEMENTIA IN LARGE NATIONAL SURVEYS

May A. Beydoun* May A. Beydoun, Hind A. Beydoun, Martine El-Bejjani, Greg A. Dore, Alan B. Zonderman, (NIA/NIH/IRP)

INTRODUCTION: Infectious agents were recently implicated in Alzheimer's disease (AD) and other dementia's etiology, notably Helicobacter pylori (H. pylori).

METHODS: We tested associations of H. pylori sero-positivity with incident all-cause and AD dementia and with AD-related mortality among US adults in a retrospective cohort study. Data from the National Health and Nutrition Surveys (NHANES) III, phase 1 (1988-1991) and 1999-2000 linked with Medicare and National Death Index registries were used (Baseline age=65y, follow-up to 2013, Npooled=5,927).

RESULTS: A positive association between H. pylori sero-positivity and AD mortality was found in men (HRadj,pooled=4.33, 95% CI:1.51-12.41, p=0.006), which was replicated for incident AD and all-cause dementia, with HRadj,pooled=1.45 (95% CI:1.03-2.04, p=0.035) and HRadj,III =1.44 (95% CI:1.05-1.98, p=0.022), respectively. These associations were also positive among higher socio-economic status (SES) groups.

DISCUSSION: In sum, H. pylori sero-positivity's direct association with AD mortality, all-cause and AD dementia was restricted to men, and among higher SES groups.
DIABETES IN RELATION TO BARRETT'S ESOPHAGUS AND ESOPHAGEAL/ESOPHAGOGASTRIC JUNCTION ADENOCARCINOMAS: A POOLED ANALYSIS FROM THE INTERNATIONAL BEACON CONSORTIUM

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Diabetes serves as a proxy for hyperinsulinemia and has been associated with higher risks of numerous cancers, but the association between diabetes and tumors of the esophageal/esophagogastroduodenal junction remains unclear. We harmonized and pooled data from 13 studies in the International Barrett's and Esophageal Adenocarcinoma Consortium (BEACON), comprising 5,793 patients with Barrett's esophagus (BE) cases, 2,311 esophageal adenocarcinoma (EA) cases, and 1,943 esophagogastroduodenal adenocarcinoma (E/GJ) cases, and 16,310 controls. Logistic regression was used to estimate study-specific odds ratios (ORs) and 95% confidence intervals (CIs) for self-reported, physician-diagnosed diabetes in association with BE, EA, and EGJ risk, adjusting for a common set of confounders (age, sex, obesity, and cigarette smoking). Study-specific ORs were then combined using random-effects meta-analysis. We also evaluated effect measure modification by gastroesophageal reflux disease (GERD), using likelihood ratio tests and the relative excess risk due to interaction (RERI). The odds for the association with diabetes was elevated by 35% for EA (OR=1.35, 95% CI: 1.00-1.82; p=0.07), 28% for EGJ (OR=1.25, 95% CI: 1.03-1.52; p=0.06), and 27% for EA/EGJ combined (OR=1.27, 95% CI: 1.06-1.53; p=0.026). RERI modified the diabetes-EA/EGJ association on the multiplicative scale (p=0.04), the odds for the diabetes-EA/EGJ association was elevated by 63% among participants with GERD (OR=1.63, 95% CI: 1.10-2.22), but was null among those without GERD (OR=0.03, 95% CI: 0.74-4.43). On the additive scale (RERI=1.29, 95% CI: 0.22-2.36, p=0.02), the odds of EA/EGJ was elevated to 3.4 for participants with diabetes and GERD (OR=3.42, 95% CI: 2.49-4.69), compared to those without either factor. Little or no association was found between diabetes and BE (OR=0.87, 95% CI: 0.67-1.13).

These results indicate that diabetes is associated with increased odds of EA and EGJ, which is confined to individuals with GERD.

S/P indicates work done while a student/postdoc
CANCERS AVERTED AMONG HIV-INFECTED ADULTS DURING 2008-2012

Jessica Yasmine Islam* Jessica Yasmine Islam, Ruth M. Pfeiffer, H. Irene Hall, Jianmin Li, Anna Satcher Johnson, Alicia Vargas, Glenn Copeland, Karen Pawlish, Bridget J. Anderson, Eric Engels, Meredith Shiels, (Division of Cancer Epidemiology and Genetics, National Cancer Institute, Rockville, MD; Department of Epidemiology, University of North Carolina Gillings School of Global Public Health, Chapel Hill, NC)

People living with HIV (PLWH) are at an increased risk of developing several cancers. Since 1996, the availability of modern highly active antiretroviral therapy (HAART) has improved immune function, and reduced the risk of certain cancers known to occur in excess among PLWH. We quantified the number of cancer cases averted in the US HIV-positive population during 2008-12. We utilized cancer incidence data (2001-2012) collected from the U.S. HIV/AIDS Cancer Match Study for anal, cervical, liver and lung cancers, Kaposi sarcoma (KS), non-Hodgkin lymphoma (NHL), Hodgkin lymphoma (HL) and cancer overall. We estimated site-specific cancer incidence rates among PLWH stratified by age, gender, race/ethnicity, sex, risk group, and calendar year. The number of PLWH in the US was obtained from the CDC’s National HIV Surveillance System for the years 2008-2012. During 2008-2012, nearly all site-specific cancer rates declined, except liver cancer rates, which remained stable over time. The largest declines in rates (all p < 0.0001) were observed for cervical cancer (61% decline), NHL (54%) and KS (49%). During 2008-2012, 36,674 cancer cases were estimated to have occurred among PLWH in the US. We estimated that the number of cancer cases averted since 2001, an additional 21,473 cancer cases would have occurred during 2008-12, including 8802 additional cases of NHL, 4263 cases of KS, 2617 lung cancers, 911 cervical cancers, and 459 HLs. Among PLWH, 19,697 cancers occurred during 2008-2012 in excess of what would be expected based on general population rates. The largest number of excess cases were observed for NHL (n = 5591), KS (n = 4060), anal cancer (n = 2774), and lung cancer (n = 2006). In the US, substantial progress has been made in preventing cancer among PLWH given the observed declining rates and estimated number of cancer cases averted. However, the large number of excess cancers highlight opportunities for further cancer prevention control initiatives.

LATENCY ESTIMATION FOR CHRONIC DISEASE RISK Mingyang Song*

Mingyang Song, Karin B. Michels, Walter C. Willett, Bernard A. Rosner, (Clinical and Translational Epidemiology Unit and Division of Gastroenterology, Massachusetts General Hospital, Harvard Medical School Boston, Massachusetts)

Identifying the susceptible period when environmental factors affect disease risk is essential for understanding disease etiology. Most existing epidemiologic studies use repeated measures of exposures over time, which is oversimplified and not ideal. Another approach is to allow for a lag period when relating exposure to subsequent disease risk. In this paper, we introduce a dartmouth-exponential weighting model to relax the assumptions required for existing approaches and provide estimates of optimal exposure weight at different time intervals. This model can be fit using standard software and has been applied to assess several risk factors for colorectal and breast cancer in the Nurses’ Health Study, in which detailed dietary and lifestyle information has been prospectively collected every 2-4 years since 1976. Our results suggest that at least 15 years of latency are needed to observe the maximal association of folate intake and body mass index with colorectal cancer. For postmenopausal breast cancer, body mass index within the past 10-15 years is more predictive of estrogen receptor (ER)+ / progesterone receptor (PR)+ cancer, while at least 30 years of latency are needed to observe the strongest association with ER-PR- cancer. Our results underscore the value of an analytic approach to risk factor assessment to identify the temporal window with maximal impact on the outcome of interest.
Increasing Incidence of Vascular Dementia with Hormone Replacement Therapy

Chun-Teng Tsai, Chun-Teng Tsai, Yu-Ching Chou, Chien-An Sun (School of Public Health, National Defense Medical Center)

Background. Menopause is associated with sharply decreasing estrogen level in females, and changes in estrogen level may contribute to vascular-related diseases and lead to vascular dementia. Objective: This present study is to assess the possible association between hormone replacement therapy (HRT) and vascular dementia. Methods: This study was a retrospective cohort study based on the National Health Insurance Research Database (NHIRD) from 2000 to 2013. We identified approximately 22,836 individuals using estrogen and randomly selected 45,712 age-matched subjects without using any estrogen as comparison cohort. All were observed until a diagnosis of vascular dementia, death, or December 31, 2013, whichever occurred first. The Kaplan-Meier method was used for calculating the cumulative incidence of vascular dementia in each cohort. Cox proportional regression hazards models were used to estimate hazards ratios (HRs) and 95% confidence intervals (CIs). SAS version 9.4 for Windows was used to analyze all the data. All statistical significance was set at p<0.05. Results: Kaplan-Meier analysis showed that the cumulative risk of vascular dementia in the estrogen cohort was significantly higher than that in the comparison cohort (log-rank test, p<0.001). In addition, Cox proportional regression showed that estrogen users had higher risk of vascular dementia than non-users (adjusted HR [aHR] of 1.50, 95% CI=1.39-1.62). Moreover, the longer duration of exposure to estrogen, the stronger risk of vascular dementia was. The aHRs at exposures of less than 91 defined daily doses (DDD); 91-365 DDDs; and over 365 DDDs, were 1.37 (95% CI=1.22-1.55); 1.49 (95% CI=1.31-1.68); and 1.73 (95% CI=1.55-1.94), respectively, and the trend test, p<0.0001. Conclusion: The results of this population-based cohort study suggest that use of estrogen is associated with higher risk of vascular dementia.

Antropometry, Socioeconomic Status over the Life Course, and Cognitive in Older Adulthood

Sarah E. Tom, Sarah E. Tom, Maria Gilmour, Eric B. Larson, Victoria Moceri, Lon White, Ruowei Yang, Paul K. Crone, (Columbia University)

Previous studies have shown that short stature, indicative of disadvantaged early life, is related to increased risk of poor cognition in older adulthood. However, the role of one’s own education as a mediator on this pathway is unclear. Using the Adult ANTHROPOMETRY, SOCIOECONOMIC STATUS OVER THE LIFE COURSE, AND COGNITION IN OLDER ADULTHOOD study as the data source, we examined the associations among short stature, education, and cognitive function with the overall 9-year follow-up. The Cognitive Screening Abilities Instrument (range 0-100, a score of <86 indicates cognitive impairment) was administered at each biannual visit to 1087 women and 788 men over a median of 10 years of follow-up. Mixed effects models with random slopes and intercepts accounted for repeated cognitive tests. Adjusting for age and parental education, women in the shortest two height quartiles had accelerated cognitive decline, compared to women in the tallest quartile (quartile 1 β=-0.055, 95% CI (0.053, 0.163); quartile 1 and visit year interaction β=-0.028, 95% CI (-0.041, -0.015); slightly weaker associations for quartile 2). Weaker associations were present for arm span in women. Men with the smallest quartile of head circumference had accelerated cognitive decline, compared to men in the largest quartile (quartile 1 β=-0.009, 95% CI (-0.129, 0.111); quartile 1 and visit year interaction β=-0.016; 95% CI (-0.029, -0.002), with similar patterns for arm span and height. Own education did not mediate these relationships. The periods of early life through adolescence, when arm span and height increase, and in men ages 0-5 years, when the head grows rapidly, are relevant for later life cognitive decline. Early brain and cognitive development may confer life-long neurological advantages.

One-Carbon Metabolism Enzymatic Gene Polymorphisms are Associated with Cognitive Trajectory Among African-American Urban Adults May a Beydoun, Salma Tajaddini, Danielle Shiokai, Hind A. Beydoun, Michele K. Evans, Alan B. Zonderman, (NIANIHRR)

Background. The sex-specific link between longitudinal rate of cognitive change (LARCC) and polymorphisms in 1-C metabolism enzymatic genes remains unclear, particularly among African-American (AA) adults. Objective: We tested associations of fourteen single-nucleotide polymorphisms (SNPs) from MTHFR, MTRR, MTR, and SHMT genes and select MTHFR latent classes (SNPLC) with LARCC. Methods: Up to 797 AA participants in the Healthy Aging in Neighborhoods of Diversity Across the Life Span (HAND) study (AgeRange 30-64 y, 52% wome n) had ~1.7 repeated measures (Follow-up time, mean=4.69 y) on 9 cognitive test scores, stratified domains of verbal and visual memory, verbal fluency, psychomotor speed, attention, and executive function, namely the California Verbal Learning test (CVLT-List A (immediate recall), CVLT-DFR (delayed free recall)), Benton Visual Retention Test (BVRT), Animal Fluency (AF), Digit Span Forward and Backward tests, and Trailmaking tasks (Trails A and B). Multiple linear mixed-effects and ordinal least square regression models were used to determine associations. Results: Overall, MTHFR SNPs rs806419 (A137G, Gs-A) and rs1801131 (A1298C, C-GT) were associated with slower and faster declines in AF, respectively, while rs2046642 (C1057G, A-G) was related to slower decline on Trails B (executive function). Among men rs8486051 (A137G, GoA) was linked to faster decline on BVRT (visual memory), while rs20664 (C1056T, Gs-A) and rs9651181 (C-T) were associated with slower decline on CVLT-List A and rs9651181 (C-T) with faster decline on CVLT-DFR. Among women, a slower decline on the combined domain “verbal memory/fuency” was observed with rs1801131 (C777T, A-G) dosage. A minor MTHFR SNPLC was associated with faster CVLT-List A decline in men, while another one was linked to slower decline on AF in women, compared with a common MTHFR SNPLC. Conclusion: In turn, MTHFR gene variation can differentially impact longitudinal changes in multiple cognitive domains among AA adults.
LICENSURE OUTCOMES FOR DRIVERS REFERRED TO THE ENHANCED MEDICAL REFERRAL AND EVALUATION MANAGEMENT SYSTEM IN IOWA Jonathan Davis*, Jonathan Davis, Brandon Batch, Cara Hartman, Cori Peek-Ass, (University of Iowa)

Background: Medical fitness-to-drive is an increasing concern as our population ages and people drive into older ages. Licensing authorities in each state allow for the referral and reexamination of a driver’s fitness-to-drive. The Enhanced Medical Referral and Evaluation Management System (EMRMS) is a unique data system that tracks medical referrals and resulting licensure outcomes. This analysis examines how the source of a driver’s referral ultimately impacts their licensure status. Methods: Iowa Department of Transportation collated information on medical referrals and licensure with EMRMS from January 2014 to March 2017. The frequency of the referral source was described for all drivers age 70 and older. Results: Of a total of 354,117 drivers age 70 and older, 59,154 drivers were referred for medical review and received a licensure determination. Common sources of a referral were the following: line exam = 539,307, accident review = 126,315, law enforcement = 100,892, self-referral = 88,366, and physician = 858,268. Individuals who were referred from a line exam, an accident review, or self-referral had a lower odds of having their license revoked compared to drivers referred from other sources. Drivers had a greater odds of having their license revoked if they were referred by law enforcement (OR=3.32, 95% CI: 2.66-4.15) or a physician (OR=5.36, 95% CI: 3.32-8.64) compared to drivers with other referral sources. Conclusions: Law enforcement and physicians are an important factor in the determination of a license outcome. Physicians should be aware of the potential contribution of sleep changes at older age to this pathway and not only focus on hypertension.

SIP

IS THE ASSOCIATION OF LOW NEIGHBORHOOD SOCIOECONOMIC POSITION WITH GREATER COGNITIVE DECLINE? Kristina Van D’Agostino, Cori Butcher, Cara Hamann, Mary Hsu, Maria Glymour, Allison Aiello, Ilene Ritz, Kimberly Paul (University of California San Francisco)

Adverse cognitive effects of social exposures such as neighborhood socioeconomic position (NSIP) may be exacerbated by environmental neurotoxins, including organophosphate pesticides (OP). Mexican-Americans are differentially exposed to both low NSIP and high OP. We examined synergistic associations of NSIP and OP on cognitive decline in older Mexican-Americans. The Sacramento Area Latino Study on Aging (SALSA, N=1,789 with cognitive assessments and N=1,482 with OP assessments), a cohort of Mexican Americans aged 60-100 who completed a modified Mini-Mental State Test (MMST) annually from 1997 to 2008. OP errors were log-transformed. Total OP pesticide exposure from California Pesticide Use Reports was dichotomized at the median. Baseline NSIP was a composite of six census tract measures from the 2000 Census (Z-scored). We used multilevel linear mixed models with random intercepts for census tract and participant to estimate effects of NSIP and OP pesticide exposure on 3MS decline. We tested for interactions of NSIP and OP pesticide exposure. Models were adjusted for baseline age, gender, diabetes, baseline BMI, rural/urban residence, occupation, years of schooling, and practice effect. In the full sample, higher NSIP predicted better 3MS (B=0.07 95% CI: 0.04-0.10), but not 3MS decline (B=0.004 95% CI: 0.002 to 0.01). OP pesticide exposure was not associated with 3MS scores (B=0.18, CI: 0.07 to 0.29), and did not predict decline (B=0.03 95% CI: 0.00 to 0.06). For those exposed to OP pesticides, each unit increase in NSIP was associated with 0.04 (CI: 0.15 to 0.32) better 3MS, compared to 0.01 (CI: 0.14 to 0.19) worse 3MS for people not exposed to OP pesticides, but these differences may have been due to chance (p=0.273 for the interaction). Higher NSIP predicted better cognitive outcomes, and higher OP pesticide exposure was associated with cognitive decline. We found little evidence for a qualitative interaction between NSIP and OP.

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SLEEP DISTURBANCES AND BLOOD PRESSURE IN COMMUNITY-DWELLING OLDER ADULTS (U) Marine Elbe, Marine Elbe, Sandy Ainslie, Monique Chauvaux, (American University of Beirut)

Several findings suggest an important role of sleep disorders for cardiovascular health. However, current findings on sleep and hypertension are limited and mixed, particularly in older adults. In a community-based cohort of Lebanese adults aged 65 and older (n=848, mean age=72.5, SD=7.2), we assessed the association of self-reported sleep disturbances with cross-sectional measures of hypertension, diastolic and systolic blood pressure, and heart rate. Sleep disturbances were assessed using the Geriatric Mental State (GMS)-Automated Geriatric Examination for Computer-Assisted Taxonomy. Associations were estimated using linear regression models adjusted for sociodemographic and cardiovascular risk factors. The prevalence of sleep disturbances was 11%. Sleep disturbances were not associated with prevalent hypertension (Relative Risk = 1.0, 95% CI: 0.9-1.1) and showed a pattern of associations with lower systolic and diastolic blood pressure (-10.1, 95% CI: -21.3, 1.1 and -4.6, 95% CI: -11.1, 1.8). Participants with sleep disturbances had an increased heart rate (+3.5 bpm, 95% CI: 0.37, 6.6). Adjustment for treatment for hypertension did not alter these conclusions. Results in this sample of older adults show a relationship of sleep disturbances with hypertension and increased heart rate, a combination that is suggested to occur with fatigue, psychosomatric conditions, and compromised cardiovascular health. Given data suggesting that hypertension at older age is associated with dementia, future studies should help understand the potential contribution of sleep changes at older age to this pathway and not only focus on hypertension.

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BASELINE CHARACTERISTICS AND SCREENING OF RAPID EYE MOVEMENT (REM) SLEEP BEHAVIOR DISORDER (RBD) STATUS IN A POPULATION-BASED COHORT OF PARKINSON’S DISEASE PATIENTS, Aline Duarte Foli, Aline Duarte Foli, Kimberly Paul, Jeff Beinart, Ilene Ritz, (University of California, Los Angeles)

Parkinson’s disease (PD) is commonly known by its motor symptoms, but patients experience a number of different non-motor symptoms as well. Rapid eye movement (REM) sleep behavior disorder (RBD) is currently thought to be a subtype of PD associated with non-motor symptoms. However, current findings on sleep and PD patients are limited and mixed, particularly in older adults. In a community-based cohort of Lebanese adults aged 65 and older (n=848, mean age=72.5, SD=7.2), we assessed the association of self-reported sleep disturbances with cross-sectional measures of hypertension, diastolic and systolic blood pressure, and heart rate. Sleep disturbances were assessed using the Geriatric Mental State (GMS)-Automated Geriatric Examination for Computer-Assisted Taxonomy. Associations were estimated using linear regression models adjusted for sociodemographic and cardiovascular risk factors. The prevalence of sleep disturbances was 11%. Sleep disturbances were not associated with prevalent hypertension (Relative Risk = 1.0, 95% CI: 0.9-1.1) and showed a pattern of associations with lower systolic and diastolic blood pressure (-10.1, 95% CI: -21.3, 1.1 and -4.6, 95% CI: -11.1, 1.8). Participants with sleep disturbances had an increased heart rate (+3.5 bpm, 95% CI: 0.37, 6.6). Adjustment for treatment for hypertension did not alter these conclusions. Results in this sample of older adults show a relationship of sleep disturbances with hypertension and increased heart rate, a combination that is suggested to occur with fatigue, psychosomatric conditions, and compromised cardiovascular health. Given data suggesting that hypertension at older age is associated with dementia, future studies should help understand the potential contribution of sleep changes at older age to this pathway and not only focus on hypertension.
SOCIAL NETWORKS OF THE OLD-OLD: AN EXPANDED TYPOLOGY AND ASSOCIATIONS WITH WELLBEING AND MOBILITY USING DATA FROM THE NUAGE COHORT. Stine Bostlier Ha* Stine Bostlier Ha* Alexandrine Neud Ruben Breindel Lise Cantin Lucie Richard, Pierrette Gignereulle, Helene Payette, Yan Kestens, Centre de Recherche du Centre Hospitalier de l'Université de Montréal (CRCHUM)

Background Aging is associated with a shift towards smaller, less diverse social networks based more heavily in primary kinship ties. Network homogenisation and shedding of peripheral ties may diminish older adults' access to social capital, social participation, and subsequent wellbeing and mobility. Aims To examine social network types and their association with wellbeing and mobility among the old-old. We hypothesised that social network diversity would relate to better outcomes.

Methods Data were collected from 183 adults aged 79 to 93 years in Montreal, Canada. Eligible participants presented with limited/no cognitive impairment and did not reside in a long-term care facility. An activity-based name generator was used to derive 13 ego-centric indicators of social network size, structure, spatial distribution, role and activity context from which network types were determined using latent class analysis. Class-specific main differences in self-reported wellbeing (SF-36) and mobility (Life-Space score) were estimated under a distal outcome model using the BCH method in Mplus and adjusted for age, gender, education, and living alone. Results Mean network size was 7.9 persons, of which half were 'strong' ties (with whom one would discuss important matters). Five network types were identified: spousal-tie (20%), child-focused (29%), friend-focused (11%), diverse: friend-based (24%) and diverse: family-based (15%). Diverse classes are larger; less dense; contain fewer strong ties; and feature more frequent interaction. Compared with the spousal-tie class, diverse classes recorded lower scores on the SF-36 Vitality subscale (p<0.05). The diverse: family-based class also recorded lower SF-36 Physical Functioning and Life-Space scores (p<0.05). Conclusion Contrary to expectations, diverse social networks were associated with lower levels of vitality, physical functioning and mobility in the old-old. Analyses are cross-sectional, however, and reverse causation cannot be excluded.

STREET DISORDER PREDICTS INCIDENT PHYSICAL FUNCTION LOSS AMONG OLDER ADULTS Laken Roberts*, Laken Roberts, Laura Samuel, Sarah Stant, Robin Therpe, (Johns Hopkins School of Nursing)

The population of adults over age 65 is expected to double to 84 million by 2050 and 85% of older adults prefer to remain in their home as they age. It is important to understand the role of the local street environment in supporting an older adult's ability to maintain independence at home. We tested the hypothesis that more street disorder predicts higher risk of incident functional loss in a national sample of older adults. The National Health and Aging Trends Study conducts annual examinations among a nationally representative sample of Medicare beneficiaries aged 65 years and older. Street disorder in 2011 measured the count of five environmental hazards and was included in the cumulative incidence function of age-to-first chronic disease. Methods: Ontario adults who completed one of the first six cycles of the Canadian Community Health survey were linked to administrative data starting January 1, 2000. Individuals were followed until December 31, 2014 for the incidence of their first chronic disease (cancer, cardiovascular disease, chronic obstructive respiratory disease, diabetes, lung cancer, myocardial infarction, stroke) with death as a competing risk. By sex, the cumulative incidence function of age-to-first chronic disease was estimated. The associations between lifestyle factors and age-to-first chronic disease were estimated using the Cox and Fine-Gray models adjusting for sociodemographic and health factors. Results: There were 112,787 adults, 15.1% of which developed at least one chronic disease. By age 50, 85.6% of females and 86.6% of males had a chronic disease. Of the lifestyle factors, heavy smoking had the strongest association with age-to-first chronic disease in the Cox model (cHR = 3.86; 95% CI: 3.46, 4.34) and was similar in the Fine-Gray model (sdHR = 2.51; 95% CI: 2.27, 2.76). The association of the lifestyle factors were modelled for each chronic disease separately, and the associations varied by sex, type of chronic disease, and the model used. For example, heavy smoking males had a much greater hazard for lung cancer (cHR = 3.86; sdHR = 2.54) than myocardial infarction (cHR = 5.29; sdHR = 3.95) as their first chronic disease. Conclusions: Most people will have at least one chronic disease by the end of their life. This study provides a novel approach using survival analysis to examine the incidence of chronic diseases relative to the life course and how their incidences are associated with lifestyle factors.


Introduction: Pain is common among older adults and negatively impacts functioning. Sleep disturbances and mood disorders, specifically depression and anxiety, are closely associated with pain in older individuals, but the exact nature of these associations remains unclear. This study deconstructed the temporal effects of insomnia symptoms on incident pain in direct and indirect pathways, with focus on mediating pathways through depression and anxiety symptoms, within a nationally representative sample. Methods: We utilized 2011-2013 data from the National Health and Aging Trends Study, a longitudinal annual survey of 2,259 community-dwelling Medicare beneficiaries. From 2011-2013, participants completed annual in-person interviews that included assessment of sleep, mood, and pain. Causal mediation analysis was applied to examine the temporal direct effects of baseline insomnia symptoms on incident pain, and their indirect effects through symptoms of depression and anxiety. We excluded participants who endorsed baseline insomnia symptoms and their indirect effects through symptoms of depression and anxiety. We excluded participants who endorsed baseline insomnia symptoms and their indirect effects through symptoms of depression and anxiety. We excluded participants who endorsed baseline insomnia symptoms and their indirect effects through symptoms of depression and anxiety. We excluded participants who endorsed baseline insomnia symptoms and their indirect effects through symptoms of depression and anxiety. We excluded participants who endorsed baseline insomnia symptoms and their indirect effects through symptoms of depression and anxiety. We excluded participants who endorsed baseline insomnia symptoms and their indirect effects through symptoms of depression and anxiety. We excluded participants who endorsed baseline insomnia symptoms and their indirect effects through symptoms of depression and anxiety. We excluded participants who endorsed baseline insomnia symptoms and their indirect effects through symptoms of depression and anxiety. We excluded participants who endorsed baseline insomnia symptoms and their indirect effects through symptoms of depression and anxiety. We excluded participants who endorsed baseline insomnia symptoms and their indirect effects through symptoms of depression and anxiety. We excluded participants who endorsed baseline insomnia symptoms and their indirect effects through symptoms of depression and anxiety.

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SMOKING, DRINKING, DIET AND PHYSICAL ACTIVITY - MODIFIABLE LIFESTYLE RISK FACTORS AND ASSOCIATIONS WITH AGE-TO-FIRST CHRONIC DISEASE Ryan Ng*, Ryan Ng, Laura Rosella, Rinku Sriraddhan, Walter Wedchun, Zhihao Yao, (University of Toronto)

Objectives: The objectives were to examine the incidence of a person's first chronic disease in relation to the adult life course; and to examine the relationships between modifiable lifestyle risk factors (smoking, drinking, diet, physical activity) and age-to-first chronic disease. Methods: Ontario adults who completed one of the first six cycles of the Canadian Community Health survey were linked to administrative data starting January 1, 2000. Individuals were followed until December 31, 2014 for the incidence of their first chronic disease (cancer, cardiovascular disease, chronic obstructive pulmonary disease, diabetes, lung cancer, myocardial infarction, stroke) with death as a competing risk. By sex, the cumulative incidence function of age-to-first chronic disease was estimated. The associations between lifestyle factors and age-to-first chronic disease were estimated using the Cox and Fine-Gray models adjusting for sociodemographic and health factors. Results: There were 112,787 adults, 15.1% of which developed at least one chronic disease. By age 50, 85.6% of females and 86.6% of males had a chronic disease. Of the lifestyle factors, heavy smoking had the strongest association with age-to-first chronic disease in the Cox model (cHR = 3.86; 95% CI: 3.46, 4.34) and was similar in the Fine-Gray model (sdHR = 2.51; 95% CI: 2.27, 2.76). The association of the lifestyle factors were modelled for each chronic disease separately, and the associations varied by sex, type of chronic disease, and the model used. For example, heavy smoking males had a much greater hazard for lung cancer (cHR = 3.86; sdHR = 2.54) than myocardial infarction (cHR = 5.29; sdHR = 3.95) as their first chronic disease. Conclusions: Most people will have at least one chronic disease by the end of their life. This study provides a novel approach using survival analysis to examine the incidence of chronic diseases relative to the life course and how their incidences are associated with lifestyle factors.
THE IMPACT OF TOBACCO TAX INCREASE ON CURRENT SMOKING AND SMOKING DEPENDENCE OF HARDCORE AND NON-HARDCORE SMOKERS IN KOREA BETWEEN 2014 AND 2016 USING PROPENSITY SCORE MATCHING AND DIFFERENCE-IN-DIFFERENCE Ikhan Kim* Ikkun Kim, (Seoul National University)

The aim of this study was to examine the impact of tobacco tax increase in Korea in 2014 on the current smoking and smoking dependence of hardcore and non-hardcore smokers. In this study, 2,084 participants of the Korean Welfare Panel Study who were smoking in 2014 were followed up for three years. Hardcore smokers were defined as those who had been observed as current smokers for at least five years and (1) had never planned to quit smoking for five years, (2) smoked more than 15 cigarettes a day, and (3) had not tried to quit smoking in the past year. We calculated the age-standardized smoking prevalence, percentage of smokers who were hardcore smokers, and smoking dependence using the Ex-Package smoking definitions. Using propensity score matching and difference-in-difference methodology, the changes in current smoking and smoking dependence between the hardcore and non-hardcore smokers in 2014 were compared. We found that the smoking prevalence and the proportion of hardcore smokers were decreased in Korea after the increase in tobacco tax. The percentage of smokers who never planned to quit and who had never attempted to quit in the past year increased again, but were lower than the figures for 2014. The reduction in smoking prevalence was observed in both hardcore and non-hardcore smokers, which were 76% larger in non-hardcore smokers, but the decreases in smoking dependence of hardcore smokers were greater than that of non-hardcore smokers for both years. These results provide evidence that the tobacco tax increases would be effective in reducing current smoking and smoking dependence of hardcore smokers as well as non-hardcore smokers.

APPLYING THE TRANSTHEORETICAL MODEL TO INTERPROXIMAL CLEANING BEHAVIOR IN PATIENTS WITH PERIODONTAL DISEASE Tzu-Yun Huang* Tzu-Yun Huang, Hsiao-Ling Huang (Department of Oral Hygiene, College of Dental Medicine, Kaohsiung Medical University, Taiwan)

Background: Periodontal disease is considered one of the most common diseases in the population and, if left untreated, can lead to tooth loss. Regular interproximal cleaning is associated with lower levels of bacterial plaque, dental calculus, and gingivitis. Objective: This study examined the applicability of the Transtheoretical Model (TTM) to understanding interproximal cleaning behavior in patients with periodontal disease. Method: A cross-sectional study was conducted. Overall, 215 patients with periodontal disease in the Dental Department of Kaohsiung Medical University in Taiwan were recruited. Patients with disability and routine use of antibiotics were excluded. The independent variable was stage of interproximal cleaning behavior change. The dependent variables analyzed were cleaning efficiency expectations, decisional balance (i.e., pros and cons), and the processes of change. We used a face-to-face interview to collect the information by a structured questionnaire. Fifty-one percent of patients were interproximal cleaning regularities (precontemplation, contemplation, or preparation stages), whereas 24% were in the action stage (regularly active <6 months) and 25% were in the maintenances stage (regularly active ≥6 months). The multivariate regression model analyzed the stage of interproximal cleaning behavior change associated with dependent variables. Results: Compared to irregularly stage, patients in action stage and maintenance stage were significantly associated with pros (β=0.25 and 0.35) and cons (β=-3.86 and -5.27) of decisional balance, self-efficacy (β=6.46 and 7.05), experiential processes (β=5.83 and 5.54) and behavioral processes (β=2.84 and 3.19). Conclusion: Regularly interproximal cleaning behavior was associated with efficacy expectations, decisional balance, and the processes of change. Results support the use of the entire TTM in examining interproximal cleaning behavior in patients with periodontal disease.
WHO CAN TOLERATE A MARGINAL KIDNEY? PREDICTING SURVIVAL AFTER DECEASED-DONOR KIDNEY TRANSPLANTATION BY DONOR-RECIPIENT COMBINATION Sunjae Bae*, Sunjae Bae, Jacqueline Garzonik Wang, Allan Massie, Kyle Jackson, Alvin Thomas, Nan Luo, Graham Bahn, Josef Coresh, Dorry Segev, (Johns Hopkins Bloomberg School of Public Health)

The impact of donor quality on post-kidney transplant (KT) survival may vary based on candidate health. Identifying candidates who can tolerate transplantation with kidneys from marginal donors, who are older or have comorbidities, would increase access to KT without sacrificing outcomes. However, little is known about the interaction of donor quality and candidate health. We developed a machine learning tool to estimate post-KT survival accounting for donor quality and candidate health together. METHODS: We studied deceased donor KT recipients (N=120,818) and waitlisted candidates (N=376,272) in 2005-2016 using the Scientific Registry of Transplant Recipients, a registry of all transplant recipients and waitlisted candidates in the US. We estimated 5-year dialysis and post-KT survival by Estimated Post-Transplant Survival (EPTS) and Kidney Donor Profile Index (KDPI), previously validated risk scores of candidate health and donor quality that are currently used in the national kidney allocation procedure. We used random forests, which can address interactions between multiple variables with minimal modeling assumptions. Survival benefit was defined as absolute reduction in mortality risk with KT vs dialysis. RESULTS: Our tool can be used to estimate 5-year dialysis and post-KT survival for any combination of KDPI and EPTS. For candidates with EPTS=80, 5-year estimated dialysis survival was 47.6%; 5-year post-KT survival was 78.9% with KDPI=20 and 70.7% with KDPI=80. Survival benefit decreased at higher KDPI scores, particularly when EPTS was higher. For candidates with EPTS=80, 5-year mortality risk decreased with KT by 31.2 percentage-points with KDPI=20 and 23.1 percentage-points with KDPI=80. For candidates with EPTS=20, the risk decreased by 19.5 percentage-points with KDPI=20 and 14.7 percentage-points with KDPI=80. CONCLUSION: Our decision tool may assist clinicians with assessment of survival benefit from a marginal kidney for a given transplant candidate.

PEDIATRIC ASTHMA IN SMALL MINORITY GROUPS: AN ANALYSIS OF 2006-2015 NATIONAL HEALTH INTERVIEW SURVEY Chi Wen*, Chi Wen, Shelley Liu, Yan Li, Petry Schefield, Brian Liu (Icahn School of Medicine at Mount Sinai)

Object: We aimed to explore asthma disparities and temporal trends among small minority groups including "American Indian/Alaska Native (AI/AN), "Asian Indian", "Chinese", "Filipino", "other Asian", and "other or multiple races", using data from 2006-2015 National Health Interview Survey (NHIS). Method: The study population consisted of children aged 4-17 years from the 2006-2015 NHIS, who answered yes or no to the question about lifetime asthma (N=88,369). We focused on four asthma outcomes: lifetime asthma, current asthma, asthma attack, and asthma emergency department (ED) visit. Weighted prevalence was summarized according to race. Survey logistic regression was used to assess the association between asthma outcomes and race adjusted for the covariates, including demographic and socioeconomic characteristics, allergy status and survey year. Cochran-Armitage trend test was used to examine the temporal trends of asthma prevalence according to race. All analyses were conducted in SAS (University Edition 2.39.4M3) survey procedures. Result: Among the six small minority groups, prevalence of both lifetime asthma and current asthma was the highest in the "other/multiple race" group (21.6%; 13.6%). Among children with current asthma, prevalence of asthma ED visit was the highest in AI/ANs (25.8%). Compared to whites, American Indian/Alaska Natives (AI/AN), Filipinos, and other/multiple races, had significantly higher odds of lifetime asthma (OR, 95% CI): 1.1 [1.1, 1.6]; 1.7 [1.4, 2.1]; 1.6 [1.2, 2.0]) and current asthma (1.3 [1.1, 1.7]; 1.3 [1.1, 1.7]; 1.4 [1.1, 1.9]), and AI/ANs had higher odds of asthma ED visit (2.3 [1.1, 4.9]). Over 2006-2015, prevalence of asthma attacks increased among other/multiple races, while prevalence of asthma ED visit decreased in all but Filipino and other/multiple race children. Conclusion: Small minority subgroups were at heightened risk of asthma and asthma associated outcomes, which highlights the need for further studies in these populations.
EPIDEMIOLOGY OF NASOPHARYNGEAL CANCER IN MOROCCO
Amal Raimer* Hinde Harni, Amal Raimer, (Laboratory of Genetics and Biometry, Faculty of Science, Ibn Tofail University, Kenitra, Morocco)

Background: Nasopharyngeal carcinoma (NPC) is a rare malignancy in most parts of the world, with an incidence and mortality risk one per 100,000 person-years. It is the 18th most commonly diagnosed cancer in men and women and the 18th leading cause of cancer-related death in Northern Africa, with an estimated 2,979 new cancer cases (2,043 men and 936 women) and 1,705 cancer deaths in 2012 (GLOBOCAN 2012). The aim of this study is to determine the epidemiological characteristics of nasopharyngeal cancer cases, diagnosed and treated at Al Azhar Oncology Center in Rabat between 2005 and 2015. Results: During 2005-2015, 280 new cases were diagnosed with nasopharyngeal carcinoma at Al Azhar Oncology Center; 189 (67.5%) in men and 91 (32.5%) in women, giving a male-female ratio of 2.1 and accounting for 3.5% of all cancers reported during this period. The average age at diagnosis was 46.5±15.2 years (range 3-80 years). The risk of developing the disease is related to age, 82.8% of cases were diagnosed in patients aged 35 years and older at the time of diagnosis, with 64.5% of new nasopharyngeal cancer cases occurring among those aged 35-59 years. Among all diagnosed cases, 0.7% were diagnosed with metastatic disease and 7.1% died from the disease during the study period, accounting for 3% of all cancer deaths. Conclusions: Nasopharyngeal carcinoma is a rare and complex etiology that is not completely understood. Although NPC is rare in most populations, it is a leading form of cancer in a few well-defined populations, including natives of North Africa.

GEORPHIC LOCATION AND MORTALITY AFTER BREAST CANCER
Ronald E. Gangnon1 Amy TRENTHAM-DIEZ, Cora Allen-Coleman, Jane A. McElroy, John M. Hampton, Polly A. Newcomb Ronald E. Gangnon (University of Wisconsin-Madison)

Breast cancer incidence and mortality rates have been higher in portions of eastern Wisconsin bordering Lake Michigan compared to other regions for over 50 years. We previously found that established individual-level risk factors do not explain in this longstanding observation for breast cancer incidence using geocoded residential location data for case-control study participants in a series of four population-based case-control studies from 1982-2004. We now examine the association between residential location and breast cancer mortality among the 13,091 cases (including 2,091 deaths) enrolled in these studies. A generalized additive proportional hazards regression model for breast cancer mortality was used to estimate geographic risk as a local hazard ratio (HR, relative to the state average) using a two-dimensional thin plate spline, while adjusting for pre-diagnosis risk factors ascertained through linkage with the state cancer registry (age and stage at diagnosis) and from telephone interviews (parity, age at first birth, alcohol intake, body mass index, family history of breast cancer, menstrual status and age at menopause, postmenopausal hormone use, education, race, smoking and mammography history). After adjustment for risk factors, breast cancer mortality was significantly higher than the state average in the south-central portion of Wisconsin (Kaukauna HR 1.10, 95% CI 1.03-1.21; Racine HR 1.10, 95% CI 1.03-1.21; Walworth HR 1.07, 95% CI 1.01-1.15; Milwaukee HR 1.06, 95% CI 1.01-1.10; Waukesha HR 1.04, 95% CI 1.01-1.08). Breast cancer mortality was lower in Jackson county (HR 0.92, 95% CI 0.85-0.99) in the west-central portion of the state. These results suggest that substantial geographic differences in breast cancer mortality persist across Wisconsin, even after accounting for individual-level risk factors. Additional analyses will examine whether adjustment for breast cancer treatment and post-diagnosis risk factors substantively influences the findings.

MELANOMA AMONG BLACKS IN THE UNITED STATES
Mary Beth Freemen1 Mary Beth Freeman, Natasha Buchanan, (CDC/CRISIE)

BACKGROUND: Melanoma is one of the top ten most commonly diagnosed cancers in the United States (US) and is increasing. Few studies have examined melanoma among black populations due to lower risk of melanoma compared to non-Hispanic whites (NHWs). However, blacks are often diagnosed at a later stage, have different predominant histology types, and have poorer survival compared to NHWs. We examined melanoma incidence and survival among black US populations by age, stage at diagnosis, anatomic site and histology. METHODS: We examined population-based cancer registry incidence data from the Centers for Disease Control and Prevention's National Program of Cancer Registration (NPCR) and from the National Cancer Institute's Surveillance, Epidemiology, and End Results Program, covering 99.1% of the US population for the years 2010-2014. Cases were limited to non-Hispanic and Hispanic black populations, except when non-Hispanic whites were used as a comparison group. Survival data were from 34 NPCR program participating states. RESULTS: From 2010-2014, melanoma rates increased with increasing age, with the highest rates among males age 65 and older (5.4 per 100,000). Half of all melanomas were diagnosed at a localized stage. Lower extremities were the most commonly diagnosed anatomic melanoma site (47.2%). Among cases with a specific histology given, the most common were acral lentiginous melanoma (16.1%). From 2000-2013, the overall relative 5-year melanoma survival among blacks was 67%, compared to 90.4% among NHWs. Survival decreased with age and was poorer among males. CONCLUSION: Although incidence of melanoma is relatively rare among black populations, survival rates lag behind that of NHW populations. Improved education of acral lentiginous melanoma history among blacks and improved medical surveillance of this histology are needed due to its atypical presentation, which is not adherent to "ABCDE" guidelines traditionally used to identify melanoma.

PERINEAL TALC USE, DOUCHING AND THE RISK OF ENDOMETRIAL CANCER
Katie O'Brien1 Katie O'Brien, Dale P. Snidler, Min Shi, Aimee D'Alonzo, Clarice R. Weinberg, (National Institute of Environmental Health Sciences)

Perineal talc use and douching could affect endometrial cancer risk through several proposed pathways, including inflammation response, changes in vaginal and uterine microbiota, or endocrine disruption. Previous cohort studies of the association between talc use and endometrial cancer have reported elevated but not statistically significant effect estimates, and we know of no previous studies of the relationship between douching and endometrial cancer. Using data from the Sister Study, a prospective cohort of breast cancer-free women who had never previously been diagnosed with the disease, we examined the relationship between endometrial cancer and self-reported use of talc or douche in the year prior to enrollment using Cox proportional hazards models. After excluding those with prior hysterectomy, 265 of 34,406 women reported an endometrial cancer diagnosis during follow-up (median=8.4 years; range=0-12.7 years). Overall, 14% of women reported using talc in the last year and 13% reported having douched. We observed positive but not statistically significant associations between endometrial cancer and talc use (adjusted hazard ratio [HR]=1.15; 95% confidence interval [CI]: 0.83-1.60) and endometrial cancer and douching (HR=1.07; 95% CI: 0.72-1.58). Results were similar for analyses stratified by race, body mass index, and subtype (endometrial versus other location). Our results are consistent with the previous literature that talc use may be associated with a small increase in endometrial cancer incidence and we have plans to pool data across multiple cohorts to investigate the relationship further. The potential positive relationship between douching and endometrial cancer also merits further consideration.
PROGNOSTIC VALUE OF IMMUNE-RELATED BIOMARKERS IN NON-METASTATIC LUNG CANCER: A META-ANALYSIS Stephanie Tuminello*, Stephanie Turninelloii, Raja Flores, Willemierman-Cribbin, Sacha Gnjatic, Miriam Mendel, Rajiv Singhavi, Emmanuel Tairi* (Department of Population Health Science and Policy and Institute for Translational Epidemiology, Icahn School of Medicine at Mount Sinai)

Background: Multiple studies have found lymphocytic infiltration of tumors to be associated with more favorable outcomes in non-small cell lung cancer (NSCLC); however, the impact of specific immune components of the tumor microenvironment in NSCLC is controversial. We performed a meta-analysis to evaluate lymphocytes as prognostic biomarkers. Methods: PubMed was searched to identify eligible studies comparing survival of surgically resected stage I/II NSCLC patients according to infiltration by lymphocytic subsets (i.e., CD3+, CD4+, CD8+, CD20+, and FoxP3). Meta-analysis was performed using a linear mixed effects model to determine overall, disease specific and progression free survival. Results: Of the 1,343 queried articles, 37 articles were eligible and included 8,162 patients. High levels of CD4+ cells were significantly associated with improved overall survival (HR: 0.51, 95% CI 0.39-0.67; 5 studies, 883 patients, Q-p-value =0.20) and progression free survival (HR: 0.59, 95% CI 0.46-0.75; 4 studies, 571 patients, Q-p-value =0.20). High CD8+ cell infiltrates were also associated with improved overall survival (HR: 0.85, 95% CI 0.73-0.99; 12 studies, 3032 patients, Q-p-value =0.68), but not progression free survival. FoxP3+, expressed on Regulatory T cells, was associated with worse overall survival (HR: 2.03, 95% CI 1.39-2.96; 9 studies, 1547 patients, Q-p-value = 0.34). High CD20+ B cells was suggestive of better overall survival, though this was not statistically significant (HR: 0.71, 95% CI 0.39-1.30; 3 studies, 569 patients, Q-p-value = 0.64). Conclusion: The presence of tumor infiltration by specific lymphocytic subsets could be potentially useful as prognostic biomarkers for survival in resected stage III NSCLC patients.

ECONOMIC BURDEN OF CANCERS ATTRIBUTABLE TO INFECTION IN KOREA IN 2014 Nguyen Thi Xuan Trinh*, Nguyen Thi Xuan Trinh, Jin Kyung Oh, Minj Han (National Cancer Center Graduate School of Cancer Science and Policy, Korea)

Background: Infection is a major public health hazard for a variety of cancers. Because of the time lag involved, the number of cancer cases due to infection is of considerable concern. To date, no studies have examined the economic burden of cancers linked to infection in Korea. Therefore, current information on the economic cost of infection-related cancers is required. Methods: The economic burden of cancers attributed to infection in Korea in 2014 is estimated using a prevalence approach. Here, cancer patients are defined as those having made medical claims using ICD-10 cancer codes, as recorded by the National Health Insurance System. Then, we multiply the costs by the population attributable fraction for each type of cancer. The study includes direct costs and indirect costs (production loss). Results: Of the 1,343 queried articles, 37 articles were eligible and included 8,162 patients. Direct costs were $1,343 queried articles, 37 articles were eligible and included 8,162 patients. Indirect costs were much higher, accounting for 10.7% of all costs. Conclusion: It is imperative that more research is conducted to determine overall, disease specific and progression free survival. Results: Of the


Prostate cancer (PC) is one of the most common cancer types in the United States. Cumulative environmental exposures have been associated with PC incidence. However, the impact of cumulative environmental exposure on PC aggressiveness is not well understood. To address this gap, we utilized the U.S. Environmental Protection Agency's (USEPA) Environmental Quality Index (EQI) to estimate cancer-level environmental quality in the U.S. The EQI captures exposure to over 200 environmental factors across five environmental domains (air, water, land, sociodemographic, and built) for 2000-2005. For persons diagnosed with PC from 2003-2014 (n=252,313), prostate specific antigen (PSA), biopsy Gleason score (BGS) and individual level covariates (age, marital status, sex, race) from the Surveillance, Epidemiology, and End Results Program (SEER) were linked to the EQI based on place of residence. PSA, a measure of prostate specific antigen, was dichotomized (PSA >=20 vs. <20) and BGS, a score used to assess the aggressiveness of PC, was also dichotomized (high grade vs. low grade). We used mixed effects logistic regression to model EQI and determine specific indices as quartiles (Q1 to worst environment) to estimate the OR and 95% CI for PC characteristics adjusting for individual-level covariates (PSA at diagnosis was not associated with overall environmental quality (EQI/4 OR=0.99(0.86,1.06)). Overall environmental quality was positively associated with increased odds of more aggressive PC as measured by BGS (EQI/4 OR=1.14(1.01,2.8)) with the strongest associations seen in the sociodemographic (SDQ4: OR=1.26(1.14,1.39)) and built (BQ4: OR=1.28(1.02,1.07)) domains. These results suggest associations between poor environmental quality and more aggressive PC at diagnosis. However, additional research is required to understand specific environmental drivers of PC aggressiveness. This abstract does not necessarily reflect EPA policy.

GENETIC SUSCEPTIBILITY TO CHRONIC INFLAMMATORY INTESTINAL DISEASES AND PANCREATIC DUCTAL ADENOCARCINOMA: A PATHWAY ANALYSIS OF GENOME-WIDE ASSOCIATION STUDIES Fangcheng Yuan*, Fangcheng Yuan, (Johns Hopkins Bloomberg School of Public Health)

Background: Chronic inflammation is known to play a role in pancreatic carcinogenesis. Registry-based epidemiologic studies suggest associations between chronic inflammatory intestinal diseases and pancreatic ductal adenocarcinoma (PDAC). Methods: We examined the association between genomic regions (50 kb up and 50 kb down) surrounding gene variants for Crohn's disease, ulcerative colitis, inflammatory bowel disease (IBD) and colorectal cancer (CRC) contributed) and colitis disease identified in published genome-wide association studies (GWAS) and PDAC in 8,723 cases and 12,433 controls of European descent using summary statistic GWAS data, from the Pancreatic Cancer Cohort Consortium (PC3) and the Pancreatic Cancer Case Control Consortium (PC4). We employed the summary adaptive random truncation product (SARTP) method to test the overall association of the combined genomic regions for each respective disease. Results: Categorization of the genomic regions for inflammatory colitis Crohn's disease, and inflammatory bowel disease were associated with PDAC at P-values < 0.05 (0.0035, 0.037, and 0.0018, respectively). After excluding the regions around the previously identified GWAS loci for PDAC in the NRAS2 gene (500 kb up and 500 kb down), only the inflammatory bowel disease genomic region remained significantly associated with PDAC (P-value = 0.047). The top genes contributing to the inflammatory bowel disease association after excluding the NRAS2 region included ACTRT2, LINC00539, and TMEM58 (P-values < 6.0 x 10^-4). Genomic regions for colitis disease were not associated with PDAC (P-value = 0.31). Conclusion: Our results provide modest support for the hypothesis that genomic regions surrounding gene variants in gastrointestinal inflammatory diseases (based on published GWAS loci) are associated with PDAC.
DIABETES AND CARDIOVASCULAR DISEASE MORTALITY AMONG WOMEN WITH AND WITHOUT BREAST CANCER

Luis A. Rodriguez, Luis A. Rodriguez, Patrick T. Brashaw, Humberto Pandia, Nilshil K. Khankari, Tengteng Wang, Rebecca Cleveland, Susan L. Teitelbaum, Alfred L. Neugut, Marjorie D. Gammon, (Department of Epidemiology and Biostatistics, University of California, San Francisco)

Cardiovascular disease (CVD) is a leading non-cancer cause of death among women with breast cancer (BC) and diabetes is a risk factor for CVD mortality. Whether the diabetes-mortality association differs among women with and without BC is unclear. We examined the diabetes-mortality association among a population-based sample of 1,413 women diagnosed with first primary BC in 1996-97, and among 1,480 age-matched women without BC who were interviewed in person shortly after diagnosis (identification among women without BC) Vital status for all-cause mortality (n = 712) and CVD-specific mortality (n = 300) through December 31, 2009 was determined via linkage with the National Death Index. Proportional hazard models were used to estimate adjusted hazard ratios (HR) and 95% confidence intervals (CIs) for all-cause and CVD-specific mortality (cause-specific HRs [cSHR]).

Subdistribution HRs (sHRs) for CVD mortality accounting for competing causes of death were estimated with the Fine-Gray model, which models the hazard from the cumulative incidence function of the outcome. Pre-diagnosis diabetes was associated with increased all-cause mortality among women with BC (HR 95% CI: 1.55 [1.15, 2.09]) and without BC (2.26 [1.52, 3.34] p-interaction 0.13). CVD-specific mortality was also elevated with diabetes in both groups [sHR, women with BC: 1.75 (1.07, 2.85); without BC: 2.06 (1.11, 3.87) p-interaction 0.67]. After accounting for competing causes of death, the association between diabetes risk of CVD-specific mortality remained elevated [sHR, women with BC: 1.53 (0.92, 2.53); women without BC: 1.80 (0.94, 3.47) p-interaction 0.69]. However, the association was lower than the cause-specific HRs for diabetes that are generally higher. We believe that diabetes is a risk factor for CVD mortality. Whether the association is stronger for diabetes that is related to other causes of death needs to be further explored. CVD survivors with an existing diabetes diagnosis are at an increased risk for all-cause and CVD-related mortality compared with those without diabetes, but the pattern is of similar magnitude compared to women without BC.
BURDEN OF LOCAL-THERAPY DECISION REGRET IN OLDER WOMEN WITH BREAST CANCER: A POPULATION-BASED STUDY

Pragati Advani Pragati Advani Xiaodong Lei, Cameron Swainwick, Benjamin Smith, (National Cancer Institute)

Background: Older women with breast cancer can often choose between several surgery and radiation treatment options. Little is known regarding how these choices contribute to decisional regret, a negative emotion reflecting the idea that another surgery/radiation decision may have been preferable. We examined the burden and correlates of surgery/radiation decisional regret among a population-based cohort of older breast cancer survivors. Methods: National Medicare claims for age-eligible female breast cancer incidence in 2009 identified patients treated with lumpectomy-alone, breast irradiation only, mastectomy alone, mastectomy with radiation. From this cohort, we sampled 330 patients per group (total 1650) of whom 1253 agreed to receive a self-assessment study indicating (yes/no) if they experienced certain symptoms after treatment. The study indicated predictors of surgery/radiation decisional regret among a population-based cohort of older breast cancer survivors. Methods: National Medicare claims for age-eligible female breast cancer incidence in 2009 identified patients treated with lumpectomy-alone, breast irradiation only, mastectomy alone, mastectomy with radiation. From this cohort, we sampled 330 patients per group (total 1650) of whom 1253 agreed to receive a survey examining the decisional regret scale and EQ-5D-3L Health Utility Scale. Predictors of surgery/radiation regret were evaluated using a multivariable generalized linear model. Correlation of surgery/radiation regret with health utility was tested using multivariable linear regression. Results: Response rate was 30.2% (n=408); 421 surveys were completed and included in this analysis. Median age at diagnosis was 72 years and surveys were completed 6 years after diagnosis. Overall, 238% (n=100) reported surgery/radiation regret. Type of local therapy was not associated with surgery/radiation regret, but predictors of increased regret included black race [Risk Ratio (RR)=2.0; P=0.001], less than high school education (RR=1.92; P=0.0009), and axillary nodal dissection (RR=2.13; P=0.002). Surgery/radiation regret was not associated with health utility (P=0.37). Conclusion: Surgery/radiation regret affects nearly one-quarter of older breast cancer survivors and is associated with black race, less education, and extensive nodal but not surgery. Regret is distinct from health utility, suggesting it is a unique psychosocial construct that merits further study and mitigation strategies.

SELF-REPORTED LATE EFFECT SYMPTOM CLUSTERS AMONG PEDIATRIC CANCER SURVIVORS Rebecca Williamson Lewis Rebecca Williamson Lewis, Karen E Ellinger, Karen Wasilewski-Masker, Ann Mertens, Cynthia Xiao, (Children’s Healthcare of Atlanta, Aflac Cancer and Blood Disorders Center)

Purpose: Overall survival for pediatric cancer is 80%; however, most survivors experience subsequent chronic conditions. Little is known about chronic symptoms experienced. This analysis seeks to determine late effect symptom clusters among pediatric cancer survivors. Methods: Patients or parents of patients <18 years enrolled in the Childhood, Adolescent, and Young Adult Cancer Survivor Study (n=2,962) if they experienced chronic symptoms after treatment. The sample was randomly divided for explanatory factor analysis identifying symptom clusters followed by confirmatory factor analyses. Symptoms with ≥10% prevalence were included. Cluster structure generalizability across subgroups was examined using congruence coefficients. Results: The sample included 579 survivors (74% non-Hispanic white, 45% leukemia, 128±4.5 years old, 5.9±3.5 years since therapy). Respondents averaged 3 symptoms with dental problems (31.3%) the most common. Three clusters were identified: 1) Gut/intestinal (GI): abdominal pain, diarrhea, constipation, nausea, vomiting (Crohn’s: 0.64); 2) Psychological: depression, anxiety, memory problems, anger management problems, sleep problems (0.71); and 3) Neurological: pain, numbness/tingling, fatigue, back pain, chronic pain, weakness/imobility to move legs (0.71). Confirmatory factor analysis confirmed the three cluster structure (Standardized Root Mean Square Residual 0.09; Parsimonious Goodness of Fit 0.96; Bentler-Bonett Normed Fit Index 0.95) which was generalizable across most subgroups. However, symptoms in the neurologic cluster varied in males, non-whites, young adult survivors, and those diagnosed at ≥5 years old (congruence coefficients <0.70). Conclusion: Three distinct late effect symptom clusters were identified in childhood cancer survivors with GI and psychological clusters remaining relatively stable across subgroups. Future studies will evaluate survivors with these clusters and the synergistic impact on quality of life.

PREVENTABLE FRACTIONS OF COLON AND BREAST CANCERS BY INCREASING PHYSICAL ACTIVITY IN BRAZIL: PERSPECTIVES FROM PLAUSIBLE COUNTERFactual SCENARIOS Leandro Fornas Machado de Rezende Leandro Fornas Machado de Rezende, Leandro Martin Teixeira Garcia, Gregoire Jean Mieleke, Dong Heon Lee, Kana Wu, Edward Giovannucci, Jose Eluf-Neto, (Departamento de Medicina Preventiva, Faculdade de Medicina FMUSP, Universidade de Sao Paulo)

Background: Currently, it is well-established that physical activity is associated with lower risks of colon and breast (post-menopausal) cancers. In this study, we estimated preventable fractions of colon and breast cancers in Brazil by increasing population-wide physical activity to different counterfactual scenarios. Methods: We estimated potential impact fractions using data from a representative national survey in Brazil and corresponding relative risks of colon and breast cancer published in a recent dose-response meta-analysis. Estimated cancer incidence was retrieved from GLOBOCAN. Five counterfactual scenarios for physical activity included: (i) theoretical minimum risk exposure (28,000 metabolic equivalents of task per minute per week; MET-min/week); (ii) physical activity recommendation (≥600 MET-min/week); (iii) 10% reduction in physical activity in men (≥8,000 MET-min/week); (iv) actual scenarios showed modest impact on breast cancer prevention in Brazil, as risk of developing more aggressive forms of prostate cancer evident among men age ≥65 but not men <65 years (p-interaction <0.08). Conclusions: Our counterfactual scenario estimates suggest that high levels of physical activity are acquired to achieve sizable impact on breast and colon cancer prevention in Brazil.

HIGH ADHERENCE TO A MEDITERRANEAN-STYLE DIET AND THE DASH EATING PLAN IS INVERSELY ASSOCIATED WITH HIGH AGGRESSIVE PROSTATE CANCER IN PCAP. Laura R Schneider, Laura Schneider, L. Joseph Su, Lenore Arath, Jeanette T. Benson, Laura Farnan, Elizabeth T.H. Fonthuitt, Jamie Hunter, Amber T. Merchant, James L. Molitor, Susan E. Stick, (Department of Epidemiology and Biostatistics, Arnold School of Public Health, University of South Carolina, Columbia, SC)

Background: Several foods and nutrients have been linked to prostate cancer, but the effects of overall diet on prostate cancer aggressiveness is not well understood. Most research has examined a posteriori dietary patterns for relation to prostate cancer and the few studies that used a priori dietary patterns have been inconclusive. Methods: Data from the only North Carolina-Louisiana Prostate Cancer Project (PCAP) were used to examine the association between overall dietary quality, as measured by the Mediterranean Diet (MED) score and the Dietary Approaches to Stop Hypertension (DASH) score, and prostate cancer aggressiveness in African-American (AA) and European-American (EA) men. Dietary patterns were assessed using a modified NCI Diet History Questionnaire for a final sample of 1,899 research subjects (AA n=908, EA n=991). High aggressive prostate cancer was defined using Gleason grade, stage, and prostate-specific antigen values. Multivariable-adjusted logistic regression was used to model high aggressive prostate cancer (n=322) versus low-intermediate aggressive prostate cancer. Results: Higher MED scores were inversely associated with high aggressive prostate cancer overall (OR: 0.66; 95% CI 0.46 - 0.95 for high score 64% vs low score 0.33%); and results were similar for AA and EA men. A weaker inverse association between higher DASH scores and high aggressive prostate cancer was observed (OR: 0.76, 95% CI: 0.55 - 1.06 for the highest tertile (score ≥25) compared to the lowest tertile (score <20). Age modified the effect of MED score, with the inverse association between higher MED scores and aggressive prostate cancer evident among men aged ≥65 but not men <65 years (p-interaction 0.08). Conclusion: High adherence to a Mediterranean-style diet may decrease the risk of developing more aggressive forms of prostate cancer among both AA and EA men, particularly in men over the age of 65 years.
WEIGHT CHANGE AND RISK OF COLORECTAL CANCER IN THE PROSTATE, LUNG, COLORECTAL AND OVARIAN CANCER SCREENING TRIAL Fang Hu* Kathryn Hughes Barry, Fang Hu, Wen-Yi Huang, Andrea Buchwald, John D. Sorkin, Sonja I. Berndt, (Department of Epidemiology and Public Health, University of Maryland School of Medicine, Baltimore, MD)

Body mass index (BMI) is an established risk factor for colorectal cancer. However, few studies have evaluated the role of weight change over the life course, and the literature is inconsistent regarding differences by sex and anatomic subsite. We investigated weight change in early-mid (age 20-50) and mid-later (age 50-baseline) adulthood and the risk of colorectal cancer in the Prostate, Lung, Colorectal and Ovarian Cancer Screening Trial. We included 56,580 screening arm participants who had no history of colorectal cancer and who had available data on weight and BMI and completed a baseline dietary questionnaire. Participants were aged 55-74 at baseline (1993-2001), and 721 developed colorectal cancer during follow-up through 2009. We categorized weight change per 5 years (kg) from age 20 to 50 as ≤0.5, >0.5 to ≤0.5 (weight stable, referent group), >0.5 to ≤1, >1 to ≤2, and >2 kg, and that for age 50 to baseline as ≤0.5, >0.5 to ≤0.5 (weight stable, referent), >0.5 to ≤2, >2 to ≤5, and >5 kg based on their respective distributions. We used Cox regression to evaluate the association between weight change and colorectal cancer risk, adjusting for starting BMI and other potential confounders. For 5-year weight gain ≥2 kg from age 20 to 50, we observed a borderline significant increased risk of total colorectal cancer (HR=1.23, 95% CI 0.96-1.58) findings were driven by rectal cancer (HR=1.31, 95% CI 0.95-1.84) and distal colorectal cancer (HR=2.96, 95% CI 1.12-8.49), with no association for distal colon cancer (HR=1.17, 95% CI 0.43-1.17). Associations were less pronounced for weight gain from age 50 to baseline (HR=1.10, 95% CI 0.83-1.46). There were no significant differences by sex. Our findings suggest that a moderate rate of weight gain from early to middle adulthood is associated with colorectal cancer, particularly proximal colon and rectal cancer, and indicate the importance of weight maintenance.

OVARIAN CANCER INCIDENCE AMONG ASIAN ETHNIC SUBGROUPS IN THE UNITED STATES Alice Lee* Alice Lee, Emma Navajas, Lihua Liu, (California State University, Fullerton)

Although ovarian cancer is the most fatal gynecologic malignancy in the United States, its burden is not equally distributed. Non-Hispanic Whites (NHWs) have the highest incidence, whereas Asian/Pacific Islanders (APIs) have the lowest. In addition, incidence has declined among NHWs, but this decrease appears to be less evident among APIs. Since most ovarian cancer research aggregates APIs into a single group, it is unclear whether these observations persist when specific API ethnic subgroups are considered. Using population-based cancer registry data from the Surveillance, Epidemiology, and End Results Program, we examined ovarian cancer incidence among various API ethnic subgroups in the United States from 2000 to 2014. Incidence rate ratios (IRRs) and 95% confidence intervals (CIs) were calculated, comparing each API ethnic subgroup to NHWs. Annual percent changes (APCs) were also calculated to evaluate trends over time. Disease histotype was considered in our analyses when appropriate. All API ethnic subgroups evaluated had a statistically significant lower risk of ovarian cancer compared to NHWs

Oophorectomy and Risk of Primary Liver Cancer and Fatty Liver Disease in the Clinical Practice Research Datalink Andrea R. Ayers*, Andrea R. Ayers, Barry I. Graubard, Marie C. Bradley, (National Cancer Institute)

The incidence of liver cancer and its precursor condition, fatty liver disease, are 2-3 times higher in males than females, but this discrepancy has not been fully explained by known risk factors. It has been hypothesized that hormones may account for the disparity. Evidence suggests that oophorectomy may increase liver tumor risk, while menopausal hormone therapy (MHT) may reduce risk. Thus, we conducted a nested case-control study within the UK Clinical Practice Research Datalink to examine the associations between oophorectomy and liver tumor risk, and whether MHT use modifies the associations. Controls were individually matched to cases of liver cancer (n=712 cases/244 controls), non-alcoholic fatty liver disease (NAFLD; n=7,314 cases/29,254 controls) and alcoholic fatty liver disease (AFLD; n=5,528 cases/2231 controls). Adjusted odds ratios (ORs) and 95% confidence intervals (CIs) were estimated using conditional logistic regression. Effect measure modification by MHT use was examined using likelihood ratio tests and the relative excess risk due to interaction (RERI). Overall, oophorectomy was not associated with an elevated liver cancer risk (OR=1.09, 95% CI: 0.75, 1.62), and no interaction with MHT was found. However, oophorectomy prior to age 50 was associated with a 22% elevated risk (95% CI: 0.77, 1.95) and oophorectomy was associated with a 24% elevated NAFLD risk (95% CI: 1.12, 1.87). Compared to women without MHT use, oophorectomy only and MHT only were each associated with a 50% elevated NAFLD risk. However, the combination of oophorectomy and MHT showed evidence of a negative interaction on the multiplicative (p=0.001) and additive scales (RERI=0.08, 95% CI: -0.69, -0.07, p=0.02). No associations were seen between oophorectomy and AFLD. These findings suggest that oophorectomy may increase risk of NAFLD, but not AFLD. A suggestion of elevated liver cancer risk associated with pre-menopausal oophorectomy, however, warrants further study.


Background. Persistent infection with oncogenic human papillomavirus (HPV) types has a causal role in nearly all cervical cancers and in many vulvar, vaginal, and oropharyngeal cancers. The 9-valent HPV vaccine protects against infection from 7 HPV oncogenic types 16/18/31/33/45/52/58. Purpose: To assess the incidence of HPV-associated and HPV-attributable cancers by race, age, and sex and cancer site. Methods: We analyzed CDC’s National Program of Cancer Registry and NCI’s SEER Program data for 2000-2014. HPV-associated cancers are invasive cancers at anatomic sites (i.e., cervix, vulva, vagina, penis, oropharynx, anus, and rectum) with cell types in which HPV DNA frequently is found. We estimated HPV-attributable cancers by multiplying the number of HPV-associated cancers by the percentage attributable to HPV based on a genotyping study. Age-adjusted rates were calculated. Results: From 2000-2014, 410,386 new HPV-associated cancers (rate of 11.9/100,000) occurred in the U.S. each year; 23,716 among women (rate of 13.5/100,000); and 17,322 among men (rate of 10.1/100,000). Among women, cervical cancer is the most common HPV-associated cancer with 11,670 cases following by cancers of anus (n=4,151), vulva (n=3,082), oropharynx (n=2,297), and vagina (n=333) with rates of 7.2, 2.2, 2.0, 1.7 and 0.4 per 100,000 respectively. Among men, oropharyngeal cancers are the most common with 13,286 cases following by anal (n=2,106) and penile (n=2,140) cancers, with rates of 8.0, 1.3, and 0.8 per 100,000 respectively. We estimated that 32,500 cancers (79%) were attributable to HPV each year. Of these, 30,000 cancers could have been prevented by the 9-valent HPV vaccine, including 26,260 caused by HPV types 16 and 18, and 3,800 caused by HPV types 31/33/35/52/58. Conclusion: Ongoing surveillance of HPV-associated and HPV-attributable cancers using population-based registries is needed to monitor burden, trends, and the impact of HPV vaccination for these potentially preventable cancers.
HELICOBACTER PYLORI TREATMENT EFFECTIVENESS IN DEVELOPING COUNTRIES: A META-ANALYSIS

Susan Thapa, University of Arkansas for Medical Sciences

Background: Helicobacter pylori is a putative risk factor for peptic ulcers and gastric cancer. Current treatment guidelines for H pylori are based on results from developed countries. Hence, these guidelines may not be generalizable to developing countries where the burden of infection is greatest. Therefore, we conducted a network meta-analysis to find sources of heterogeneity in treatment effectiveness and the most effective regimens for developing countries. Methods: We searched Medline, EMBASE, Web of Science, LILACS, the Cochrane library and the African Index Medicus for H pylori trials from developing countries. We conducted network meta-regression analyses to identify potential sources of heterogeneity and the most effective regimens within patients groups responding similarly to treatment. Results: We included 31 regimens from 309 eligible studies and 36 developing countries. Identified sources of heterogeneity included studies conducted in Turkey, treatment duration and antimicrobial resistance. Seven regimens, all of which contained clarithromycin, were used outside of Turkey where clarithromycin resistance was >20%. Eradication observed for these 7 regimens ranged from 58% to 76%. When clarithromycin resistance was ≤20% outside of Turkey, the most effective regimen contained clarithromycin, furazolidone and a proton pump inhibitor (PPI) for 14 days (Risk Difference [RD] = 0.89; 95% CI: 0.79, 0.99). The most effective regimen in areas with high metronidazole resistance contained clarithromycin, amoxicillin and metronidazole for 14 days (RD=0.97; 95% CI: 0.49, 1.00). In areas with low metronidazole resistance, the regimen containing amoxicillin and a PPI followed by metronidazole, levofloxacin and a PPI was most effective (RD=0.93; 95% CI: 0.78, 1.00). Most effective regimens were not included in current treatment guidelines. Discussion: Current treatment guidelines for H pylori eradication differ from what is most effective in developing countries.

PATTERNS OF CHRONIC ILLNESS AMONG BREAST CANCER SURVIVORS AGED 65 AND OLDER

Theodore P. McDade, MD, MPH, Catarina I. Kiefe, PhD, MD, Thomas K. Houston, MD, MPH, University of Massachusetts Medical School

Background: Survivors of breast cancer often have comorbid disease prior to its diagnosis, and may also develop post-treatment sequelae. This population is likely at increased risk for both specific chronic illnesses, as well as higher overall chronic illness burden, however, longitudinal patterns underlying this have not previously been well characterized. Methods: Breast cancer diagnoses from 2000-2013, were identified in SEER-Medicare data, along with a 5% Medicare random non-cancer sample for the same time period. Exclusion criteria were: age <65, death before 2014, male sex, non-adenocarcinoma of breast, non-enrollment in Medicare parts A and B, HMO enrollment 12-months before and 9-months following diagnosis, and diagnosis via autopsy or death certificate. Information from the 27 Medicare chronic condition (CC) flags for 1999 and 2014 (pre- and post- diagnosis and treatment, respectively) were utilized. Student's t-test was performed to compare CCs of breast cancer survivors with the non-cancer group. Logistic regression models were used to control for age and race. Results: N=70,544 (74,921 breast cancers; 95,623 non-cancer). Breast cancer patients started with higher total CC (OR 1.20 (95%CI 1.19-1.21)), were at greater risk of higher total CC 15 years later (OR 2.24 (95%CI 2.20-2.29)), and had the largest increase (Student's t p<0.0001). There are similar patterns of risk for cardiovascular, neuropsychiatric, musculoskeletal, pulmonary, ophthalmic, and endocrine CC subtypes, with cardiovascular CCs predominating (OR 2.85 (95%CI 2.79-2.92)). Conclusions: Breast cancer survivors face substantial future chronic illness burden, impacted by both prior comorbidities and additional subsequent CCs, some related to therapy. Their cardiovascular risk is nearly 3 times that of individuals without a cancer history of the same age. Further research is needed to understand potential long term impacts of strategies targeting chronic illness prevention and/or control.
HAIR CORTISOL AND RISK OF HYPERTENSION
Pra_veen Bajwa* 

Background: Uncertainty about the role of chronic psychosocial stress (CPS) in the development of hypertension is partly due to poor accuracy of CPS measures. Blood, urinary, and salivary cortisol, and catecholamine, are influenced by daily physiological fluctuations. Hair cortisol (HC), an alternative marker, captures systemic cortisol levels over months, and is not highly affected by circadian rhythms and transient events. We assessed whether HC is independently associated with hypertension (systolic/diastolic BP ≥140/90 mmHg or medication). Method: We collected hair samples in 75 consecutive participants in the Survey of the Health of WI, 2015 and measured HC using an ELISA test. Those with HC ≥ median (78.11 pg/mg) were considered exposed. We identified a minimally sufficient adjustment set of variables (MSAS: age, gender, age-by-gender interaction, abdominal obesity, alcohol intake) for estimating the unconfounded effect of HC on hypertension using Pearl's back-door criterion, and included it in our models. We used approximate Bayesian logistic regression via penalized likelihood estimation with data augmentation to quantify this association. We selected a prior OR of 10.4-0.7, consistent with previous knowledge about hypertension risk factors, and obtained 95% CI by bootstrapping. We also compared HC level in hypertensives and normotensives using bootstrapped non-parametric kernel regression. Results: Mean age was 46.9 years, 37.3% were male, and 26.7% were hypertensive. After adjusting for MSAS variables, the prevalence of hypertension increased by 9.5% (95% CI: 1.4, 2.6), (p) increase. A sensitivity analysis with a prior OR of 0.61-3.70 resulted in a 6.3% (95% CI: 1.04, 2.50) increase. MSAS adjusted average HC was 87.3 pg/mg (95% CI: 227, 217.0) higher in hypertensives than in normotensives. Conclusions: HC, as measured through HC, may independently increase the risk of hypertension. However, it should be replicated in larger samples and prospective cohort studies.

THE RELATIONSHIP BETWEEN HYPERTENSION AND BLOOD PRESSURE REACTIVITY IN A POPULATION-BASED SAMPLE OF CENTRAL PA ADOLESCENTS - THE PENN STATE CHILD HOOD (PSCC) Chen Chen* Chen Chen, Jianping Liao, Edward O Bistler, Fan He., (Penn State College of Medicine)

Objective: To determine the relationship between hypertension and gravity-induced blood pressure (BP) reactivity in a population sample of adolescents. Methods: In PSCC study, Systolic and diastolic BP (SBP and DBP) were measured in seated, supine and standing positions. The SBP and DBP reactivity were defined as the difference between supine to standing BP, and analyzed as hyper-, normal-, and hypo-reactivity. Seated BP was measured three times after 5 minutes of resting. The average of the last two minutes was used to define hypertension, as SBP >130 or DBP >80 mmHg. Continuous seated BP was analyzed using analyses of variance (ANOVA) and hypertension status was analyzed using logistic regression. All models were adjusted for age, sex, race, and BMI percentile. Results: The mean age of the participants was 17 years (SD=3.3 years). There were 277 male, and 329 white, out of entire 419 participants. The age, race, sex, and BMI percentile adjusted means of seated SBP (SE) were 115 mmHg (1.6 mmHg), 113 mmHg (0.6 mmHg), and 119 mmHg (1.7 mmHg), respectively in hyper-reactivity, normal-reactivity, and hyper-reactivity groups when using 0th and 90th percentiles of ASBP in respective cutoff points. A similar pattern of "U" shape relationship was observed across three categories of ADDBP. Sensitivity analyses were performed using different cutoff points, and similar patterns of relationships were observed. From the logistic regression models, a similar pattern of a "U" shape relationship between binary defined hypertension and BP hyper- and hypo-reactivity, especially in hyper-reactivity. For example, hyper-reactivity and hyperactivity of SBP were associated with hypertension status, with OR=5.0 and OR=1.8, respectively. Conclusions: These findings suggest that in adolescents, hyper- and hypo-reactivity of BP, especially SBP-reactivity, may predispose these individuals at a higher risk of developing hypertension in later life.

TIME TRENDS IN HYPERTENSION PREVALENCE, AWARENESS, TREATMENT, AND CONTROL IN RURAL BANGLADESH

Prompt diagnosis and treatment of hypertension can prevent morbidity and mortality. However, in Bangladesh, like many developing nations, the burden of hypertension is not well-established, even as rapid demographic and economic changes in the past decade have increased the prevalence of many known risk factors. Although barriers to awareness, treatment, and control of hypertension are present in Bangladesh, the magnitude of these barriers, and their change over time has not been systematically reported. This study was undertaken to collect data about hypertension awareness, treatment, and control in rural Bangladesh using the most recent clinical guidelines, and establish low rates of awareness, treatment, and control that is likely mirrored in other countries undergoing similar economic transitions.

CHOLESTEROL LEVELS AND THE RISK OF HEMORRHAGIC STROKE AMONG WOMEN
Pamela M. Rist*, Pamela M. Rist, Julie F. Buring, (Brigham & Women's Hospital)

Background and purpose: Some studies have suggested that low cholesterol levels, specifically low density lipoprotein cholesterol (LDL-C) levels, may increase risk of hemorrhagic stroke. However, few studies have explored this association in female populations. Methods: We performed a prospective cohort study among 27,937 women enrolled in the Women's Health Study who had measured levels of LDL-C, high density lipoprotein cholesterol (HDL-C) and total cholesterol at baseline. We used Cox proportional hazards models to analyze the association between cholesterol categories and risk of hemorrhagic stroke. Results: During a mean of 11.0 years of follow-up, 148 hemorrhagic stroke events occurred (94 intracerebral hemorrhages and 54 subarachnoid hemorrhages). After multivariable adjustment, compared to those with normal LDL-C levels of 100-129.9 mg/dL, the risk of hemorrhagic stroke was 1.44 times (95% CI: 0.93, 2.15) higher among those with LDL-C level ≤100 mg/dL. A sensitivity analysis suggested that the slightly increased risk of hemorrhagic stroke seen among those with LDL-C level ≤100 mg/dL is driven primarily by those with LDL-C levels ≥100 mg/dL. We observed no association between HDL-C or total cholesterol categories and the risk of hemorrhagic stroke. Conclusions: We did not observe significant associations between LDL-C levels and the risk of hemorrhagic stroke but we could not exclude a potential increased risk of hemorrhagic stroke among those with very low LDL-C levels (<70 mg/dL). Future studies should explore the observation that substantially elevated LDL-C (≥160 mg/dL) may be associated with risk of hemorrhagic stroke.
HIGH-SENSITIVITY CARDIAC TROPONIN T AND NATRIURETIC PEPTIDE AT MIDDLE AGE AND PROGNOSIS AFTER INCIDENT MYOCARDIAL INFARCTION AT LATER LIFE: Yejin Mok* Yejin Mok, Yangying Song, Shoshita H. Ballew, Ron C. Hoogeveen, Christl M. Ballantyne, Wayne Rosamond, Josef Gersh, Elizabeth Selvin, Kunihiro Matushita, (Department of Epidemiology and the Welch Center for Prevention, Epidemiology and Clinical Research, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD, USA)

Background: We have recently demonstrated that traditional risk factors at middle age are associated with prognosis after incident myocardial infarction (MI) at later life. Whether such an association is present for high-sensitivity cardiac TnT (hs-cTnT) and N-terminal pro-B-type natriuretic peptide (NT-proBNP) is unknown. Methods: In the Atherosclerosis Risk in Communities (ARIC) Study, we divided hs-cTnT and NT-proBNP levels at visit 2 (1990-1992) into 5 categories at the same percentiles. hs-cTnT (<3.5, 3.6-8.9, 9-14, 15-24, ≥25 ng/L) and NT-proBNP (<37.8, 37.8-65.8, 65.8-107.2, 107.2-237.3, ≥237.3 µg/L). We evaluated the associations of these cardiac markers with composite and individual outcomes of all-cause death, cardiovascular death, recurrent MI, heart failure, and stroke among 1,092 participants who experienced an MI using baseline through 2013 (11.7 years from baseline on average), using Cox model adjusted for conventional risk factors at incident MI results. During a median follow-up of 3 years, 775 individuals developed the composite outcome after incident MI. Hazard ratio (HR) for composite outcome was: 1.4 (95% CI: 1.06-1.92) for hs-cTnT ≥14 vs <3 ng/L. NT-proBNP generally demonstrated a dose-response relationship, with HR of 1.28 (95% CI: 1.05-1.56) for 37.8-65.8, 1.25 (1.01-1.54) for 65.8-107.2, 1.40 (1.10-1.77) for 107.3-237.7, 1.92 (1.46-2.53) for ≥237.8 µg/L. Both hs-cTnT and NT-proBNP were associated with all-cause and cardiovascular death, and NT-proBNP was additionally associated with heart failure after incident MI. The associations were consistent even after accounting for MI severity score. Conclusions: hs-cTnT and NT-proBNP measured in middle age were associated with prognosis after incident MI later in life, with more robust relations for NT-proBNP. These results further support the importance of cardiac health at middle age and suggest potential usefulness of these cardiac biomarkers for the prognosis following MI.

HEPATITIS B VIRUS INFECTION AND DEVELOPMENT OF CHRONIC KIDNEY DISEASE: A COHORT STUDY Yun Sue Hong* Yun Sue Hong, Shenghua Yi, Yousoo Chung, Miguel Calzudo-Achirica, Zhina Tao, Tariq Shafi, Mariana Lioz) Roberto Pasto-Parrilla, Jihae Cho, Eliezer Guallar, (Johns Hopkins University Bloomberg School of Public Health)

Background and aims: The effect of chronic hepatitis B virus (HBV) infection on the risk of chronic kidney disease (CKD) is controversial. We examined the prospective association between hepatitis B surface antigen (HBsAg) serostatus and incident CKD in a large cohort of men and women. Methods: A cohort study of 299,913 adults free of CKD at baseline who underwent health screening exams between January 2002 and December 2016. Incident CKD was defined as the development of an estimated glomerular filtration rate (eGFR) < 60 ml/min/1.73m2 and proteinuria. Results: In 4,637,701 person-years of follow-up, we observed 13,924 incident cases of CKD (3,225 cases of eGFR < 60 ml/min/1.73m2 and 10,702 cases of proteinuria). In the fully adjusted model comparing positive to negative HBsAg participants adjusting for age, sex, study center, baseline eGFR, smoking status, alcohol intake, level of education, physical activity, body mass index and the presence of hypertension, diabetes, and fatty liver disease, the hazard ratio (HR, 95% confidence interval) for incident CKD was 1.11 (1.03-1.19, P = 0.00). The corresponding HR for incident proteinuria and for eGFR < 60 ml/min/1.73m2 were 1.12 (1.12-1.35, P < 0.0001) and 0.80 (0.73-1.04, P = 0.21), respectively. The associations were similar across categories of liver enzyme levels at baseline. Conclusions: In this large cohort, HBsAg positive serostatus was associated with higher risk of incident CKD, and we provide novel evidence that this association was due to a higher incidence of proteinuria in HBsAg positive participants. Our study adds to the growing body of evidence suggesting that chronic HBV infection may be a contributor to the increasing incidence of CKD.

DECREASED KIDNEY FUNCTION AS A RISK FACTOR FOR HOSPITALIZATION AT OLDER AGE: INCREASED SENSITIVITY WITH SERUM CYSTATIN C. Eugenie Wong* Eugenie Wong, Morgan Graitis, Natalie Dea, Juntichi Inagaki, Casey M. Rebholz, Shoshita H. Ballew, Kunihito Kato, Josef Gersh, (Department of Epidemiology, Johns Hopkins Bloomberg School of Public Health)

Background: Current guidelines stage chronic kidney disease (CKD) by estimated glomerular filtration rate (eGFR) and albuminuria (ACR). Serum creatinine is the standard clinical measure (eGFRcr) with cystatin C recommended as a confirmatory measure (eGFRcys). CKD is common in older age but the magnitude of hospitalization risk across CKD stages is uncertain as is the additional utility of measuring cystatin C. Hypothesis: Functional decline of the kidneys, as indicated by advanced CKD stages based on eGFRcr and eGFRcys, will be associated with increased risk of all-cause hospitalizations. Methods: We evaluated 5,669 participants (mean age, 76 y, 57% female, 57% African-American, 23%) of the Atherosclerosis Risk in Communities study at Visit 5 (2011-2013). eGFR was measured by both serum cystatin C and cystatin C. Incidence rate ratios (IRR) for all-cause hospitalizations were estimated using negative binomial regression. Reclassification to a lower eGFR category by cystatin C was also examined as an additional covariate. Results: 6,714 hospitalizations occurred over 19,788 person-years of follow-up. Prevalence of CKD (eGFR<60) by eGFRcr was 30% and 51% by eGFRcys. After adjustment for demographics, behaviors, and comorbidities, the IRR [95% CI] for hospitalizations by CKD stage were: eGFRcr vs eGFRcys [60-89 ml/min/1.73m2]: 45-59: 1.2 [1.1,1.3], 30-44: 1.4 [1.1,1.6], 25-29: 2.3 [1.7,3.2] and albuminuria [<30 mg/gC] 300+ 1.8 [1.4,2.3]. Stroke, cancer, CHD, and heart failure had IRRs of 1.3, 1.3, 1.5, and 2.0, respectively. eGFRcys classified 41% of individuals to a lower eGFR category and this reclassification was associated with IRR [95% CI] of 1.4 [1.2-1.5]. Conclusion: Risk of hospitalization at older age is related to established measures of CKD including eGFRcys and albuminuria with adjusted incidence rate ratios comparable to other major comorbidities. Risk is 40% higher when severely reduced eGFR is detected by cystatin C versus creatinine.
ASSOCIATION OF OBESITY AND MORTALITY IN INDIVIDUALS WITH CARDIOVASCULAR DISEASE AND WELL-CONTROLLED RISK FACTORS

Usama Bilal* Usama Bilal, Mariana Lazo, Josef Coresh, Melinda Power, (Drexel University)

Whether patients with excess weight and cardiovascular disease should be advised to lose weight remains controversial. Our objective was to evaluate the association of overweight/obesity on 10-year mortality after achieving clinical control of intermediary risk factors (blood pressure, glucose, total cholesterol and inflammation markers) among persons with cardiovascular disease. This study uses data from 1,187 individuals aged 55 or above with self-reported history of cardiovascular disease, no history of smoking or severe weight loss from the National Health and Nutrition Examination Survey from 1988-1994 and 1999-2010. We categorized people into normal weight (BMI 18.5 to 24.9 kg/m²) or overweight/obese (BMI ≥25 kg/m²). Well-controlled risk factors were defined using clinical guidelines, and absent inflammation was defined as an absence of elevated inflammation markers. We estimated total effects and controlled direct effects using a Cox Proportional Hazards model. Compared with normal weight, overweight/obesity was associated with a 46% increase in the hazard of mortality (HR = 1.46, 95% CI: 0.99 to 2.15) after adjusting for age, sex and race. After controlling for glucose, blood pressure, LDL-cholesterol, and inflammation, overweight/obesity was associated with a 26% increase in the hazard of mortality (HR = 1.26, 95% CI 0.84 to 1.89). This attenuation was stronger when considering obese (BMI ≥30 kg/m²) people separately, where the increased hazard of mortality relative to those of normal weight was reduced from 37% to 6% after controlling for all risk factors. Well-controlled glucose, blood pressure, LDL-cholesterol and inflammation attenuate, but do not fully eliminate the association between overweight/obesity and mortality. Clinical interventions to control intermediary risk factors remain a useful approach to secondary cardiovascular prevention, while additional efforts to improve weight loss among patients with CVD seem to remain justified.

ASSOCIATION BETWEEN MYOCARDIAL INFARCTION AND COGNITIVE DECLINE AMONG US ADULTS: A CROSS-SECTIONAL STUDY USING NATIONALLY REPRESENTATIVE DATA

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Association between myocardial infarction and cognitive decline has not been fully elucidated. And, to the best of our knowledge, this association has not been studied yet in a large community sample of US adults. Therefore, the objective of the current study is to study the association between myocardial infarction and cognitive decline in US adults. Cross-sectional data from the 2015-2016 Behavioral Risk Factor Surveillance System (BRFSS) were used for this study (n = 207,696). Myocardial Infarction (MI), the primary exposure of interest, was binary (Yes/No). Cognitive decline (Yes/No) was determined based on the response to the following question: "During the past 12 months, have you experienced confusion or memory loss that is happening more often or is getting worse?". Weighted prevalence estimates of MI and cognitive decline along with corresponding 95% confidence interval (CI) were computed. Logistic regression was used to examine the association between MI and cognitive decline after adjusting for all potential confounders. Statistical analysis accounted for complex sampling design of the BRFSS. The prevalence of MI and cognitive decline among US adults was 6.1% (95% CI: 5.9 - 6.3) and 10.0% (95% CI: 9.7 - 10.4) correspondingly. The prevalence of cognitive decline was significantly higher in adults with an MI event compared to those who did not have an MI event: 19.5% (95% CI: 17.8 - 21.2) vs. 9.4% (95% CI: 9.1 - 9.7). After adjusting for all potential confounders, adults who reported having an MI event were at a significantly higher likelihood to report cognitive decline compared to those who did not report having an MI event: 1.30 (95% CI: 1.15 -1.47). Findings from the current study suggests that cognitive decline is an adverse consequence in patients with MI. Healthcare professionals should screen MI patients for cognitive decline. Targeted interventions should be integrated into disease management to mitigate cognitive decline.

S/P indicates work done while a student/postdoc
HAS THE SKYROCKETING COST OF INSULIN AFFECTED GLYCEMIC CONTROL IN THE US? Mitra Mosslemi* Mitra Mosslemi, , (Epidemiology Department, School of Medicine, University of California Irvine)

Background: Major randomized control trials conducted during the 1990s demonstrated the central role of managing A1C levels in diabetic care. Previous studies have shown a significant improvement in A1C among US adults between 2001-2004. On the other hand, insulin price has been increasing steadily since 1999, and the rate of increase has intensified since 2009. The potential effect of the intensified rise in insulin price on the glycemic control among patients with diabetes in the US has not been studied. Methods: Data from the National Health and Nutrition Examination Survey (NHANES) 2009-2014 and yearly insulin price data from Truven Health Analytics were used to investigate the association between the trends in increasing cost of insulin and the national glycemic control in the US adults (aged ≥18 years) with diagnosed diabetes. First, we performed a Cochran-Armitage test trend analysis on the insulin price and the number of patients with A1C ≥ 8 (poor control) from 2009 to 2014. Next, we used multivariable regression analyses to test which of the demographic, diabetes-related and/or insulin price contributes to the A1C variation in the period of 2009-2014, controlling for other factors. Results: Using NHANES data, we demonstrated that the mean A1C level among individual with diagnosed diabetes inclined from 7.33 in 2003-2004 to 7.44 (7.36-7.52, p<0.05) in the period of 2009-2014. The Cochran-Armitage test demonstrated the expected increasing trend in the proportion of poorly controlled A1C among diabetes patients with the increasing cost of insulin (2% to 28%, p<0.01). In the final model (F=7.17, p<0.0001), the family income to poverty (F=3.83, p<0.05) and its interaction with insulin price (F=5.22, p<0.05) were the only statistically significant contributors to the A1C variations (p<0.05). Conclusions: This study suggests that glycemic control is worsened in recent years among US adults with diabetes and the deterioration is associated with the increasing price of insulin.

SIP indicates work done while a student/postdoc

THE EFFECT OF A COMMUNITY HEALTH WORKER IN A CLINIC SETTING FOR DIABETES MANAGEMENT Chad M. Coleman* Chad M. Coleman, David Wittenberg, Annalisa Nair, Andrew Bossick, Linda Hopkins-Johnson, Genevi Wegenthal (Henry Ford Health System)

Background: Diabetes control can be more challenging in low-income communities. Methods: A community health worker (CHW) with the purpose of efficiently using clinical resources and coaching to manage diabetic patients to glycemic control, was added to a clinical care team in an internal medicine clinic in downtown Detroit (K15). The CHW was also tasked with additional responsibilities that involved general well-checks of the participants, such as solving barriers to health (e.g., accessing food resources). This program's effectiveness was evaluated by reviewing the rates which participants obtained A1C measures and achieved A1C level <7.0%. Eligible participants were those whose primary care physician was based in K15, age 18-75 years, and who were new users of long acting basal insulin or already on insulin with elevated blood sugar. Clinical results were compared to those of a similar population of diabetic patients at a nearby Henry Ford Health System primary care clinic (Harberton) without a CHW. Results: 137 patients enrolled (52.6% female, 93.3% African-American, 58.9% Medicare/Medicaid Dual eligible) The average age was 55.0 years (SD=10.5) and average BMI was 34.4 kg/m2. 127 (92.7%) had an A1C measure in the year before enrollment and 79 of the 127 (62.2%) had an A1C measure in the six months after enrollment. The overall A1C within participants decreased after enrollment (mean: 11.4% to 9.5%). Among individuals with both a pre-and post-enrollment A1C measures, 40 (52.6%) had a decrease ≥1% and 16 (21.1%) had A1C drop <8%. Compared to Harberton patients, CHW program participants had a larger drop in mean A1C and started with higher mean A1C measures (11.1% vs. 10.0%). Conclusions: Among the 76 individuals with a pre- and post-enrollment A1C, there was an average decrease of 1.57%. Multivariate analyses are ongoing.

A PROSPECTIVE AND LONGITUDINAL STUDY OF PLASMA PHOSPHOLIPID N-3 AND N-6 POLYUNSATURATED FATTY ACIDS IN RELATION TO RISK OF GESTATIONAL DIABETES Yeyi Zhu* Yeyi Zhu, Mengying Li, Shriki Rawal, Stefanie N. Hinkle, Jing Wu, Jagteshwar Grewal, Huixia Yang, Michael Y. Tsai, Assiamira Ferrara, Cuilin Zhang (Kaiser Permanente Northern California Division of Research)

Objective: Despite recommendations on dietary intakes of polyunsaturated fatty acids (PUFAs) for cardiometabolic health, data on n-3 and n-6 PUFAs in relation to diabetes risk remain debated. Further, data are lacking in pregnant women. We prospectively investigated individual plasma phospholipid n-3 and n-6 PUFAs throughout pregnancy in relation to risk of gestational diabetes (GDM). Methods: Within the NICHD Fetal Growth Studies-Singleton Cohort of 2,802 pregnancies, 107 GDM cases were ascertained by medical record review and matched to 214 non-GDM cases by gestational age at diagnosis and maternal age. Participants (n=321) provided a blood sample at each of 8 visits spanning early to mid-pregnancy for measurement of plasma phospholipid PUFAs. Results: Overall, n-3 PUFAs decreased slightly and n-6 PUFAs did not change appreciably across gestation. Among n-3 PUFAs, docosahexaenoic acid (22:6n3) at GW 10-14 was significantly and inversely associated with subsequent risk of GDM (aOR=0.69, 95% CI 0.48, 0.98; P=0.03). Among n-6 PUFAs, gamma-linolenic acid (18:3n6) and dihomo-gamma-linolenic acid (20:3n6) at GW 10-14 were positively associated with risk of GDM (aOR=1.25, 95% CI 1.12, 1.38; P=0.001). Further, per standard deviation increase in PUFAs n-6/n-3 ratio at GW 15-26 was related to a 1.64-fold (1.12, 2.46) increased risk of GDM. Conclusions: Our novel findings highlight the potentially important differential roles of individual n-3 and n-6 PUFAs and the PUFAs n-6/n-3 ratio during early to mid-pregnancy for GDM development. Our findings may underlie distinct nutritional, metabolic, or physiological processes and inform potential prevention strategies.
ACUTE PESTICIDE POISONING IN NORTH WEST MOROCCO: THE EPIDEMIOLOGICAL EVIDENCE
Soumaia Hmimou* Hinde Hami, Soumia Hmimou, (Laboratory of Genetics and Biometry, Faculty of Science, Ibn Tofail University, Kenitra, Morocco)

Background: Acute pesticide poisoning is a major preventable public health problem, especially in developing countries. The aim of this study is to describe the epidemiological characteristics of acute poisoning with pesticide in the region of Tanger-Tetouan in North West Morocco. Methods: This is a descriptive retrospective study of acute pesticide poisoning cases, recorded between 2014 and 2015 in the regional hospitals. Results: During the period of study, there were 246 cases of acute pesticide poisoning aged 1 to 65 years. Of these, 10.9% were children under the age of 15 years. The average age of the patients was 23 ± 10.1 years. More than two-thirds of the cases (72.6%) were females with a female:male ratio of 2.6. Nearly 98% of reported cases resulted from oral exposure, 1.2% from dermal exposure and only 0.8% from inhalation. According to recorded data, pesticides were used as a means of suicide in 18% of cases. The risk was mainly observed in children under the age of 15 years. The average age of the patients was 23 ± 10.1 years. In the region of Casablanca-Meknes and Tanger-Tetouan, acute poisoning with pesticide is a more common problem. 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.

RESIDENTIAL GREEN SPACE AS A PREDICTOR OF 30-DAY READMISSION AND 30-DAY MORTALITY FOLLOWING ACUTE MYOCARDIAL INFARCTION
Stephanie Williams* Stephanie Williams, Murray Mittleman, Peter James, Chih-Du Wu, Elissa Wilker, (Boston University)

Background: Many hospitals have implemented interventions focused on improving quality of care to reduce readmission after discharge following acute myocardial infarction (MI), but studies suggest that these approaches are not always effective. Residential proximity to green space is associated with numerous health benefits, including lower incidence of chronic illnesses and mortality. Therefore, we addressed the relationship between residential green space and 30-day readmissions and mortality within 30 days. Methods: Patients discharged from Beth Israel Deaconess Medical Center in Boston following a first diagnosis of Acute MI (ICD 9 Code 410.xx) from 2009-2014 were included. We determined 30-day readmission from medical records and 30-day mortality from the Social Security Death Index. Addresses were linked to Normalized Difference Vegetation Index (NDVI) data averaged for the month of July from 2000-2014 as an indicator of residential green space. Logistic regression models were adjusted for clinical demographic and socioeconomic factors. Results: Of the 2,490 participants (63% men, mean age: 70 ± 14 years), 143 (6%) were readmitted within 30 days of discharge, and 53 (3%) died within 30 days of discharge. In our multivariable adjusted logistic regression models, compared to living in the highest quartile of NDVI, living in the lowest quartile was associated with higher rate of re-admission within 30 days (OR: 1.17, 95% CI: 0.59-2.31) and 1.79 times higher odds of mortality with in 30 days (95%CI: 0.59, 5.43) but confidence intervals were wide. Conclusions: No clear pattern of association was observed for associations between NDVI and readmission or mortality. However, elevated point estimates were observed for both outcomes. Both readmission and mortality were low in this population and our estimates had wide confidence intervals. Our findings suggest a role for additional work examining how neighborhood-level characteristics influence post-discharge prognosis.
BISphenol-A (BPA) is an endocrine-disrupting chemical that has been linked to obesity and hypothesized to increase breast cancer risk. Prior studies report accumulation of BPA in peripheral adipose tissue, yet whether BPA accumulates in breast adipose tissue is unknown. In this pilot study, we sought to determine if BPA accumulates in breast adipose tissue and to compare BPA concentrations between breast cancer cases and controls. We recruited 36 breast cancer patients undergoing mastectomy and 14 healthy women undergoing reduction mammoplasty at Baystate Medical Center, Springfield, MA. Samples of breast adipose tissue were collected and BPA concentration was determined using HPLC-ESI-SIMS/MS, with a limit of quantitation (LOQ) of 0.38 ng/g. We assessed variation in BPA concentrations within and between breasts among both cases and controls. Mean BPA concentration was similar between cases and controls (0.39 vs 0.41 ng/g, p=0.74). Among cases with a tissue specimen from each breast (n=40), the mean BPA concentration was border line significantly higher in the affected versus non-affected breast (0.45 vs 0.30 ng/g, p=0.10). We report, for the first time, that BPA accumulates at low frequency and concentration in breast adipose tissue, however, such accumulation may not differentiate breast cancer cases and controls. High variability within- and between-breasts suggests a heterogeneous distribution of BPA in breast adipose tissue and thus the need for multiple specimens to accurately classify exposure in future studies.


Drinking water concentrations from community water systems (CWS) have been used to estimate county-level exposure to contaminants, such as arsenic. Many studies neglect to account for how exposure may differ within counties based on population served (PS) by a CWS. Accounting for PS by CWS provides a more direct estimate of individual exposure to a contaminant from drinking water. To explore the influence of PS by CWS, three county-level arsenic exposure measures were constructed: unadjusted for PS for all; controlled for PS (as a covariate) and accounted for PS (concentration multiplied by proportion of PS by county population). CWS arsenic concentrations, obtained from Fort northeast states (MA, ME, NH, RI) for 2000-2009, were aggregated to county-level and linked to county-level bladder cancer incidence for 2010-2014 from National Cancer Institute State Cancer Profiles. Poisson regression models estimated incidence rate ratios (IRR) and 95% CI for associations between bladder cancer and four arsenic exposure categories (50 ppb), adjusting for potential confounders. For unadjusted arsenic concentrations, the IRRs were 1.65 (95% CI: 1.26, 2.16), 1.02 (95% CI: 0.79, 1.33) and 1.81 (95% CI: 1.38, 2.36) for categories 2, 3, and 4, respectively. For unadjusted arsenic concentrations controlled by PS, the IRRs were 1.24 (95% CI: 0.93, 1.64), 0.72 (95% CI: 0.54, 0.96) and 1.41 (95% CI: 1.06, 1.86) for categories 2, 3, and 4, respectively. After accounting for PS, the IRRs were 0.62 (95% CI: 0.49, 0.90), 1.15 (95% CI: 1.02, 1.30) and 1.16 (95% CI: 1.02, 1.32) for categories 2, 3, and 4, respectively. Using different methods with respect to PS by CWS in measured drinking water arsenic concentrations resulted in positive but varied associations to bladder cancer. Thus, it is important to account for PS when developing drinking water exposure measures. This abstract does not reflect EPA policy.
USING RESIDENTIAL PROXIMITY TO WIND TURBINES AS AN ALTERNATIVE EXPOSURE MEASURE TO INVESTIGATE THE ASSOCIATION BETWEEN WIND TURBINES AND HUMAN HEALTH

Rebecca Barry* Rebecca Barry, Sandra I Sulsky, Nancy Kreiger, (University of Toronto)

The Community Noise and Health Study was developed by Statistics Canada to investigate the association between residential proximity to wind turbines and health-related outcomes using modeled wind turbine noise as a main exposure, and examining health-related outcomes using both self-report and objective measures. This analysis aimed to examine an alternative primary wind turbine exposure, residential proximity to wind turbines. This analysis followed the same methods used by Statistics Canada. Results suggest that living further away from wind turbines is associated with increased environment domain quality of life scores (β = 1.23 (SE = 0.145), p = 0.0046). There was also a positive association between living further away from wind turbines and the scores for the physical health quality of life domain (β = 1.26 (SE = 0.20), p = 0.04). Our findings indicate that residential proximity to wind turbines is correlated with annoyance (OR = 0.39, 95% CI = 0.07, 0.53, p = 0.001). This suggests that the odds of reporting being annoyed by a turbine are reduced for each kilometer a person lives further away from a wind turbine. These associations differ in some respects from associations with noise measurements. Results can be used to support discussions between communities and wind-turbine developers regarding potential health effects of wind turbines.

HAZARDOUS AIR TOXICS AND BREAST DENSITY

Alexandra White* Alexandra J. White, Choice R. Weinberg, Ellen S. O'Meara, Brian L. Sprague, Dale P. Sandler, (National Institute of Environmental Health)

Mammographic density is strongly related to breast cancer risk. Identifying associations between environmental exposures and breast density may lead to better understanding of environmental risk factors for breast cancer. Toxic metals and polycyclic aromatic hydrocarbons (PAHs) may influence breast density via their ability to induce oxidative stress and act as endocrine disruptors. We evaluated airborne metals and PAHs in relation to breast density using data from the Breast Cancer Surveillance Consortium, a geographically diverse registry of women in the US who have undergone mammograms. Study participants included 313,493 women who had mammograms in 2011. Residential levels of airborne PAHs and toxic metals (arsenic, cadmium, chromium, cobalt, lead, nickel, mercury and selenium) were assessed using the 2011 EPA National Air Toxics Assessment database. Airborne toxins were estimated at the zip-code level for study participants' 2011 residences. Adjusted multivariable logistic regression was used to estimate odds ratios (OR) and 95% confidence intervals (CI) for associations between airborne air toxics and breast density, as determined by BI-RADS score. 47% of the women were classified as having dense breasts (BI-RADS 3 or 4). Living in an area with higher levels of arsenic, cadmium, chromium, cobalt, lead, manganese, nickel, or PAHs was associated with a higher BI-RADS score. Women who lived in areas with arsenic, lead and cobalt levels above the median had a 2.5-fold higher odds of BI-RADS 4 relative to BI-RADS 1 (arsenic OR = 2.89, 95% CI = 2.26-3.51; lead OR = 2.93, 95% CI = 2.79-3.08; cobalt OR = 2.47, 95% CI = 2.34-2.60). Little to no association with breast density was observed for cadmium, mercury or selenium levels. In this first study to evaluate the association between airborne toxics and breast density, we observed that women in areas of higher airborne metals and PAHs had higher odds of having dense breasts, a marker of enhanced breast cancer risk.

MORTALITY IMPACTS OF THE JULY 21, 2012, FLOOD IN BEIJING, CHINA

Meilin Yan* Meilin Yan, Tiantian Li, G. Brooke Anderson, (Colorado State University)

On July 21, 2012, Beijing, China suffered its heaviest rainfall in 61 years. The average rainfall was 170 mm across Beijing and reached 460 mm in the Fangshan District. In Beijing, floods have resulted in a total of 92 deaths, 1,635 people injured, and 704 people missing. Finally, we calculated excess death attributable to this flood based on the estimated RRs. Mortality risks were substantially increased during the flood period (July 21-22, 2012) compared with other days from two days before to two days after the most severe flood day. During a five-day window from two days before to two days after the most severe flood day, the estimated death toll attributable to the flood was 141 excess, demonstrating that the flood had a significant impact on public health. This study provides valuable insights into the health impacts of severe floods and can help policy makers in future flood risk assessments.

INVESTIGATING THE ASSOCIATION BETWEEN CHANGE IN WALKABILITY AND CHANGE IN BODY MASS INDEX FROM CHILDHOOD TO ADOLESCENCE: FINDINGS FROM THE NEIGHBORHOOD QUALITY COHORT STUDY


Objective: To estimate the relationship between change in pedestrian-related features in residential neighborhoods observed between 2008 and 2006, and change in body mass index. Methods: QUALITY is an ongoing cohort study of 630 Quebec youth with a history of parental obesity. Baseline data were collected 2008 when children were aged 8-10 years, and a follow-up was completed in 2016 (mean age at follow-up 16.9 years). At both time points, anthropometrics were measured by a trained nurse, and neighborhood audits were conducted around each participant's residence. BMI was based on CDC age- and sex-specific growth curves. Results: We observed a significant association between the change in walkability and change in body mass index (α = 0.05-0.65). Conclusion: These findings suggest that changes in walkability over time are associated with changes in body mass index from childhood to adolescence.
NO CROSS-SECTIONAL ASSOCIATION BETWEEN ARSENIC EXPOSURE AND SERUM PROSTATE-SPECIFIC ANTIGEN LEVELS IN U.S. MEN OVER 40 YEARS OLD: 2003-2010 NHANES Madhi Saranadasa*, Madhi Saranadasa, Catherine Bulka, Maria Argos, (University of Illinois at Chicago)

Background: Inorganic arsenic is a lung, bladder, and skin carcinogen that contaminates drinking water globally. Recent ecologic studies conducted in Illinois and Iowa have reported that counties with higher average arsenic concentrations in public drinking water had elevated prostate cancer incidence. However, individual-level data regarding inorganic arsenic exposure and prostate cancer are lacking.

Objective: We evaluated the cross-sectional relationship between inorganic arsenic exposure, as measured in urine, and serum total prostate-specific antigen levels among American men, aged 40-85 years, using data from the 2003-2010 National Health and Nutrition Examination Survey (NHANES). Methods: Participants were excluded based on use of finasteride, history of prostate cancer and recent prostate gland inflammation, prostate biopsy or rectal exam. We estimated exposure to inorganic arsenic by subtracting urinary arsenobetaine (a form of non-toxic organic arsenic derived mainly from seafood intake) from urinary total arsenic. Values below the detection limit were imputed as the limit of detection divided by the square-root of 2. Both serum PSA levels and the estimated urinary inorganic arsenic concentrations were log-transformed to improve normality. Survey-weighted linear regression models were used to assess the cross-sectional association between serum PSA levels and inorganic arsenic exposure, adjusted for age, ethnicity, smoking status, BMI, hypertension, diabetes and urinary creatinine. Results: In our sample, the median PSA level was 1.00 ng/mL (IQR: 0.60, 1.86). Higher serum PSA levels were associated with older age, African-American ethnicity, lower BMI and non-diabetic status in our adjusted linear models. However, a null association was observed between serum PSA levels and estimated urinary inorganic arsenic (percent change in PSA per 2-fold increase in urinary inorganic arsenic: 0.96, 95% CI: -3.34, 5.48). Results were not appreciably different when estimated urinary inorganic arsenic was

ANIMALS AND INFLAMMATORY BOWEL DISEASE: AN INTERNATIONAL PERSPECTIVE Faraz Mahmood Ayyaz, (Services Hospital Lahore)

Background: Inflammatory bowel diseases (IBD) have a pathogenesis that may correlate to changes in the gut microflora, environmental factors and genetic predisposition. Associations with animals in the environment are debated upon in IBD. Previous studies have not compared the associations in areas with prevalent pet ownership versus countries where pet ownership is an emerging trend.

Methods: The Migrant IBD Microbiome Analysis Study (MIMAS) aimed to conduct a large-scale study on the inflammatory bowel disease environment. 1660 participants were recruited in the United States, India and China from self-reporting participants on ResearchMatch. Cases were matched to friends or family controls. Participants completed a questionnaire online or with a health professional. The data was stored and accessed on RedCap. Results: 70.4% of IBD cases had lived with pets during childhood compared with 61.6% of controls (p= 0.000428). This trend was not consistent across the countries; USA and China had a higher number of reported cases than India (USA 63.0% vs 36.9%; India 50% vs 50%; China 60% vs 64%). Pet ownership during adulthood mirrored the childhood pet exposure in all countries. Dogs were the most common pets overall and farm animals were more frequently reported among cases from India than USA or China (USA 63.0% vs 64.9%; India 50% vs 50%; China 60% vs 64%). More pet-owners reported a diagnosis of Crohn's disease rather than ulcerative colitis (CD=58.5% vs UC=48.6%). More asthmatics with IBD reported as having lived with animals compared to cases which had never lived with animals. Conclusion: IBD cases were more likely than controls to have lived with animals during childhood and adulthood. Participants reporting association with farm animals developed ulcerative colitis more frequently than Crohn's disease. Infectious transmission from pets may be a possible trigger in IBD development.
IMPACT OF ORAL COLLECTION METHOD ON THE ORAL MICROBIOTA Emily Vogtmann* Emily Vogtmann, Xing Hua, Leon Zhou, Yunhui Wan, Shahlib Samain, Bin Zhu, Casey Dagnew, Amy Hutchinson, Kristine Jones, Belynda Hicks, Rashmi Sinha, Jianxin Shi, Christian C. Abnet, (National Cancer Institute)

Background: Replication of findings from studies of the human microbiota and health outcomes has been difficult which may be related to the use of variable collection methods for microbial profiling. Therefore, we compared oral microbial characteristics of four oral collection methods. Methods: Forty individuals provided oral samples using the OMNigene ORAL kit every two months over 10 months. At the second, fourth, fifth, and sixth visits, an additional sample was collected using Saccomanno fixative, Scope mouthwash, or a non-ethanol mouthwash. DNA was extracted using the QIAamp DNA kit, the V4 region of the 16S rRNA gene was amplified and sequenced using the MiSeq, and data were processed using DADA2. The average alpha diversity measures were compared with the OMNigene ORAL sample collected at the same timepoint using a paired t-test. A distance-based coefficient of determination for the beta diversity metrics was calculated to evaluate the percentage of variability explained by subject sample collection method and visit. Results: The OMNigene ORAL samples tended to have slightly higher alpha diversity compared to the Scope mouthwash, non-ethanol mouthwash, and the saliva in Saccomanno. For observed species, the OMNigene ORAL samples had an average of 126.4 (standard deviation [SD] 31.9) compared to 120.2 (SD 31.2) for Scope mouthwash samples (p=0.005). Most of the variability in the beta diversity measures was explained by between subject differences, with a smaller amount of variability explained by collection method, and very little variability explained by the visit. Conclusions: The collection method appeared to modify the oral microbial characteristics of the sample, however the greatest variability in the oral microbiota was explained by between subject differences and not oral collection method. This data suggests that future studies should use one common collection method for all individuals in order to make all comparisons within the same collection method.

GxE STUDY OF CHILDHOOD STRESS AND GENETIC RISK VARIANTS IN MULTIPLE SCLEROSIS CASES AND CONTROLS Mary Horton* Mary Horton, Lisa Bancellos, Catherine Schaefer, (University of California, Berkeley)

Multiple sclerosis (MS) etiology involves substantial genetic and environmental components; however, most MS risk remains unexplained. Evidence suggests interactions between genetic variants and environmental triggers explain some of the risk and complexity of MS. Childhood stress has been implicated in early-life origins of adult disease and, because stress has mechanistic underpinnings related to inflammation and immunity, childhood stress may play a role in MS etiology. Prior studies have reported an association between childhood stress and MS risk; however, none have tested whether an individual's genetic make-up interacts with stress in childhood to modify MS risk. The objective of our study was to test for interaction between MS- or stress-related genetic risk variants and exposure to childhood stressful life events and susceptibility to MS. We included ~1,500 MS cases and ~2,000 non-MS controls from the Kaiser Permanente Northern California MS Research Program. Occurrence of 10 stressful life events during two time periods (≤10 years and 11-20 years of age) were retrospectively measured using a modified version of the Life Event Record. Genotyping was performed using saliva or blood DNA samples. We included established MS risk variants including those in the major histocompatibility complex (MHC) and ~200 non-MHC variants. Additionally, we included variants within ~30 candidate stress-related genes involved in hypothalamus-pituitary-adrenal axis regulation. To assess gene-environment interaction and risk of MS, we used logistic regression with product terms of childhood stressful life events and genetic variants associated with MS or stress. We adjusted for genetic ancestry principal components and used the Benjamin-Hochberg procedure to control the false discovery rate resulting from multiple testing. Initial results from the analysis will be presented and analytic methods and issues will be discussed.

HALUCINATIONS AMONG PATIENTS WITH PARKINSON’S DISEASE ARE ASSOCIATED WITH A HIGHER MORTALITY Cynthia Kusters* Cynthia Kusters, Jeff Bronstein, Baite Ritz, (University of California, Los Angeles)

Objective: To examine the association between hallucinations and mortality among patients with Parkinson’s disease (PD). Background: Although the diagnosis of PD is established based on motor symptoms, non-motor symptoms, such as hallucinations, are very common. The prevalence of hallucinations increases with disease duration and a prevalence as high as 60% has been described in previous studies. We analyzed whether patients with hallucinations have an increased mortality compared to PD patients without this debilitating symptom. Methods: A population-based cohort study (Parkinson’s Environment and Gene study) of 246 incident PD patients were followed. The presence of hallucinations was assessed with the Unified Parkinson’s Disease Rating Scale (UPDRS). During their first follow-up visit and the levodopa-equivalent dose of PD medication. Results: Hallucinations were present in 9% of the patients during the first follow-up visit. The median follow-up for PD patients was 1.3 years from the baseline visit (range 0.4 - 10.4 years). The crude Hazard Ratio (HR) was 2.26 (95%CI 1.33-3.83). Adjustment for disease severity did not change the hazard ratio significantly. The adjusted HR was 2.19 (95%CI 1.23-3.80). Conclusions: PD patients with hallucinations have an increased mortality even after adjusting for disease severity. Our study provides support that non-motor symptoms, such as hallucinations, have a large impact on disease progression.
INCREASED EDUCATION REDUCES ALL-CAUSE MORTALITY IN BANGLADESH FOR WOMEN BUT NOT MEN: A PARADOX. Gene R. Peloza, Gene R. Peloza, Yu Chen, Vernon M. Chinielli, Maria Argo, Lin Tong, Faustino Purvez, Turqul Islam, Alhodin Ahmed, Rubli Hanin, Alfred I. Neugut, G.R. Bart, Habibul Ahsan, Mailman School of Public Health (Epidemiology) & Dept. of Medicine (Section of Pulmonary/Critical Care, Harlem Hospital/Columbia Univ., New York, N.Y.)

Background: It is generally believed that those with more education have a reduced long-term mortality. This concept has been poorly studied in undeveloped countries. The purpose of this investigation was to assess educational level in an undeveloped country to see if education matters. Methods: A population-based sample of 11,744 Bangladeshis aged 18 to 75 was recruited from the Health Effects of Aries Longitudinal Study (HEALS) and followed for 13-14 years. The outcome, all-cause mortality, was evaluated in those with varying educational levels from zero to up to 16 years. The median education of 2 years was dichotomized into education < 2 years and 2 years of education). The data was then analyzed by gender. In females, the crude and separation between groups with a higher mortality in those with reduced education; this occurred for both the total population and gender-specific populations, (p < 0.001). The concept of increased education results in decreased mortality over time in developed countries, in developing countries like Bangladesh this may only be true for women. Clearly for men in Bangladesh, increased education does not result in an all-cause mortality reduction.

LONGITUDINAL CHANGES IN VIRAL LOAD SUPPRESSION AMONG ADOLESCENTS LIVING WITH HIV IN URBAN PERU Carly A Rodriguez, Lenka Kocianova, Michael Monzo, Ailin Ramos, Molly F Franks, (Department of Global Health and Social Medicine, Harvard Medical School, Boston, MA)

AIDS-related deaths among adolescents have increased in the last decade despite decreases in other age groups. Studies suggest viral load (VL) suppression suffers in adolescence but little data exists from Latin America. Among adolescents on combined antiretroviral therapy (cART) in Peru, we examined how VL suppression rates changed from childhood to adolescence. We conducted a retrospective chart review of all adolescents ages 10-18 on cART and receiving care at the Instituto Nacional de Salud del Niño in Lima, Peru, a few HIV prevalence testing with low mortality among those on cART. VLs throughout infancy to adolescence were abstracted from charts. Analytes were restricted to VLs taken ≥26 months after cART initiation. We modeled the association between age and VL suppression with restricted cubic splines and an autoregressive structure to account for multiple VLs per person. We graphed the probability of VL suppression by age and tested for a relationship between age and VL suppression using the likelihood ratio test. Of 132 adolescents, we analyzed 116 (87.9%) with a known cART initiation date and 26 months of cART. The median age was 14.8 (IQR 4-4) and the mean age of cART initiation was 6.3 (±R 5.2). A total of 1553 VL measures (median 13 per adolescent) were available over a median follow-up period of 8.0 years (±R 5.1). We observed a statistically significant (p < 0.001) relationship between age and VL suppression. Suppression rates increased steadily from infancy to early adolescence, reaching a maximum rate of 82.7% (95% CI 77.1-87.1) at age 13.2 years and declining thereafter to 66.7% (95% CI 54.5-84.1) by age 18. This is the first report from Latin America to examine longitudinal changes in VL suppression into adolescence. Consistent with other settings, decreases in VL suppression occurred in adolescence. Though this is a survival cohort of adolescents alive and on cART, this likely explains the observed decline in VL suppression.
MATERNAL PERCEPTIONS OF CHILD DEVELOPMENT IN RURAL MADAGASCAR


BACKGROUND: Maternal perceptions have been demonstrated to be associated with early child development (ECD) outcomes. However, few studies examine a mother's perception of her child's development after the neonatal period and no studies have examined maternal perceptions of child development in a very low-income context such as rural Madagascar. METHODS: Using data from a cluster-randomized controlled trial, we compared maternally perceived and objectively-derived child development. Maternally perceived ECD was measured using a ladder ranking based on the MacArthur subjective social status scale. Objective ECD was measured using the Ages and Stages Questionnaire: Inventory, a caregiver-reported and observation-based score, which was age-standardized. We took the difference between perceived and objective ECD and created three categories: underestimation (less than -2), approximately correct (between -1 and 1), and overestimation (greater than 2). RESULTS: Over half of mothers inaccurately described their children's development; 4% underestimated and 48% overestimated. The relationship between maternally perceived and objectively derived ECD was modest (Kendall's tau-b=0.18, p<0.01). A multinomial logistic regression adjusting for child, maternal, and household covariates revealed that mothers were more likely to overestimate their child's development if the child was older (RRR: 1.03, 95% CI 1.01-1.04) and had a higher weight-for-age z-score (RRR: 1.13, 95% CI 1.01-1.27). Compared to the lowest wealth quintile, mothers in the highest quintile were more likely to overestimate their child's development (RRR: 1.32, 95% CI 1.00-1.75).

CONCLUSIONS: In this rural sample of Malagasy women, maternal perceptions of child development do not align with objective measures, with many women overestimating their child's development. Future work in this field could inform behavioral interventions to improve development outcomes in this population.
GEORGIC VARIATION IN RACIAL DISPARITIES IN THE TREATMENT OF EARLY STAGE HEPATOCELLULAR CARCINOMA IN THE UNITED STATES, 2005 - 2014 Katherine Ross* Katherine Ross, Joel Widd, (Emory University)

Background: Procedural management (PM), including interventional radiology and surgery, confers dramatically improved survival for patients with localized hepatocellular carcinoma (HCC). Black patients are least likely to be treated with PM. We assessed geographic differences in racial disparities in receipt of PM for localized HCC. Methods: Data from 18 cancer registries representing 12 states is available from the Surveillance, Epidemiology and End Results (SEER) program. Inclusion criteria were patients treated at white and black hospitals (defined by the SEER staging system) between 2005 and 2014. PM was defined as local tumor destruction, resection, liver biopsy, or transplantation. Risk ratios were calculated with confidence intervals comparing receipt of PM among black patients to white patients were calculated for each state. Reasons given for not receiving PM were also compared. Results: The proportion of patients receiving PM for localized HCC ranged from 28.6% in New Mexico to 56.8% in Hawaii; 36.0% of white patients received PM compared to 32.3% of black patients. Black patients were significantly less likely than white patients to receive PM in Louisiana, Kentucky, Michigan, New Jersey, and Georgia. There were no differences by race in reason for not receiving PM except for patient death (6.9% of black vs. 5.1% of white patients). Discussion: Racial disparities in the receipt of PM, often the optimal treatment strategy for localized HCC, vary by state. All registries in the southern US had significant racial disparities in receipt of PM. One limitation is the lack of data on ethnicity, as previous studies have shown that Hispanics are less likely to receive PM than non-Hispanics. There are substantial racial disparities in survival from HCC, which may be partially attributable to differences in clinical care and treatment decisions. Further research is needed to identify reasons for the under-utilization of PM among black patients with localized HCC in the South.

SYPHILIS OUTBREAK IN HAMILTON COUNTY, OHIO 2009-2013 DISPROPORTIONATELY AFFECTS BLACK/AFRICAN AMERICAN WOMEN OF REPRODUCTIVE AGE Katherine Bowers* Katherine Bowers, David Carlson, Craig Davidson, Akeem Johnston, (Cincinnati Children's Hospital Medical Center)

Sypheles during pregnancy presents risks to the mother and infant including increased risk for fetal loss, stillbirth, birth defects, and low birth weight. Since 2000, there has been a steady increase in the incidence of both primary and secondary syphilis in the United States. Mirroring this national epidemic, a recent increase in syphilis prevalence has been observed in Hamilton County, Ohio, which includes the city of Cincinnati. The objective of this analysis was to describe the syphilis epidemic among an urban population of women between 2009 and 2013. We determined whether certain risk behaviors influence frequent among women who have syphilis who become pregnant compared with women who do not become pregnant. A passive syphilis surveillance system collected reports of infection ascertainment by clinical laboratory results. Regional emergency department provided syphilis testing for all new patients presenting with STI symptoms. The health department conducted case interviews to collect demographic data, lab results, disease classification, and risk characteristics. To compare women with syphilis to all women in Hamilton County, data for females in Hamilton County was obtained from the United States Census Bureau. Two comparisons were made: 1) women with syphilis in women of Hamilton County 2) women who were pregnant to non-pregnant women of reproductive age. Differences were identified using t-tests and chi-square tests for continuous and categorical variables, respectively. Among 774 cases, a racial disparity was observed with greater than 85% of syphilis cases among women of reproductive age were black or African American women, while only 26% of the population is black or African American. Pregnant women were more often engaging in heterosexual sex with fewer partners and with anonymous partners compared with non-pregnant women. Prevention efforts could emphasize testing of high-risk individuals prior to pregnancy to prevent congenital cases and risks to infants.

ASSESSING SOCIAL DETERMINANTS OF HEALTH SEEKING BEHAVIOR FOR DELIVERY AMONG PREGNANT WOMEN IN MALAWI: A LATENT CLASS ANALYSIS Rachel Yorks* Rachel Yorks, Kate Iveson, Sarina Bosco, Brian Coates, Justin McEwen, Hattie Travers, Hannah H. Leslie, Mark G. Shrime, (Boston Children's Hospital)

Background: In the era of the Sustainable Development Goals, reducing maternal and neonatal mortality is a priority (SDG 3.1 and 3.2). With one of the highest maternal mortality rates in the world, Malawi provides a significant opportunity for improvement. One effort to improve maternal outcomes involves increasing access to high-quality health facilities for delivery. This study aimed to determine the role that quality plays in women's choice of facility for delivery. Methods: A revealed-preference latent class analysis was performed with data from 6,625 facility births among women in Malawi from 2013 to 2014, utilizing data from the 2014 Malawi Millennium Development Goal Endline Survey and the Malawi Service Provision Assessment. Results: Two classes of preferences exist for pregnant women in Malawi. Most of the population (66.9%, 95% CI: 59.1-74.7%) prefer closer facilities and facilities that do not charge fees. The remaining third of the population (33.1%, 95% CI: 25.3-40.9%) prefers hospital care, facilities with higher basic obstetric readiness scores (a measure of structural capacity), and positions that are further away from their homes. Women in this class are statistically significantly more likely to be in the top wealth quintile and primitively than the majority of the women. Conclusion: For only one-third of pregnant Malawian women, primarily those who are primipartous and wealthy, the structural capacity of a facility is metric of quality, factored into their choice of facility for delivery. Most women instead prioritize closer and more access. Interventions designed to increase access to high-quality care in Malawi will need to take distance and fees into account, as structural capacity alone is not predictive of facility type selection in this population. Funding: BHL & Melinda Gates Foundation OPP1161450

S/P indicates work done while a student/postdoc.
RACIAL DIFFERENCES IN THE ASSOCIATION BETWEEN SOCIOECONOMIC STATUS AND BIOLOGICAL AGE IN THE CORONARY ARTERY RISK DEVELOPMENT IN YOUNG ADULTS (CARDIA) STUDY. Sarah Forrester*, Sarah Forrester, David Jacobs, Rachel Zmora, Pamela Schreiner, Veronique Roger, (University of Massachusetts Medical School)

Background. Socioeconomic status (SES) and inequality have been linked to physical health differences between Blacks and Whites. We examined the association between SES in adulthood and biological age (BA), a marker that represents the chronological age (CA) at which most "normal" persons share a physical state. Generally, younger biological age is considered a marker of better health. Method: CARDIA participants (549 Black and 853 White), were followed from age 32-47 in 2005-06 for 15 years through 2015-16. BA was defined by the 2006 Klinean and Doubl method (KDM) as equal to CA plus a random variable, RBA, that minimizes the distance between m regression lines and m biomarker points within an m dimensional space of all biomarkers. Biomarkers were selected based on knowledge of their association with aging, availability, and significance associated with CA: total and HDL cholesterol, glucose, waist-to-hip ratio, C-reactive protein, forced expiratory volume in 1 second, and mean arterial pressure. SES was a composite score based on the individual's availability of basic needs and medical care, income, assets, home ownership, and education where a higher SES value indicated better SES. We used linear regression to measure the association between SES and BA at age 31 and 46, testing for interactions and then stratifying by race. All models controlled for sex and CA. Results: SES score was significantly lower in Blacks compared to Whites (p<0.001). Overall, the association between adult SES score and BA differed by race, p-value for interaction = 0.042: a 1-point increment in adult SES score was associated with a 0.51 year (95% CI: -0.09 - 0.11) decrease in BA among Blacks and a 0.065 year (95% CI: 0.31 - 0.18) decrease in BA among Whites. Conclusion: Although Blacks generally have lower SES, our results suggest that higher SES may be associated with younger biological age among Blacks.

THE HEALTH EFFECTS AND INEQUALITIES OF THE DEATH OF FAMILY MEMBERS IN YOUNG ADULTS Naomi Thyen*, Naomi Thyen, Nicole Schmidt, Theresa Oysip, (University of Minnesota)

The death of a parent or sibling in early life is a stressful event that causes a significant disruption in one's life. Because people of color die earlier than white individuals, young people of color may be more likely to experience the death of a close family member. However, little research has investigated whether the experience of nuclear family death varies by race, or affects health. We examine how a nuclear family death is associated with health in a nationally representative prospective cohort begun in adolescence. We used data from the National Longitudinal Survey of Youth 1997 with respondents ages 18-22 from the 2002 survey (n=7383). Respondents reported if a sibling parent or spouse had died (in nuclear family death) in the past 5 years. The outcomes were the Mental Health Inventory (ranging from 5 (poor) to 20 (good)), obesity (BMI≥30), self-reported health (poor, fair, good, very good, excellent, modeled linearly), and alcohol use (# drinks per day). We estimated the effect of family death using regression adjusted for baseline self-reported health, household income, parent education, urban/rural census region, race/ethnicity, and sex. White respondents were less likely to have nuclear family death in the past 5 years (3.4%) than those who were Hispanic (4.4%), Black (6.9%), Asian or Pacific Islander (7.3%), or African American (9.8%) (race/ethnicity p-value<0.001). As hypothesized, experiencing a family death was significantly associated with worse mental health (β(SE)=-.72(15), 95%CI:-1.02,-.42), higher obesity odds (OR: 1.3, 95%CI:1.02-1.72), and worse general health (β(SE)=-.01(5), 95%CI:0.13.02), but it was not associated with alcohol use (β(SE)=0.20(29), 95%CI:-0.75,0.35). Because young people of color are more likely to experience the death of a close relative and because nuclear family deaths are associated with worse health, this exposure may play a role in perpetuating health disparities by race.

A BAYESIAN SPATIO-TEMPORAL ANALYSIS ON RACIAL DISPARITIES IN HYPERTENSIVE DISORDERS OF PREGNANCY IN FLORIDA, 2005-2014 Hai Hu*, Ha Xiao, Hong Xiao, (Department of Epidemiology, University of Florida)

Disparities in hypertensive disorders of pregnancy (HDP) exist among racial and ethnic groups in the US. However, little is known about spatio-temporal variations in HDP disparities between African American women and non-African American women. To fill this gap, we used the geocoded Florida Vital Statistics Birth Records to investigate spatio-temporal variations in HDP disparities from 2005 to 2014. A Bayesian hierarchical regression approach was used, with all models fit using the Integrated Nested Laplace Approximation (INLA). Specifically, a spatio-temporally varying coefficient model of the disparity between African American and non-African American women was used. County-level variation was first examined, followed by census tract-level variation assessment in counties where high HDP disparities were observed. Our results suggest that a spatio-temporal heterogeneity model best accounts for the observed HDP disparities, after controlling for age, education, pregnancy smoking, and pre-pregnancy body mass index (BMI). A significant disadvantage in HDP was revealed for African American women in Florida overall (Relative Risk or RR: 1.27, 95% credible interval for 95% CI: 1.25, 1.29), and significant spatial variations in this disparity have been observed. The greatest HDP disparities between African American and non-African American women occurred in North Central Florida counties (the Big Bend region of Florida), with consistent patterns from 2005 to 2014. Analyzes at census tract-level further identified areas with significantly high HDP disparities within these counties. Findings from this study provide important information for public health agencies and policymakers to reduce HDP disparities at the population level.
SOCIAL GRADIENTS IN PSYCHOLOGICAL DISTRESS: EVIDENCE FROM THE 2014-16 HEALTHY CHICAGO SURVEYS Fernando De Maio* Fernando De Maio, Emily Laflamme, Phillip Held, Raj C. Shah, Britney Langemaai, Jana Hirschtick, Nik Prachand, David Ansell, (DePaul University)

Objectives: Chicago’s public health plan targets psychological distress among residents in high hardship communities. Our study documents the social patterning of distress across the city, identifying social gradients and how they may vary by race/ethnicity. Methods: Secondary analysis of the 2014-16 Healthy Chicago Surveys (N = 7,649). Psychological distress was measured with the Kessler Psychological Distress Scale (K6). Household income was used to operationalize the social gradient. Using a logistic regression model adjusted for race/ethnicity, gender and age, we examined the social patterning of distress. Stratified models were used to examine if the income gradient varied by race/ethnicity. Results: In total, 15.4% of adults screened for some degree of distress. This reflects an estimated 321,048 adults in Chicago (95% CI = 295,831 to 346,265). The prevalence of serious psychological distress was higher in Non-Hispanic Black and Hispanic respondents (6.2% and 5.0%) than among non-Hispanic White respondents (3.5%; χ² = 20.04, p < 0.001). Compared to respondents with the highest income, low income respondents were most likely to have at least mild psychological distress (OR = 3.39, 95% CI = 2.84 - 4.79), followed by those in the middle income group (OR = 2.23, 95% CI = 1.67 - 2.98). Stratified analyses suggest that the gradient may be steepest for non-Hispanic Whites. Conclusion: In Chicago, the burden of psychological distress is heavily patterned by a social gradient. Recognizing the heterogeneity that exist within city-level data, future research should explore community-level factors that may influence the steepness of the social gradient in psychological distress.


Researchers and policy makers have dedicated considerable attention to the social context as a determinant of health and health disparities. For example, studying residential neighborhoods, researchers estimate the impact of neighborhood walkability on racial disparities in obesity; in the workplace, studies may estimate the effect of fringe benefits on gender disparities in depression. To estimate valid causal effects from these exposures, studies must satisfy assumptions of: exchangeability (i.e., comparability between treatment groups), positivity (i.e., positive probability of assignment to each exposure level), no interference, and no unrepresented versions of treatment. However, when examining group differences, issues of positivity may become significant in situations of high neighborhood or occupational segregation. By definition, segregation implies a non-overlapping distribution of contextual characteristics, often leading to substantively unequal exposure opportunities for groups. When identified, researchers can address near positivity violations by either restricting the study sample to only subjects for whom the positivity assumption is not violated, redefining the effect of interest to apply to only those treatments that do not violate positivity, or excluding those covariates that violated the positivity assumption. Importantly, these approaches can cause significant bias when inferences are based on groups comparisons with limited overlapping exposure levels, or they may substantively change the interpretation and the external validity of study estimates. The present analysis illustrates the consequences of structural positivity violations in studying contextual determinants of health disparities through two examples: neighborhood segregation by race, using data from the National Survey of American Life, and occupational segregation by gender, using data from the National Longitudinal Survey of Youth.
ENHANCING HEALTH-EQUITY DISSEMINATION STRATEGIES WITHIN A POLICY RESEARCH CENTER IN THE SOUTHEAST UNITED STATES
Frances Dean* Frances Dean, Jammie M Hopkins, DrPH, MS, Divine Offoegbu, DrPH, MPH, (The University of Georgia)

Background – Health equity work has been framed by disseminating innovative products on a local and national level. Many organizations have been creating projects around health equity, but have been struggling to make the information understandable to audiences not involved with health policy. Objective(s) – The objective of this project is to inform the direction of an evolving comprehensive knowledge translation and dissemination plan for the Transdisciplinary Collaborative Center (TCC). In achieving this, the content of two innovative TCC dissemination platforms were critically assessed and enhanced: 1) Health Equity (HE) Vision Board and 2) Collaborative Partnership Map. Method(s) – A brief interview guide was refined, and informal interviews were conducted with faculty, staff and students at Morehouse School of Medicine to gather their attitudes, perceptions, and current health equity-related work. The interview data were added to the existing HE Vision Board database, compiled into a multimedia database (n=58), and a thematic content analysis was conducted. A map of TCC collaborative partners (n=133) was updated by members of the TCC research and project staff, and several map enhancements were applied to the map on the Google Map platform. Result(s) – Results for the Vision Board showed that healthcare was a growing issue and access to adequate resources are prominent to achieving health equity with the power of education. Results for the map showed most collaborators to be academic (26.3%) and CBO (16.5%) organizations. Conclusion(s) – Comprehensive frameworks are greatly encouraged for dissemination and promotion of health equity within various settings (i.e., workplace, communities). Key Word(s) – health equity, dissemination project, research centers, dissemination products, health disparities.

S/P indicates work done while a student/postdoc

HYDROXYUREA USE AND INITIATION AMONG CHILDREN WITH SICKLE CELL ANEMIA
Sarah Reeves* Sarah Reeves, Kevin Dombkowski, (University of Michigan, Child Health Evaluation and Research Center)

Background: Hydroxyurea (HU) reduces the incidence and severity of pain crises among children with sickle cell anemia (SCA) and is recommended by the National Heart Lung and Blood Institute. Objective Describe HU use and initiation among children with SCA. Methods: The study population consisted of children ages 1-18 with SCA enrolled in Medicaid for ≥1 year (2005-2012) in Florida, Louisiana, Michigan, South Carolina, or Texas. Children with SCA were identified using a validated method of ≥3 SCA-related administrative claims within a year. HU use was defined as claims for >30 days of filled prescriptions within a year and summarized by year and state. HU initiation was explored among a subset of SCA cases enrolled in Medicaid for 2 consecutive years. Initiation was defined as no HU use in the index year, followed by HU use in the subsequent year, children with no HU use either year were the comparison group. Health services utilization was summarized; subsequently, logistic regression assessed the association between HU initiation and number of outpatient, inpatient, and emergency department (ED) visits in the index year, adjusted for age. Results: A total of 7963 children contributed 22,424 person-years; average age was 8 years and 48% were female. HU use increased over time from 9% to 18% and varied by state. Among those with HU use (n=4967 person-years), mean number of days filled was 167 (SD=113). The subset enrolled for two years included 3,965 children (50%); 885 (22%) initiated HU and 3080 (88%) had no HU use in either year. On average, these children had 2.0 inpatient admissions, 3.6 ED visits, and 21.0 outpatient visits. Each additional inpatient admission was associated with higher odds of HU initiation (OR=1.10, 95%CI:1.05,1.15), as well as each additional ED visit (OR=1.06, 95%CI:1.04,1.09). Conclusion: HU use was uncommon among children with SCA. Strategies targeting the numerous healthcare encounters may be appropriate to increase its initiation.
THE ASSOCIATION BETWEEN SUBSTANCE USE AND NUMBER OF SEXUAL PARTNERS AMONG MEN WHO HAVE SEX WITH MEN IN ATLANTA, GA

Background: High-risk sexual behavior is a strong risk factor for contracting HIV and other STIs. Among men who have sex with men (MSM), these risk factors include condomless anal intercourse and increased number of sexual partners. Moreover, the use of alcohol and non-injection substances may interfere with the ability to make safe choices regarding sexual behavior. Since non-injection use is prevalent in this population, a better understanding of the relationship between substance use and high-risk sexual behavior among MSM is important for public health programming. Methods: The Intervention and Longitudinal study prospectively followed black and white MSM in Atlanta, GA for two years at six-month intervals between 2011-2014. Using self-reported longitudinal data from this cohort, we fit regression models to estimate the association between substance use in the past six months and higher number of reported sexual partners, accounting for covariates. We selected a Poisson marginal model with a compound symmetric error matrix, and considered confounders included age, student status, education level, sexual orientation (gay or bisexual), race, sign of alcoholism, and income. Results: Among 903 participants, men who used non-injection drugs in the last six months had 129 times the odds (95% CI: 1.15, 1.44) the number of sexual partners in the same time interval compared to those who did not use drugs after controlling for age, signs of alcoholism, and sexual orientation. Conclusion: Non-injection drug use in the past six months was associated with an increase in the number of sexual partners among MSM. Non-alcohol substance use as a risk factor for high-risk sexual behavior has tended to receive less attention compared with alcohol use as risk factors, and results from this study may represent an important consideration when designing public health interventions and policies targeted at decreasing the risk of STIs and HIV among this population.

TRANSPORTATION BARRIERS DECREASE HIV VIRAL LOAD SUPPRESSION AMONG WOMEN LIVING WITH HIV


Initiating and maintaining HIV care is an essential component of healthy living for people living with HIV (PLWH). One barrier to care is transportation, qualitative work among PLWH, HIV case workers and care providers consistently identified transportation difficulty as a contributor to missed visits, particularly in rural and Southern populations. Among PLWH (N=386) from the Women’s Interagency HIV Study we associated travel difficulty with transportation appointments on two clinical outcomes: HIV viral load suppression (<150 copies/mL) and blood pressure control (systolic <135 and diastolic <85). Transportation difficulty (endorsing the following statement not having transportation to get to or from a regular HIV care visit) was assessed yearly from 2004, and correlated with clinical outcomes was assessed six months later (the next study visit). Generalized estimating equations adjusted for age, race, ethnicity, income, marital status, health insurance, AIDS Drug Assistance Program use, drug use, alcohol consumption, and depression were used to account for repeated measurements over time. We used multiple imputation to account for missing data. Absence of transportation difficulty was associated with better HIV viral load suppression (IRR 1.42, 95% CI: 1.15, 1.77) and non-significantly associated with blood pressure control (IRR 0.82, 95% CI: 0.66, 1.03). Comparing women with transportation difficulty to those without, more missed HIV appointments in the last 6 months (32% versus 11%, p<0.001) and similar proportions attended any healthcare visit in the last 6 months (89% versus 95%, p=0.11). These results suggest that transportation difficulties contribute to missed visits and lack of HIV viral load suppression among women living with HIV. Non-emergency medical transportation assistance is available through public programs (e.g., Medicaid); however, a more robust transportation support system is needed to provide full access to HIV care to PLWH.

DEVELOPMENT AND EVALUATION OF A HUMAN PAPILLOMAVIRUS (HPV) VACCINE COMIC BOOK FOR COLLEGE STUDENTS IN NORTHEAST OHIO: AN APPLICATION OF INTEGRATED BEHAVIOR MODEL (IBM)

Olihnuuji Genevieve Agboluji, Olihnuuji Genevieve Agboluji, Lynette Phillips, Tara Smith, Vinay Cheolu, Laurie Wagner, (College of Public Health, Kent State University, Kent, Ohio)

Human papillomavirus (HPV) causes cancers and the most common venereal diseases in both sexes in the United States (US). Young adults are mostly affected. HPV vaccine was approved in the US in 2006. They are safe and effective and recommended for all young females aged 11-26 years, and men aged 21-26 years. However, coverage is low compared to other vaccines for young adults, implying missed vaccination chances, and a need to improve HPV vaccination promotion strategies. Comics are potentially effective for health education of diverse groups, because they are easily accessible and decreasing HPV sexual behavior. Since non-injection use is associated with better HIV viral load suppression (<150 copies/mL) and blood pressure control (systolic <135 and diastolic <85). Transportation difficulty (endorsing the following statement not having transportation to get to or from a regular HIV care visit) was assessed yearly from 2004, and correlated with clinical outcomes was assessed six months later (the next study visit). Generalized estimating equations adjusted for age, race, ethnicity, income, marital status, health insurance, AIDS Drug Assistance Program use, drug use, alcohol consumption, and depression were used to account for repeated measurements over time. We used multiple imputation to account for missing data. Absence of transportation difficulty was associated with better HIV viral load suppression (IRR 1.42, 95% CI: 1.15, 1.77) and non-significantly associated with blood pressure control (IRR 0.82, 95% CI: 0.66, 1.03). Comparing women with transportation difficulty to those without, more missed HIV appointments in the last 6 months (32% versus 11%, p<0.001) and similar proportions attended any healthcare visit in the last 6 months (89% versus 95%, p=0.11). These results suggest that transportation difficulties contribute to missed visits and lack of HIV viral load suppression among women living with HIV. Non-emergency medical transportation assistance is available through public programs (e.g., Medicaid); however, a more robust transportation support system is needed to provide full access to HIV care to PLWH.

YOUTH IN THE CONTINUUM OF HIV CARE IN FLORIDA, 2014-2015

Merhawi T Gebregzi, Merhawi T Gebregzi, Dita M Sheehan, Daniel E Mauck, Kristopher P Fennie, Emma C Spencer, Lorene M Maddox, Mary J Trepta, (Florida International University)

Background: Youth aged 13-24, have poor outcomes throughout the HIV continuum of care. Using routinely collected HIV surveillance data, we aimed to determine individual (age, year and facility of diagnosis, sex, race/ethnicity, mode of transmission and AIDS status in 2015) and neighborhood (socioeconomic status, rural-urban status, and non-Hispanic Black density) predictors of non-linkage, non-retention, and non-viral suppression among youth living with HIV in Florida. Methods: We used Poisson regression modeling with robust error variance estimation to calculate prevalence ratios of interest. Linkage to care was defined as documentation of an HIV laboratory test within three months of HIV diagnosis for those diagnosed with HIV during 2014 or 2015 (N=13,761). For those diagnosed 1993-2014 (N=2,872), retention in care was defined as having two or more care index (lab, medical visits, prescriptions), at least three months apart in 2015, and viral suppression (V5) was defined as having a viral load <100 copies/mL during 2015. Results: Among youth living with HIV in Florida, 73.7% were linked, 65.4% were retained, and 48.8% were virally suppressed. After adjusting for all covariates, non-Hispanic Blacks compared to non-Hispanic Whites had higher prevalence for non-linkage, non-retention, and non-viral suppression. For non-linkage to care, those diagnosed at blood banks and HIV screening facilities (compared to outpatient care), and those with a history of injection drug use (compared to heterosexual) had higher prevalence. For non-retention, age group 18-24 years-old had higher prevalence. Age group 21-24, and those living in high Non-Hispanic Black density neighborhoods had higher prevalence of non-viral suppression. Conclusion: Less than half of youth living with HIV were virally suppressed, particularly non-Hispanic Black youth. Disparities in care and treatment for youth appear to be present across both individual and neighborhood characteristics.

DEVELOPMENT AND EVALUATION OF A HUMAN PAPILLOMAVIRUS (HPV) VACCINE COMIC BOOK FOR COLLEGE STUDENTS IN NORTHEAST OHIO: AN APPLICATION OF INTEGRATED BEHAVIOR MODEL (IBM)

Olihnuuji Genevieve Agboluji, Olihnuuji Genevieve Agboluji, Lynette Phillips, Tara Smith, Vinay Cheolu, Laurie Wagner, (College of Public Health, Kent State University, Kent, Ohio)

Human papillomavirus (HPV) causes cancers and the most common venereal diseases in both sexes in the United States (US). Young adults are mostly affected. HPV vaccine was approved in the US in 2006. They are safe and effective, and coverage is low compared to other vaccines for young adults, implying missed vaccination chances, and a need to improve HPV vaccination promotion strategies. Comics are potentially effective for health education of diverse groups, because they are easily accessible and decreasing HPV sexual behavior. Since non-injection use is associated with better HIV viral load suppression (<150 copies/mL) and blood pressure control (systolic <135 and diastolic <85). Transportation difficulty (endorsing the following statement not having transportation to get to or from a regular HIV care visit) was assessed yearly from 2004, and correlated with clinical outcomes was assessed six months later (the next study visit). Generalized estimating equations adjusted for age, race, ethnicity, income, marital status, health insurance, AIDS Drug Assistance Program use, drug use, alcohol consumption, and depression were used to account for repeated measurements over time. We used multiple imputation to account for missing data. Absence of transportation difficulty was associated with better HIV viral load suppression (IRR 1.42, 95% CI: 1.15, 1.77) and non-significantly associated with blood pressure control (IRR 0.82, 95% CI: 0.66, 1.03). Comparing women with transportation difficulty to those without, more missed HIV appointments in the last 6 months (32% versus 11%, p<0.001) and similar proportions attended any healthcare visit in the last 6 months (89% versus 95%, p=0.11). These results suggest that transportation difficulties contribute to missed visits and lack of HIV viral load suppression among women living with HIV. Non-emergency medical transportation assistance is available through public programs (e.g., Medicaid); however, a more robust transportation support system is needed to provide full access to HIV care to PLWH.
THE ASSOCIATION BETWEEN HEAVY ALCOHOL USE AND DECREASED VIROLOGIC SUPPRESSION IN PERSONS WITH HIV DEPENDS ON CONCURRENT SYMPTOMS OF DEPRESSION Anthony Todd Fojo Anthony Todd Fojo, Catherine Lesko, Keri Calkins, Richard Moore, Mary E. McCaul, Heidi E. Hutto, William C. Matthews, Heidi Crane, Katrina Christopher-Pauls, Karen Croogey, Michael J. Maguess, Kenneth Meyer, Brian W. Pence, Brian Lau, Greenfield Chander. (John Hopkins University School of Medicine)

Background: Depression and substance misuse negatively impact HIV care outcomes. Few studies have examined the ways in which depression and specific substances interact to affect HIV care outcomes. We analyzed a cohort of 14,780 patients with HIV (PWID) in care across seven US sites which collected patient-reported measures of depression and substance use. We used logistic regression with generalized estimating equations to identify how symptoms of depression interact with use of alcohol, cocaine, opioids, and amphetamines on three continuum of care outcomes: retention in care, receipt of ART, and consistent virologic suppression over the subsequent year. We conducted a secondary analysis that stratified symptoms of depression according to whether subjects were concurrently taking an antidepressant. Results: Heavy alcohol use interacted with depressive symptoms among subjects with no-mild symptoms of depression, heavy alcohol use had no association with virologic suppression (OR 1.00 [0.95-1.05]), but among those with moderate-severe symptoms, heavy alcohol use was associated with reduced viral suppression (OR 0.80 [0.74-0.87]). This interaction persisted only in subjects not on antidepressants. There were no significant interactions between depression and substance use with respect to retention in care or receipt of ART. Conclusions: Depression and heavy alcohol use interact to lower the odds of achieving consistent virologic suppression. This highlights the need for multifaceted interventions that target alcohol use and depression simultaneously, and reinforces the importance of diagnosing and treating depression in PWID, especially in the setting of alcohol misuse.

PROVIDER AND PATIENT CHARACTERISTICS ASSOCIATED WITH HIGH VIRAL SUPPRESSION AMONG HRSA RYAN WHITE HIV/AIDS PROGRAM OUTPATIENT AMBULATORY HEALTH SERVICE PATIENTS Pamela Klein, Pamela Klein, Allison Mair, Marinda Fanning, Stacy Cohen, Laura Cheever, (HHS/HRSA)

The Health Resources and Services Administration's Ryan White HIV/AIDS Program (RWHA) is a comprehensive system of HIV medical care, medications, and essential support services for low-income people living with HIV (PLWH) in the US. The proportion of RWHA outpatient ambulatory health service (OAH+S) patients whose population achieved 90% viral suppression (VS) was quantified, and provider and patient characteristics associated with high VS were identified. RWHA provider characteristics (region, provider type, rural location, number of patients), patient demographics (gender, age, health care coverage), and VS were examined using patient and provider data from the RWHA Services Report 2010-2015. VS was defined as the most recent viral load (VL) test result <200 copies/mL among patients with 2+ visits during the calendar year and ≥2VL test. Mean VS by provider (Provider-aggregated VS) was calculated. Multivariate, multinomial logistic regression was conducted to determine patient and provider characteristics associated with provider-aggregated VS in 2015, resulting in marginal effects (ME) and 95% confidence intervals (CI). In 2015, 72% OAH+S providers served 346,085 patients; 33% were white non-Hispanic. Among patients with 2+ visits during the calendar year and at least 2 VL test, mean VS by provider was 12.57. The proportion of providers with 90% VS increased from 4.0% in 2010 to 17.7% in 2015. Providers with higher proportions of youth aged 13-24 (ME: 2.94%, 95% CI: 1.92-4.95), uninsured patients (ME: 0.23%, 95% CI: -0.01 to 0.47) were less likely to have high provider-aggregated VS. Providers in the South were less likely to have high provider-aggregated VS than other providers (ME: 1.5%, 95% CI: 0.02-2.9%). In 2015, 12,755 of RWHA providers had high provider-aggregated VS. Patient characteristics were more strongly associated with provider-aggregated VS than provider characteristics. The successful identification of characteristics associated with high VS may help in the development and implementation of interventions and tools to improve VS.

ESTIMATING THE PREVALENCE OF HIV AMONG LIVER TRANSPLANT CANDIDATES IN THE UNITED STATES Ashton Shaffer Ashton Shaffer, Alvin G. Thomas, Allan B. Minisly, Sally Gustafson, Jon Snyder, Brittany Shettle, Rhianston Reed, Byrne E. Locke, Jani McAdams-Marco, Barry L. Segel, (John Hopkins University)

End-stage liver disease is a leading cause of morbidity and mortality for HIV individuals. Since 2002, the annual number of HIV+ liver transplant recipients in the US has increased from 8 to 50. However, HIV-status is not collected in the national transplant registry for candidates on the waitlist, limiting our ability to characterize or study health disparities in this unique population. To address this knowledge gap, we created a novel linkage between the national transplant registry and pharmaceutical claims data from a national technology and analytics company (QuintilesIMS). We used prescription fills of HIV-specific medications to identify HIV+ candidates listed from 2002 to 2012. We compared demographic and health characteristics of HIV+ (vs. HIV-) candidates using rank-sum and chi-squared tests. Comparing our linked study population to the registry source population, we explored the level and pattern(s) of misclassification. We then estimated the prevalence of HIV in the US using multiple imputation by chained equations (MICE), assuming the data were missing-at-random. In our study period, the linkage (n=72,974 candidates) comprised 8% of the national registry population, with an HIV prevalence of 0.80% (95% CI: 0.76-0.84%). Compared to HIV- candidates, HIV+ candidates were more likely to be younger (median [IQR]: 51 [46-55] vs. 59 [49-60]), black (19.1 vs. 8.1%), male (82.3 vs. 64.6%), have liver disease due to hepatitis C (51.5 vs. 31.4%), and have public insurance (47.7 vs. 37.1%), and were less likely to be obese (18.5 vs. 40%) (p<0.001 for all). By MICE, the overall prevalence of HIV among US liver transplant candidates was 0.88% (95% CI: 0.81%-0.94%). In conclusion, HIV+ liver transplant candidates represent a sizeable, understudied population. Estimating the prevalence of HIV in this population is the first, critical step toward understanding how HIV-status might impact a candidate's survival and access to liver transplantation.

HOT SPOTS OF ADOLESCENT ED-DIAGNOSED STIS, WASHINGTON DC Monelly Hart* Monelly Hart, Gia Badalato, (CHSU-PSU School of Public Health)

Background: A goal of Healthy People 2020 is to increase access to quality services to prevent sexually transmitted infections and their complications. Adolescents are disproportionately affected by sexually transmitted infections (STIs) and frequently seek care for sexual health in the emergency department (ED) setting. Objective: (1) To describe the spatial distribution of adolescents with ED-diagnosed STIs in a large urban area; (2) to compare census tract groups and identify STI positivity “hot spots”; and (3) to determine the presence of STI testing sites in STI positivity “hot spots.” Design/Method: Retrospective cross-sectional medical record review of all ED visits to the two pediatric EDs in Washington, DC made by District residents age 13–19 years old in 2016. We abstracted patient and visit level factors. We calculated Chisquare test statistic (CI) and Kosinski's goodness-of-fit (GC) positivity rates using census data by census tracts. We performed Moran I and Hot Spot Analysis (Getis-Ord Gi) to determine if positivity rates were clustered where testing sites were not. Results: In ArcMap 10.4 and SAS 9.3, 9,016 patients were tested for CT or GC in pediatric EDs and 194 (17.2%) tested positive for either CT or GC. The mean age of patients who tested positive was 15.0 (±1.3) years and the majority of patients were black (n=180, 97.8%) female (n=129, 71.7%) and publicly insured (n=164, 84.5%). STI positivity rates clustered by census tract (Moran’s I: 0.152, Z=7.007, p<0.001) with Ward 6 having the highest STI positivity rate (21.5%). Hot spots of STI positivity were located in Ward 6 and partially in Ward 7. Five STI testing sites are located within the STI positivity hot spots. Conclusion(s): Geospatial techniques identified hot spots of ED-diagnosed STIs. Within the hot spots, multiple alternative testing sites exist. Future research should investigate factors associated with adolescent ED utilization compared to office-based visits.
IMPACT OF A CHANGE IN SEPSIS DEFINITION ON INTENSIVE CARE EPIDEMIOLOGY AND COST: COMPARISON OF SEPSIS-2 AND SEPSIS-3 DEFINITIONS  
Felix K. Chang\textsuperscript{a} Felix K. Chang, Matthew D. Stanley, Timothy G. Buchman, Shantam Nemati, Gari D. Clifford, Allan D. Kirk, Eric A. Elster, (Uniformed Services University of the Health Sciences and the Walter Reed National Military Medical Center)  

Background. Sepsis is a serious medical condition of high concern. To better recognize and diagnose it, clinicians adopted a new definition for sepsis in 2016. Since it was the third time the condition was meaningfully defined, it is referred to as Sepsis-3. Early studies showed similar outcomes to its predecessor, Sepsis-2. Unfortunately, it also rendered all the epidemiological and cost studies of sepsis, which were done prior to the definition change, incompatible with those that will be done in the future. This study seeks to create a translation mechanism between the two sets of sepsis studies and, thus, preserve the relevance and value of an entire generation of epidemiological studies. Methods. We conducted a three-year retrospective case review of 33,771 patient stays in Emory University Hospital’s intensive care units (ICU) to identify how many patients would have been diagnosed with sepsis under the definition criteria for Sepsis-2 and Sepsis-3. We then assessed the difference between the average treatment costs for sepsis under its two definitions using data gathered from a literature review and the AHRQ’s Healthcare Cost and Utilization Project. Results. We determined that of the total number of ICU patient stays, 10,271 would have had a sepsis diagnosis under the Sepsis-2 definition and 8,088 would have had a sepsis diagnosis under the Sepsis-3 definition. Further, it was estimated that if a provider’s perspective was taken, the average cost to treat sepsis-2 patients was $41,289 and sepsis-3 patients was $45,500. Conclusion. The more stringent Sepsis-3 definition would have resulted in 21.9% fewer sepsis diagnoses than the Sepsis-2 definition. However, the average cost to treat sepsis under its new definition would be 10.2% higher than under its old one. As a result, we expect Sepsis-3 definition change will produce a modest decline in sepsis’ total economic burden in the ICU.

DISTRIBUTION OF VIRAL LOADS AMONG HEPATITIS C-INFECTED INDIVIDUALS SERVED BY TWO LARGE COMMERCIAL LABORATORIES IN THE UNITED STATES. Mona Doshani\textsuperscript{a,b}\textsuperscript{a} Mona Doshani, Lauren Canary, Melissa Collier, Claudia Vellozzi, Xiaohua Huang, Jeanette Whitcomb (fntf@ed.gov)  

Background. Hepatitis C virus (HCV) infects an estimated 3.5 million persons in the United States and is the leading cause of cirrhosis and hepatocellular carcinoma. Current clinical guidelines recommend that HCV-infected persons undergo screening uniformly. Quantitative RNA viral load (VL) test performance for HCV viral load is essential for guiding treatment decisions. Third party payers may require documentation of decreased VL following treatment initiation for approving treatment and remuneration. Understanding differences in HCV VL distribution across laboratories may support clinical decisions as well as aid in the development of new assays. The aim of this study is to describe the distribution of HCV VL among HCV-infected persons using data from two independent large commercial laboratories. Methods. We analyzed data received from Quest Diagnostics (Quest) and Laboratory Corporation of America (LabCorp) from 2011-2016 for all persons who had detectable quantifiable HCV RNA. Because commercial assays each have a lower end of detection, a log scale was used for VL: lower limit of detection (LOD) results may be reported differently depending on the assay used. Data were transferred into a log scale and further stratified by gender, age, and genotype to compare differences in the distributions of VL. Results. During 2011-2016, among persons tested for HCV RNA at Quest, 62,422 (53.6%) were HCV RNA positive with a median VL of 6.07 log10/ml and interquartile range (IQR) of 5.47–6.48. At LabCorp, 558,866 (56.6%) were positive with a median VL of 6.14 log10/ml and IQR of 5.49–6.63. Stratification of VL by demographic variables did not show any differences in the median VL in all categories. Conclusion. Our study demonstrated similar VL results in both laboratories. Furthermore, inclusion of results on the lower end can inform future assay development and refinement as smaller quantities of VL may need to be measured.

URINARY LEAD LEVEL AND GUT COLONIZATION BY ANTIBiotic RESISTANT BACTERIA: EVIDENCE FROM A POPULATION-BASED STUDY. Shoshannah Eggens\textsuperscript{a,b}\textsuperscript{a} Shoshannah Eggens, Nozaf Saffār, Ajay K. Sethi, Paul Peppard, Kristin Malecki, (University of Wisconsin School of Medicine and Public Health)  

Infection by antibiotic resistant bacteria is a global health crisis, and asymptomatic colonisation increases risk of infection. Non-human studies have linked heavy metal exposure to selection of antibiotic resistant bacteria, however, few epidemiologic studies have been done. This study analyses the association between urinary lead level and colonization by antibiotic resistant bacteria in a non-clinical human population. Data came from the Survey of the Health of Wisconsin (SHOW) and its ancillary microbiome study SHOW is a population-based health survey collecting data on many health determinants and outcomes, and biological specimens. Participants for this study are Wisconsin residents, age 18 and older, who participated in SHOW in 2016 and submitted urine and stool specimens. Urinary lead was measured using inductively coupled plasma mass spectrometry. Colonization by antibiotic resistant organisms was assessed by culturing for methicillin resistant Staphylococcus aureus, vancomycin-resistant enterococci, and fluoroquinolone resistant Gram-negative bacilli in stool samples. Logistic regression was performed in SAS version 9.4, with the dichotomous outcome of no antibiotic resistant colonization (negative) vs. colonization by bacteria with full or intermediate antibiotic resistance (positive). Among 465 participants, 42 (9%) tested positive. Positive colonization was highest in those age 20-70 years, females, those who self-identify as black, and those living in an urban area. Geometric mean urinary lead was 0.296 μg/L for negative participants and 0.313 μg/L for positive participants. Logistic regression adjusted for creatinine level showed 2.5 times increased odds (OR 2.55, 95% CI 1.20-5.39) of positive colonization for those in the highest quartile of urinary lead compared to those in the lower 3 quartiles. These novel results suggest that lead exposure is associated with gut colonization by antibiotic resistant bacteria in a community-based human population.

QUANTIFYING POTENTIALLY INFECTIOUS SHARING PATTERNS AMONG PEOPLE WHO INJECT DRUGS IN BALTIMORE, MD. M Kumi-Smith\textsuperscript{a} Kumi-Smith, Matthew Graham, Carl A Latkin, Shunhi M. Melser, Derek A Cummings, (Gilling School of Global Public Health, University of North Carolina Chapel Hill)  

Mixing matrices in the study of infectious diseases quantify how people with similar or different characteristics make contacts that put them at risk for disease transmission. Little empirical data on mixing patterns among people who inject drugs (PWID) are available. To inform our understanding the spread of blood borne disease in this population. A better understanding of population mixing can also inform design and evaluation of emerging interventions to prevent transmission of HIV and hepatitis C virus in PWID. To determine network mixing, egocentric network data provided by PWID regarding their drug using network members from Baltimore, MD, were used to construct mixing matrices of drug equipment sharing patterns according to individuals’ age, race and sex. Patterns of contact between any two individuals were estimated as the ratio of observed shares between each age group relative to the expected shares under the proportionate mixing assumptions, with confidence intervals estimated by bootstrapping partnerships. From 2005 to 2007, 647 participants who reported at least one drug use in the past 6 months provided information on a collective 2,651 partnerships. Baseline network sizes were on average larger among younger, female, and non-black PWID. Mixing according to race was highly assortative (assortativity ratio, 1.16), while less so for mixing by age (2.4) and sex (1.3). Highly assortative mixing by race highlights the existence of demographically isolated clusters for whom generalized treatment interventions may have limited benefits unless targeted directly. Age-assortativity was similar to levels observed in studies of casual mixing, which is a critical insight given the known role of this type of assortativity in driving transmission of pathogens such as influenza and tuberculosis. Low sex-assortativity indicates that factors beyond personal preference drive partner selection and suggests a complex overlap of drug sharing and sexual networks.
INCIDENCE AND PREVALENCE OF ANTIBODY TO HEPATITIS C VIRUS IN FDNY FIRST RESPONDERS BEFORE AND AFTER WORK AT THE TRADE CENTER DISASTER SITE. Yang Liu, Yang Liu, Mayrie P. Webber, Heidi W. Cohen, Theresa Schwartz, Michael Weiden, Kerry Kelly, Viola Ortiz, Rachel Zieg-Owens, Nadia Jaber, Hilary L. Colbeth, David J. Peurto. (Fire Department of the City of New York)

Objective: Firefighters and emergency medical service workers respond to various emergencies, including mass casualty events. The goal of the current study is to: 1) assess the impact of work at the World Trade Center (WTC) site in relation to the incidence of new, post-9/11 (2001) (9/11) hepatitis C virus (anti-HCV) antibody to Hepatitis C Virus (anti-HCV) and 2) evaluate secular trends in seroprevalence of anti-HCV in WTC-exposed Fire Department of New York City (FDNY) responders over time. Methods: The FDNY Bureau of Health Services monitors WTC-exposed responders by offering physical exams and routine blood work every 12-18 months. Data were collected from 2000-2012 on routinely collected specimens. Results: Incidence of anti-HCV seroconversion was 0.42 per 100 persons in the trans-9/11 period (pre-9/11 to first post-9/11 test), as compared with 0.54 per 100 persons in the post-9/11 period (1st post to 2nd post-9/11 test), rates that were not significantly different (P=0.68). The overall prevalence at the time of each worker's last anti-HCV test was 1.3%, with the highest age-specific rate (2.4%) in older men, aged 50-59 on 9/11. Seroconversion, as measured in 2-year intervals, declined from 1.79 per 100 in the pre-9/11 period to 0.49 per 100 in the final period (2011-2012) (P trend test for trend P=0.0001). Conclusions: Work at the WTC site was not associated with an increase in anti-HCV seroconversion in the FDNY WTC-exposed population, as shown by similar seroconversion rates during trans-9/11 and post-9/11 periods. Similarly, the decreasing overall prevalence of anti-HCV from 2000 to 2012 mirrors national and local trends, suggesting a waning of the HCV epidemic in the US.

ESTIMATING THE EFFICACY OF CHLORHEXIDINE DECOLONIZATION IN PREVENTING MRSA: A BAYESIAN APPROACH. Eric Logren, Eric Logren. (Washington State University)

The use of chlorhexidine gluconate (CHG) washes to decolonize the skin of patients with methicillin-resistant Staphylococcus aureus (MRSA) has been suggested as a means to control the transmission in high risk settings, such as intensive care units. While randomized clinical trials (RCTs) have been promising, observational studies have been equivocal. In both cases, it is difficult to directly estimate the per-application efficacy of CHG, an important factor in understanding the discrepancy between study design, as well as for modeling and cost-effectiveness studies. We construct a stochastic compartmental model of MRSA transmission within an ICU to include CHG-based intervention as a known parameter. Using the results of a MRSA prevention RCT as well as a meta-analysis of CHG-related studies, we use Approximate Bayesian Computation to estimate the per-application efficacy of CHG. We then use this fitted model to assess whether or not the clinical standard of a decolonizing bath every 24 hours is an optimal treatment regime. Based on an incidence rate (IRR) of MRSA acquisitions from CHG in a meta-analysis of 0.67, we estimate a CHG efficacy, expressed as a probability of decolonizing a patient, to be 0.11 (95% Credible Interval 0.05, 0.17). Assessing the frequency of CHG application, application intervals of 12, 24, and 48 hours are all superior to a control scenario, there is no meaningful difference within those intervals, with IRRs of 0.66, 0.65, and 0.67 respectively. While capable of producing reductions in MRSA acquisition rates, these results suggest that the efficacy of CHG is relatively modest. There may be room for significant room for improvement in the formulation of CHG-based products or their application. CHG is also relatively robust to fluctuations in administration timing, and concerns about patient comfort, skin irritation, etc. may be able to be accounted for without jeopardizing clinical effectiveness.

THE INTERFACE BETWEEN SEXUAL AND INJECTING RISK FOR HEPATITIS C VIRUS INFECTION AMONG PEOPLE WHO INJECT DRUGS IN MONTREAL. Brendan Juck, Brendan Juck, Elke Roy, Sine Haj, Geng Zang, Nanu Minoyan, Dae Joo Shim, Julie Beaus, (Centre de recherche du Centre hospitalier de l'Université de Montréal)

Background: Although hepatitis C virus (HCV) infection is both preventable and curable, acquisition remains high in key populations. Historically, few studies of HCV infection and acquisition have examined the contribution of sexuality. This study examined the association of recent sexual activity with HCV baseline seropositivity, and with HCV acquisition among those HCV seronegative at baseline. Methods: PEPCO study participants (2004-2016) were eligible for HCV seroconversion analysis. HCV incidence analysis (baseline HCV seronegative with >2 visits). Questionnaires and HCV serology performed at baseline and 36 monthly follow-up. Recent sexual activity (past 34m) was a time-updating variable: sexual partners of opposite sex, same sex partner only, or same-sex (+) and (-) partner. Logistic and Cox regression models assessed associations between recent sexual activity and HCV baseline seropositivity and time to HCV seroconversion, respectively. Results: At baseline, 65% (95% CI: 60-70) were HCV seropositive, mainly male (63%), median age 38 years (IQR: 29-46), and recently injected cocaine (63%). In unadjusted logistic regression, reporting opposite sex partner (OR: 0.45, 95% CI: 0.25-0.78) or same sex partner (OR: 0.50, 95% CI: 0.28-0.88) were less likely to be HCV seropositive at baseline compared to participants reporting no sexual partner. In 422 HCV seronegative participants, at incidence rate of 1244/1000 (95% CI: 1194-1300) was observed. Reporting recent same sex partner (HR: 2.06, 95% CI: 1.20-3.54) but not opposite sex partner only (HR: 1.33, 95% CI: 0.91, 1.95) was associated with HCV seroconversion relative to reporting no sexual partner. Conclusion: In this cohort of PWID, reporting recent same sex partners was associated with reduced odds of HCV seropositivity at baseline, but greater risk of HCV acquisition. Suggesting complicated interactions of risk behaviors, and the need for tailored prevention strategies for people who report same sex activity.

INDIRECT CALCULATION OF THE RISK OF REACTIVATION TUBERCULOSIS AMONG PERSONS WITH IMMUNOSUPPRESSIVE MEDICAL CONDITIONS. Carly Rodriguez, Carly Rodriguez, Timothy C. Heeren, C. Robin Hsia, (Department of Epidemiology, Boston University School of Public Health)

Background: Immunosuppressive medical conditions increase the risk of progression from TB infection (LTBI) to TB disease, but direct measurement of this risk is usually precluded by preventative therapy for LTBI. Therefore, a method for indirect calculation of this parameter is needed. Methods: A meta-analysis of the risk of TB and LTBI associated with smoking, low BMI (BMI < 18.5), and diabetes were reviewed to identify summary estimates of the relative risk for LTBI and TB disease associated with each condition. An indirect method for calculating the relative risk for progression was developed, whereby the increased risk of progression to TB for those with LTBI is determined by dividing the relative risk (RR) of TB disease associated with the condition by the RR of LTBI associated with the condition. Odds ratios reported in meta-analyses were converted to RRs through a correction method using the incidence of TB disease among those without the condition. Confidence intervals for the estimated RR of progression were calculated from the standard errors of the natural log of the RRs for TB and LTBI. Where needed, continuous outcomes were converted to dichotomous outcomes by adjusting for the global distribution of the parameter of interest. Results: Indirect calculation of the RR of progression from LTBI to TB for smoking was 1.44 (95% CI: 1.06, 1.95), for low BMI was 3.53 (95% CI: 1.90, 4.09), and for diabetes was 2.66 (95% CI: 1.91, 3.70). Conclusion: Tuberculosis and LTBI among persons with immunosuppressive medical conditions offers an opportunity to prevent TB before disease progression. Measurement of the RR of LTBI and the RR of TB disease associated with a medical condition allows indirect calculation of a ratio of RRs of progression from LTBI to TB disease, thus providing the amount of disease that could potentially be prevented by screening and treatment for LTBI among persons with the medical condition.
APPLICATION OF A MULTIPLEX SALIVARY IMMUNOASSAY TO DETECT SPORADIC INCIDENT NOROVIRUS INFECTIONS IN A PROSPECTIVE COMMUNITY STUDY Timothy J. Wade, Timothy J. Wade, Shannon Griffin, Andrey Egorov, Elizabeth Sams, Edward Hudgens, Stephanie DeFlorio-Barker, Trevor, Jennifer Styles, Kevin Oshima, (US EPA)

Norovirus is one of the most common causes of gastroenteritis. Following infection, anti-norovirus salivary immunoglobulin G (IgG) rises steeply within 2 weeks and remains elevated for several months; this immunoconversion can serve as an indicator of infection. We used a multiplex salivary immunoassay to detect incident norovirus infections in a cohort of 484 visitors to a beach on Lake Michigan in 2015. Saliva was collected on the day of the beach visit (SI); after 10-12 days (S2); and after 3-5 weeks (S3). Luminex microspheres were coupled to recombinant antigens of genogroup I (GI) and II (GII) noroviruses and incubated with saliva. Immunoconversion was defined as at least 4-fold increase in anti-norovirus IgG antibody response (median fluorescence intensity, MFI) from SI to S2 and a 3-fold increase from SI to S3 with a minimum S2 MFI above the 75th percentile prediction interval of a cubic spline regression of MFI on age. Ten participants (2.1%) immunoconverted: 5 to GI norovirus (1%); 8 to GII (1.7%); and 3 to both. Four of the 10 participants (40%) reported at least one gastrointestinal symptom; diarrhea was the symptom most strongly associated with immunoconversion (OR=5.4, 95% CI 1.3-22.5). Participants 10-18 years old had the highest incidence of immunoconversion (5%). White race and greater household size were moderately (p<0.1) associated with immunoconversion; however, swimming during the beach visit was not (OR=1.4, 95% CI 0.15-12.3). Although the sample size was insufficient to fully examine risk factors, this study demonstrated that the salivary immunoassay can be used to study norovirus epidemiology in a community. Furthermore, because saliva is simple, painless and inexpensive to collect, this approach is an efficient and novel way to study infectious agents in large cohorts. This abstract does not reflect EPA policy.
A PROPORTIONAL ODDS MODEL OF HIGH-RISK DRIVERS’ ATTRIBUTES ASSOCIATED WITH ROAD TRAFFIC CRASHES IN KUWAIT
Saeed Alkhter1, Eisa Aldhafeeri, Farah Alshammari, Hana Jafar, Haya Almutai, Marwa Bhatia, and Nor Alhadi Alsharrah (Department of Community Medicine and Behavioral Sciences, Faculty of Medicine, Kuwait University, Kuwait)

Objective: This cross-sectional study assessed one-year period prevalence of one, two or more road traffic crashes (RTCs) and identified the attributes of high-risk drivers associated with the ordinal outcome among young adults in Kuwait. Design and setting: During December 2016, 1,500 students enrolled in 15 colleges of a public university in Kuwait were invited to participate in the study. Students were 18 years old or older and who drive by themselves were eligible. Data were collected using a structured self-administered questionnaire. One-year period prevalence of RTCs (one, two or more) was computed. Multivariable proportional odds model was used to identify the attributes of high-risk drivers associated with ordinal outcome. Results: Of 1,500 invited students, 1,465 (97.9%) participated, of which 71.5% were female, 56.4% were aged between 21 and 25 years, and 67.1% were Kuwaitis. Among 1,465 participants, one-year period prevalence of one, two and three RTCs was 23.3% (38), 10.9% (66) and 4.6% (68) respectively. The variables associated with the ordinal RTCs outcome in the final multivariable proportional odds model included habitual violation of speed limit (proportional OR = 1.40; 95% CI: 1.12–1.75; p = 0.003), crossing red light (proportional OR = 1.64; 95% CI: 1.30–2.06; p < 0.001), received three or more speeding tickets (proportional OR = 1.63; 95% CI: 1.10–2.42; p = 0.015), and being a person with epilepsy (proportional OR = 4.37; 95% CI: 1.65–11.55; p = 0.003). A test revealed that the proportional odds assumption was met by all the variables in model singly as well as in combination. Conclusions: High one-year period prevalence of one, two and three RTCs was recorded. Targeted education based on identified attributes and enforcement of existing traffic laws may reduce the RTCs frequency in this relatively young population.

INTERPERSONAL VIOLENT INJURY TRENDS IN CALIFORNIA, 2005 TO 2016
Christopher Rowe, Christopher Rowe, Elliott Matthy, Jennifer Ahern, (University of California, Berkeley)

Interpersonal violent (IPV) injury is a major public health problem in the United States. Although homicides have largely declined since the 1990s, non-fatal IPV injuries are far more common and receive less attention. We sought to describe recent trends in non-fatal IPV injury and compare rates across means and demographic groups in a large and diverse state. We used California (CA) state hospitalization and emergency department discharge records with ICD codes to calculate rates of IPV injury in 2005-2016 by year, overall and by age, gender, and race/ethnicity. In results through 2013 (to be updated through 2016), the overall IPV injury rate remained relatively stable (345 per 100,000 in 2005; 355 per 100,000 in 2013). However, this overall trend masks considerable heterogeneity. During 2005-2013, the largest portion of injuries involved bodily force (i.e., hands, feet, etc.) (142 per 100,000 in 2013) and overall rates were highest among 15-29-year-olds (755 per 100,000), men (482 per 100,000), and non-Hispanic Black individuals (285 per 100,000). From 2015-2013, IPV injury rates increased among non-Hispanic Black (950 to 1,075 per 100,000) and White individuals (293 to 323 per 100,000) while remaining stable or decreasing among other race/ethnicity groups. Rates increased among those aged 30-44 (426 to 469 per 100,000), 45-59 (271 to 313 per 100,000), and 60+ (52 to 72 per 100,000), and among females (198 to 231 per 100,000), while remaining stable or decreasing among younger age groups and males. Increasing rates were driven primarily by increases in bodily force; and other injuries (composed mostly of ICD-9 code E969.8 Assault by other specified means). Although the overall rate of non-fatal IPV injury in CA was relatively stable from 2005-2013, several groups have experienced substantial increases. These trend warrant further examination to better understand their causes and whether these patterns exist in other parts of the U.S.

QUALITY OF LIFE 15 YEARS AFTER 9/11 AMONG PERSONS INJURED ON THE DAY OF THE ATTACKS WHO HAVE NOT REPORTED POST-TRAUMATIC STRESS DISORDER (PTSD) SYMPTOMS POST-DisASTER
Robert Brackbill, Robert Brackbill, Lisa Gargano, Laura DiGrande, Howard Alper, Susan Gurley, (NYC Department of Health and Mental Hygiene)

PTSD is often the focus of quality of life studies in persons exposed to 9/11 with non-fatal injury included as a co-factor. However, general population studies demonstrate injury can affect health through diminished quality of life caused by long-term pain and/or disability. In this study, we assessed the current quality of life of persons injured on 9/11 who did not report experiencing PTSD symptoms 15 years after 9/11. We hypothesized that the long-term effects of injury included both physical and mental health impairment even among those without PTSD. Method: The World Trade Center Health Registry is a longitudinal cohort of persons (N=71,437) directly exposed to 9/11 that includes four waves of data collection. In early 2017, persons who reported injury on 9/11 and a non-injured comparison group were administered a survey (N = 6,748 of 8,580 completed). This analysis is restricted to respondents who never reported PTSD symptoms (Injured n=284, Non-Injured n=3,116). Level of severity of injury was based on need for assistance devices or medical intervention. Study outcomes included specific measures of quality of life and physical and mental health domain. Results: Persons injured on 9/11 who had a subsequent medical intervention (e.g., surgery or physical therapy) were significantly more likely to be limited in their usual activities compared to non-injured (OR = 3.5, 95% CI 2.2, 5.6) and those injured without a medical intervention were significantly more likely to report that pain interfered with normal work (OR = 1.8, 95% CI 1.1, 2.8). There was a significant point difference in physical health functioning (SF-2) for persons injured, with or without medical intervention compared to non-injured but there was no significant difference for mental health functioning. Conclusions: Counter to our hypothesis, there was no significant decrease in mental health functioning among persons injured on 9/11 who had no history of PTSD for 14 years but physical quality of life was reduced.

EXAMINATION OF STATE-LEVEL TRENDS IN MOTOR VEHICLE CRASHES AMONG OLDER ADULTS
Arturo J. Palumbo, Aimee Palumbo, Melissa R. Pfister, Kristi B. Metzger, Allison E. Curry, (Children’s Hospital of Philadelphia)

As the number of older adults in the U.S. increases, older adults will make up a greater proportion of drivers than ever before. Driving is critical for the well-being and quality of life for older adults, but age-related health conditions have been associated with driving reduction or cessation and may increase crash risk for those who continue to drive. Most studies exploring crashes among older drivers are limited to fatal or serious crash events, and rigorous examination of older driver crash rates using individual-level data has been conducted. The objectives of this study were to estimate per-driver crash rates and to describe the nature and circumstances of crash involvement among drivers age 65 and older. We examined individual-level linked data on licensing and police-reported crashes of New Jersey drivers age 65+ during 2010-2014. Monthly crash rates were calculated as the number of crashes per 100 licensed drivers. Crash frequencies and rates were calculated separately by sex and 5-year age groups, up to age 85. Among licensed drivers, males had a crash rate of 39 per 1000 licensed driver-months and females had a crash rate of 30 per 1000 licensed driver-months over the entire time period. Crash rates were similar across age groups, declining for all age groups from 2014 through 2016. One third (34%) of crashes involved driver’s vehicles at least 10 years old. Among older male drivers, 9% of crashes involved an unlicensed older driver; among female drivers 2% of crashes involved an unlicensed older driver. The prevalence of unlicensed older males involved in crashes suggests that a substantial proportion of older males are driving without an active license. Furthermore, vehicle age may be related to safety characteristics of vehicles, and may have an important influence on risk of injury among older adults involved in crashes. More research is needed to understand driving exposure and crash risk in this population.
CONCURRENT USE OF PRESCRIPTION OPIOIDS AND ALCOHOL AND FATAL MOTOR VEHICLE CRASHES: A POPULATION-BASED CASE-CONTROL STUDY Guohua Li, Guohua Li, Stanford Chihuri, (Columbia University)

In light of the ongoing opioid epidemic, the impact of prescription opioids on traffic safety has become a serious concern. Using a case-control design, we assessed the individual and joint effects of prescription opioids and alcohol on fatal crash risk. Cases (n = 3,606) were drivers who were involved in fatal motor vehicle crashes in the United States at specific times on Fridays and Saturdays between July 20 through December 1 in 2006, 2007 and 2008, and between June 7 through March 30 in 2012, 2013, and 2014. Controls (n = 15,604) were drivers who participated in the 2007 and 2013 National Roadside Surveys of Alcohol and Drug Use by Drivers. Cases and controls were selected from the same times of day, days of week and months of year. Overall, cases were significantly more likely than controls to test positive for prescription opioids (5.0% vs. 3.7%, \( p < 0.001 \)), alcohol (56.0% vs. 7.0%, \( p < 0.0001 \)) and both prescription opioids and alcohol (2.2% vs. 0.2%, \( p < 0.0001 \)). Relative to drivers testing negative for both prescription opioids and alcohol, the adjusted odds ratios of fatal crash involvement were 1.72 [95% confidence interval (CI): 1.37, 2.17] for those testing positive for prescription opioids and negative for alcohol, 17.74 (95% CI: 16.09, 19.56) for those testing positive for alcohol and negative for prescription opioids, and 21.40 (95% CI: 14.13, 32.42) for those testing positive for both prescription opioids and alcohol.

Prescription opioids and alcohol are each associated with significantly increased risks of fatal crash involvement. When used together, prescription opioids and alcohol appear to confer a positive interaction effect on fatal crash risk on the additive scale.

S/P indicates work done while a student/postdoc

0725 SP MASS SHOOTINGS AND PERMISSIVENESS-RESTRICTIVENESS OF STATE GUN LAWS Paul Reeping, Paul Reeping, Magdalena Cerda, Charles C. Branas, (Department of Epidemiology, Columbia Mailman School of Public Health)

Objective: This cross-sectional time-series study examines the relationship between the permissiveness-restrictiveness of state gun laws and mass shootings. Background: Previous studies have shown that gun laws are negatively associated with day-to-day firearm fatalities, however, there have been no studies of the permissiveness or restrictiveness of state gun laws and the occurrence of mass shootings. Methods: We used the 1997-2017 editions of the "Traveler's Guide to the Firearms Laws of the Fifty States," in constructing the independent variable of interest. This annually published guide gives a rating between 0 (restrictive) and 100 (permissive) for the firearm laws of all 50 states. Mother Jones (MJ), the Gun Violence Archive (GVA), and Supplementary Homicide Reports from the FBIs Uniform Crime Reporting System (UCR) were used to construct outcome variables on mass shootings. For UCR, mass shootings were defined as instances where 4+ individuals were killed in a single event by gunfire and was stratified to analyze instances when the perpetrator was a stranger to the victims. Data were analyzed using GEE with a poisson distribution and log link. An offset of state population was used and median income, percent high school graduation, percent single mother household, percent in poverty, percent who voted, and percent white were included as time-varying confounders. Results: For every ten-unit increase in permissiveness of firearms in a state, there is a significant or near significant 8.7% (p=0.034), 10% (p=0.040), and 10.4% (p=0.069) increase in mass shootings for the fully adjusted models UCR (all), UCR (stranger) and MJ, respectively. The GVA data were insignificant. Conclusion: Stricter laws on firearms in a state are associated with fewer mass shootings after accounting for population and multiple confounding factors. More studies are warranted given these findings and the pressing need to stem the continued stream of mass shootings in the US.
In the United States, human papillomavirus (HPV) vaccination has been recommended for females since 2006 and males since 2011. There are limited data on HPV vaccine uptake among all age groups eligible for HPV vaccination (ages 9-26 years), particularly for males. This nationally-representative study assessed temporal trends in self-reported HPV vaccination (≥1 dose) among 9-26-year-olds sampled in the 2011-2016 National Health and Nutrition Examination Surveys (n=7368). Adjusted prevalence differences (aPD) in HPV vaccination were calculated from marginal predicted probabilities estimated by sex-stratified multivariable logistic regression models, which included adjustment for study period, age group, race/ethnicity, health insurance, poverty status, and immigration status. Among females, HPV vaccination significantly increased overall from 37.7% in 2011-2012 to 45.7% in 2015-2016 (aPD,+7.1%; [95% CI: +0.1 %,+13.7%]). However, upon stratification by age group, HPV vaccination did not significantly change over time among adolescent females aged 9-10, 11-12, or 13-17 years (P>0.05). Among males, HPV vaccination significantly increased overall from 7.8% in 2011-2012 to 27.4% 2015-2016 (aPD,+18.8%; [95% CI: +14.1 %,+23.5%]). In stratified analyses among males, significant increases in HPV vaccination over time were observed in every stratum of age, race/ethnicity, health insurance and poverty level, as well as by immigration status (P<0.05). The marked increase in HPV vaccination observed among age-eligible males is encouraging. However, HPV vaccine coverage remains low overall with minimal gains in vaccine uptake among females, thereby emphasizing the need to develop and implement evidence-based strategies to overcome residual barriers to HPV vaccination.
Both epilepsy and suicidality are major causes of adolescent morbidity, and over the life course are associated with substantial economic and personal costs. Recent epidemiologic studies suggest bidirectional associations between epilepsy and suicidal behavior, with strong evidence that epilepsy triples the risk of death by suicide. Emerging evidence also suggests that suicidal behavior increases risk for both developing epilepsy and for worse disease prognosis, but this association is poorly understood, especially in adolescence. We examined this question in a retrospective cohort study using statewide, all-payer, individually linked emergency department (ED) data from California. Risk of future ED visits for epilepsy (assessed using ICD-9 diagnostic codes) was compared between two groups of patients aged 10–19 years who presented to a California ED in 2010: Self-harm patients, identified using ICD-9 injury codes E950–E959 (n=5,158) and controls, who were randomly selected from all other patients and matched 3:1 to self-harm patients on age, sex, visit month, and Zip code (n=14,286). Covariates included adolescent race; insurance; and prior history (2006–2009) of ED visits for epilepsy, mental health problems, and other complaints. Nearly 3% of self-harm patients (mean age=16.6 years; 63.6% female) had a subsequent visit for epilepsy, vs. 1.4% among controls. In multivariate models, self-harm patients showed higher risk (RR=1.37, 95% CI: 1.08, 1.74) for future epilepsy-related ED visit. However, this association was specific to males (male RR=1.69, 95% CI: 1.27, 2.27; female RR=1.01, 95% CI: 0.67, 1.52; interaction p=0.012). Findings from our large, population-based study of adolescent ED patients suggest that self-harm behavior is associated with worse epilepsy prognosis, especially among males. Future research should investigate the causal pathways underlying this association, in order to improve patient prognosis for both self-harming and epileptic adolescents.

ASSOCIATION BETWEEN SELF-INJURY AND EPILEPSY AMONG ADOLESCENTS: A COHORT STUDY USING STATEWIDE EMERGENCY DEPARTMENT DATA FROM CALIFORNIA. Cristina Lidón-Moyano, Silvia Colmen-Mellor, Deborah Wieve, Magdalena Cerda, UC Merced.

EARLY CHILDCARE PREDICTS CHILDREN'S EMOTIONAL AND BEHAVIOURAL TRAJECTORIES INTO MIDDLE CHILDHOOD. DATA FROM THE FRENCH EDEN MOTHER-CHILD COHORT STUDY. Marie Melchior*, Maria Melchior, Ramonduat Comas, Robineau El Khoury, Sylviane Côté, Judith van der Waerden, Laura Pryor, (marie.melchior@inserm.fr)

Background: Studies on the impact of early childcare on children's later emotional and behavioural difficulties have yielded contrasting results and are often limited by a short duration of follow-up. Methods: We examined associations between childcare type (childmind, centre-based or informal care) prior to school entry at age 3 years and problems related to emotional difficulties in middle childhood (age 3 to 8 years) in a community sample of children (n=1286) in France (EDEN cohort study). Results: Type of professional childcare children were in was principally dependent on availability extraneous to family characteristics. Children's emotional difficulties (emotional symptoms, peer relations, hyperactivity/inattention, conduct problems, prosocial behaviours) were assessed by the Strengths and Difficulties Questionnaires (SDQ) at ages 3, 5.5 and 8 years. Trajectories of children's difficulties (high, intermediate or low) over time were estimated using group-based trajectory modelling. Family and childcare characteristics were accounted for via inverse probability weights based on propensity scores of childcare type. Results: Compared to children in informal care, those who attended centre-based childcare had lower levels of emotional difficulties (OR=0.35, 95% CI: 0.35, 1.41) and of peer relationship problems (OR=0.19, 95% CI: 0.15, 1.67) up to age 8 years. Children who spent at least 1 year in centre-based childcare had lower levels of hyperactivity/inattention and higher levels of prosocial behaviors than those who were looked after by a childcare provider. Girls and children from a less favourable family background reaped more benefits from being in childcare than boys and children from a less favourable background. Conclusion: High quality childcare, such as offered in centre-based childcare settings in France is associated with positive psychological development into middle childhood.
NO ASSOCIATION BETWEEN NEIGHBORHOOD DISADVANTAGE AND DEPRESSIVE SYMPTOMS AMONG ADOLESCENTS FOLLOWED INTO EMERGING ADULTHOOD  Rise B Goldstein, Rise B Goldstein, Anupama K. Lee, Jacob S. Jeffers, Brian J. Fairman, Jeremy W. Luk, Denise L. Haynek, Bruce G. Simon-Morton, Stephen E. Glaiman. (Health Behavior Branch, Division of Intramural Population Health Research, Eunice Kennedy Shriver National Institute of Child Health and Human Development)

Introduction: According to recent studies, residents of disadvantaged neighborhoods have higher levels of depressive symptoms; however, most of these studies have focused on adults and used cross-sectional designs. Therefore, we prospectively examined associations of two aspects of neighborhood disadvantage (socioeconomic disadvantage and income inequality) with depressive symptoms over six yearly waves of a nationally representative survey of adolescents. Methods: The NEXT Generation Health Study enrolled 10th-grade students from 90 United States high schools in 2010. Depressive symptoms were assessed with the pediatric Patient Report Outcome Measurement Information System (PROMIS) from Waves 2-6. Social fragmentation and income inequality were measured at the census-tract level using geocoded data from the American Community Survey 5-year estimates. We used linear mixed-effects models to relate time-varying neighborhood disadvantage to PROMIS T-scores at Waves 2-6 controlling for neighborhood racial composition, respondent age, sex, race/ethnicity, family affluence, and Wave 1 depressive symptoms. Results: Respondents (n=2647) were 55% female, 16.3 years old at Wave 1, and completed an average of 4 follow-up assessments. Neighborhood disadvantage was not associated with depressive symptoms. Regression coefficients (SE) for the 2nd through 4th (vs. first) quartiles of social fragmentation were 0.25 (0.29), -0.07 (0.39), and 0.35 (0.43). Coefficients for income inequality were 0.15 (0.30), 0.37 (0.31), and -0.53 (0.38). Conclusion: Social fragmentation and income inequality, which were associated with depressive symptoms in prior studies of adults, were not associated with depressive symptoms in a nationally representative cohort of adolescents. These findings raise questions for future research regarding developmental timing of neighborhood effects on mental health and their potential heterogeneity across the United States.

ACCESS TO AFFORDABLE DAYCARE AND WOMEN'S MENTAL HEALTH IN RAJASTHAN, INDIA: EVIDENCE FROM A CLUSTER-RANDOMIZED SOCIAL INTERVENTION Arijit Nandi, Arijit Nandi, Sim Haiper, (McGill University)

The provision of affordable and reliable daycare services is a potentially important policy lever for reducing gender inequality, improving health and socioeconomic wellbeing, and empowering women in resource-limited settings. This cluster-randomized trial uses data from a sample of 2659 mothers with age-eligible children to evaluate the impact of providing access to a community-based daycare program on maternal mental health in a lower-income, rural context. The study takes places in 160 village hamlets in rural Rajasthan, India, which were randomized to intervention or control groups after a baseline survey. Symptoms of common mental disorders were assessed using a Hindi version of the 12-item General Health Questionnaire (GHQ-12). At baseline, the mean number of GHQ-12 symptoms was 2.12 (SD=2.45). Treatment assignment increased the probability that a respondent used a daycare by 33 percentage points. Mothers living in treated hamlets reported 0.17 fewer symptoms of distress (95% CI: -0.14, 0.03) at follow-up. We found some variability in treatment effects according to block of residence and baseline characteristics, with the largest reductions in mental distress observed among women employed year round prior to the intervention. Analyses exploring the impact of maternal use of a daycare using two-stage least squares (2SLS) instrumental variables analysis showed that daycare use decreased symptoms of mental distress by 0.24 (95% CI: 0.17, 0.31) symptoms, or roughly 21% compared to the baseline mean. The provision of affordable, community-based daycare was associated with substantial uptake and showed potential for improving mothers’ mental health in a lower-income, rural context.

TRAUMA EXPOSURE, POSTTRAUMATIC STRESS DISORDER SYMPTOMS, AND HORMONE REPLACEMENT THERAPY AFTER MENOPAUSE IN WOMEN Shin Je Jung, Shin Je Jung, Jennifer Summer, Carolyn Gibson, Yong Jo Kim, Andrew L. Roberts, Quelan Chen, Lutia Klibansky, Eric B Rimm, Kanestan C Koenen, (Harvard University T.H. Chan School of Public Health)

Background: Posttraumatic stress disorder (PTSD) is a common and often persistent psychiatric disorder that occurs twice as frequently in women as in men. PTSD has been linked to increased cardiometabolic risk, and use of female hormone therapy may potentially contribute to or reduce the risk of these health conditions. We hypothesized that women with PTSD and traumatic exposure will have increased use of hormone therapy compared to women with no trauma exposure. Method: We used data from 34,461 women in Nurses’ Health Study II which began in 1989. History of trauma and PTSD were asked with Short Screening Scale for DSM-IV PTSD in 2008. Use of hormone replacement therapy (HRT) after menopause was assessed in every year from 1998, and we utilized the data from 2009 to compare baseline association. We made bivariate outcome yes/no for HRT use. Logistic regression was used to estimate multivariable-adjusted odds ratios and 95% confidence intervals for HRT use, adjusting for age, childhood factors, reproductive factors, other comorbidities, and behavioral factors in the final model. Results: In multivariable-adjusted models, we found significant associations for PTSD with HRT use (p-trend <0.001; trauma with no PTSD symptoms, 1.12 [95% CI: 1.05-1.20]; 1.3 PTSD symptoms, 1.34 [95% CI: 1.26-1.45]; 4 or more PTSD symptoms, 1.47 [95% CI: 1.33-1.61]; and 67 PTSD symptoms, 1.46 [95% CI: 1.30-1.64]). Conclusion: PTSD was associated with higher likelihood of HRT use in a dose-dependent pattern. Further research is needed to explore the role of HRT as a possible mediating mechanism between PTSD and cardiometabolic diseases.

S/P indicates work done while a student/postdoc
MENTAL HEALTH VARIABLES ASSOCIATED WITH EMERGENCY DEPARTMENT ADMISSION IN COPD PATIENTS: APPLICATION OF SELECTIVE INference Hayden L. Smith* Hayden L. Smith, Corey S. Ellis
(UnifyPoint Health)

Background: Statistical models are used in medical research for feature selection. However, the models are not consistent when different methods are used to analyze the same data. Identification of optimal features requires an objective method to select features. The aim of this study is to compare the performances of different statistical methods in identifying significant mental health variables associated with emergency department (ED) admission in COPD patients.

Methods: In this study, we used a dataset of 607 unique COPD patients with an ED encounter for exacerbation. Fifty percent of these patients were admitted. Variables with heart rate (i.e., 5 bpm: AOR: 1.1; 95% CI: 1.0, 1.3), oxygen saturation (AOR: 0.95; 95% CI: 0.92, 0.98), and comorbidities of anxiety (AOR: 6.7; 95% CI: 4.5, 11.4) and depression (AOR: 6.8; 95% CI: 3.5, 16.7) were associated with admission status. The median age of patients was 60 years (range: 18-91), and the median body mass index was 25 kg/m² (range: 15-45). All patients had a history of COPD exacerbations, and the majority of patients (n=420) had a history of depressive disorder.

Results: The study found that the top 50 OTUs were identified by each method. The overlap by test and the total number of unique groupings identified if all 3 tests were used. For brevity, we limited our discussion to the top 50 OTUs.

Conclusions: The study demonstrated that the novel Bayesian factor analysis model is shown to have several advantages over other methods: (1) Ability to identify latent variables of mixtures (2) Ability to classify the contribution of individual chemicals to the overall mixture (3) Allows easier interpretation of the results. However, the study also has several weaknesses: (1) Requires high quality data with small exposure measurement (2) Ability to classify the contribution of individual chemicals to the overall mixture (3) Requires evidence regarding interaction pathways of individual chemicals. Based on our findings, Bayesian factor analysis is a potentially useful tool for estimating the effect of epidemiological assessment of environmental chemical mixtures.

MODEL CHOICE IN MICROBIOME PROFILING MATTERS: COMPARISON OF STATISTICAL TESTS TO PROFILE DIFFERENTIALLY DISTRIBUTED OTUS Jun Hu*, Jun Hu, Na You, Xiang Zou, Yuming Zhang, Min Zhang, Meilin Zheng, Jinjia Hu, Susun Mathew, Min Zha (Guangdong Key Laboratory of Colorectal and Pelvic Floor Diseases, The Sixth Affiliated Hospital of Sun Yat-sen University, Guangzhou, Guangdong, China)

Background: 16s RNA sequences have been frequently used to profile the diversity of organisms in a sample. Standard techniques rely upon one statistical method mainly. However, the selected methods are not consistent when multiple tests are examined. We aimed to compare microRNA using different modeling approaches in the data discovery phase. We studied the microbiota structure of 29 cases and 24 household matched controls. We profiled the microbial sequencing of the V1-V3 region of the 16s RNA gene. Three tests were used to calculate and compare relative abundances of OTUs in and between case and control groups: Wilcoxon Signed Rank, Kolmogorov-Smirnov and Chi-square.

Methods: The study used 16s RNA sequences from 29 cases and 24 household matched controls. The microbial sequences were analyzed using three different modeling approaches: Wilcoxon Signed Rank, Kolmogorov-Smirnov and Chi-square. The unique family genus/species identified by each test, the overlap by test and the total number of unique groupings identified if all 3 tests were used for brevity, we limited our output to the top 50 most statistically significant results. The results included cases, aged at 32.54-95.5 years, diagnosed in the Sixth Affiliated Hospital of SYSU Inflammatory Bowel Disease Center from April to December 2015. Household-matched controls, aged at 33.90-91.98, were provided for the same childrens born preterm. We asked parents at the baseline visit to rate how likely they were to complete the 6-month study. For brevity, we limited our discussion to the top 50 OTUs.

Conclusions: The ranking of statistically significant OTUs differ by statistical test used. Identifying OTUs that overlap across multiple methods is desired for data discovery.

A SIMULATION STUDY OF BAYESIAN FACTOR ANALYSIS FOR EPIDEMIOLOGICAL ASSESSMENT OF THE CAUSAL EFFECT OF ENVIRONMENTAL CHEMICAL MIXTURES Liang Hu*, Liang Hu, Zheng Zeng, Lawrence McCandless (Simon Fraser University)

In the field of environmental epidemiology, it is often challenging to estimate the causal effect of chemical mixtures due to the high-dimensionality of the exposures and interactions between variables. In addition, exposure measurement error and the statistical power of multiple comparisons in chemical mixtures are also potential challenges. This study aims to develop and investigate a novel Bayesian factor analysis method for estimating the causal effect of environmental chemical mixtures. A simulation study was conducted to compare the estimations of the causal effects of environmental chemical mixtures using several different statistical methods including the novel Bayesian factor analysis model, Bayesian hierarchical linear models, k-absolute shrinkage and selection operator (LASSO), and traditional approaches such as multiple linear regression. The performances of models were evaluated on their abilities to describe the effects of chemical mixtures in addition to individual chemical variables. Forest plots of each statistical model were produced to compare and contrast the performances. Bias, variance and mean squared error of the above models were also provided and compared with each other. The preliminary results demonstrated that the novel Bayesian factor analysis model is shown to have several advantages over other methods: (1) Ability to identify latent variables of mixtures (2) Ability to classify the contribution of individual chemicals to the overall mixture (3) Allows easier interpretation of the results. However, the study also has several weaknesses: (1) Requires high quality data with small exposure measurement errors (2) Requires evidence regarding interaction pathways of individual chemicals. Based on our findings, Bayesian factor analysis is a potentially useful tool for estimating the effect of epidemiological assessment of environmental chemical mixtures.

APPLICATION OF THE “INTENT TO ATTEND” ASSESSMENT TO PREDICT MISSING DATA AND ADHERENCE IN A PEDIATRIC CLINICAL TRIAL Sarah A. Keim*, Sarah A. Keim, Kelly M. Boone, Joseph Rasch ( Nationwide Children's Hospital/Ohio State U)

A 2010 National Research Council report on missing data in clinical trials recommended that trial participants be asked about their intent to attend subsequent study visits to improve handling of missing data when participants fail to complete study activities. This method has not been applied outside a single adult psychiatric trial and a simulation study, so its general utility remains uncertain. Our Omega Tots trial (n=377, Columbus OH, 2012-17) tested daily dietary supplement, with the goal of improving cognitive development in (older) born preterm. We asked parents of the baseline visit to rate how likely (1-very unlikely, 10-very likely) they were to complete the 6-month study (3 total study visits) 20% of patients gave a rating (<45,000) were more likely to give a rating of 7, compared to families with lower incomes (2=46; p<0.03). Parents who rated 10 had a lower odds of attending the last study visit (OR=0.35, 95% CI: 0.06, 1.2) and having complete primary outcome data (OR=0.11, 95% CI: 0.003, 0.67). Conversely, higher to attend ratings were associated with fewer number of days late the family was for their last study visit (mean=55 days late for ratings of<10 vs. 4.4 for ratings 10, r=17, p=0.01). Intent to attend ratings were unassociated with how many medications they completed, medication adherence, or whether adherence data were missing entirely. In this pediatric clinical trial intent to attend ratings had complex relationships with participant demographics and study participation indicators which had not been previously examined or were contrary to the prior small literature. It is possible that social desirability bias may influence question response and be differential by SES, and this may undermine the utility of the intent to attend approach.
FURTHER REMARKS ON COVARIATE BALANCE FOR NO CONFOUNDING

Etsuji Suzuki* Etsuji Suzuki, Toshihide Tsuda, Eiji Yamamoto, (Department of Epidemiology, Graduate School of Medicine, Dentistry and Pharmaceutical Sciences, Okayama University)

Covariate balance is often addressed as a key feature to control confounding in epidemiology, and many researchers have been concerned about whether covariate balance is achieved between the exposed and the unexposed groups in their analyses. A recent study proposed a mapping between covariate balance under the sufficient-cause model and exchangeability conditions in the counterfactual model, highlighting the fact that covariate balance is a stronger condition than no confounding and that the required covariate balance depends on the target population of interest. In this presentation, we aim to further explore the relationship between covariate balance and exchangeability under situations in which one can assume no preventive action, or sufficient-cause positive monotonicity. Based on the link between the sufficient-cause model and the counterfactual model, we emphasize that covariate balance depends on the target population of interest. When the target is the exposed group, covariate balance and exchangeability become consistent under the assumption of no preventive action. However, when the target is either the unexposed group or the total population, covariate balance is a stronger condition than no confounding even under the assumption of no preventive action. We also show that, under the assumption of no preventive action, the condition for covariate balance when the target is the unexposed group becomes equal to the corresponding condition when the target is the total population, which is stronger than the corresponding condition when the target is the exposed group. This study exemplifies that it would be of significance to understand the subtle difference between exchangeability and covariate balance, based on the link between the counterfactual model and the sufficient-cause model.

WITHIN-WOMAN PHENOL AND PHTHALATE VARIABILITY IN PERCONCEPTIONAL URINE SPECIMENS AFTER LONG-TERM STORAGE

Ani K. Rosen Vollmar* Ani K. Rosen Vollmar, Donna D. Baird, Allen J. Wilcox, Cherie K. Weinberg, Anne Marie Z. Jolicoeur (Department of Environmental Health Sciences, Yale School of Public Health)

Phthalates and phenols, endocrine disruptors, are rapidly excreted from the body. Sources of exposure can vary over time, making within-person variability a concern for assigning exposures in epidemiologic studies. We used urine and urine samples from the North Carolina Family Pregnancy Study to characterize within-person variability. Women attempting pregnancy completed daily diaries and collected daily urine samples for up to 4 months preconception and 2 months postimplantation if they conceived. Urinary ICCs were used to identify implantation day. Three daily urine specimens were selected from all menstrual cycles not resulting in clinical pregnancy, and preimplantation in conception cycles. Equal aliquots were combined to create cycle-specific pooled specimens (78 preimplantation cycles from 221 women). We also pooled 3 postimplantation urine aliquots (145 pregnancies). Concentrations of phthalates and phthalate metabolites were measured by mass spectrometry, creatinine-adjusted, and replaced with LOD/2 if below the level of detection. Temporal variability and changes from preconception to early pregnancy were assessed using intraclass correlation coefficients (ICCs) and mean within-woman differences. Preimplantation ICCs ranged from 0.36 for bisphenol-A and mono(2-ethyl-5-hydroxyxyl) phthalate to 0.740.75. All other ICCs were between 0.38 and 0.59. All other phthalate metabolites decreased from the preimplantation average to early pregnancy (within-woman percent change: 2.8% to 59.9%, p<0.02 for all). Para-benzeno and other phenols decreased -9.7% to 15.7% (p<0.1 for all). Preimplantation reproducibility is good for dichlorophenols, and poor to fair for all other exposures, indicating that more than 3 repeat samples would better characterize women’s exposure levels. Preconception phenol and phthalate levels may not accurately reflect early pregnancy levels.

ESTIMATING PER-PROTOCOL EFFECTS IN RANDOMIZED TRIALS USING THE PLACEBO ARM TO ASSESS CONFOUNDING

Eleanor Murray* Eleanor Murray, Miguel A. Roman (Harvard T.H. Chan School of Public Health)

Background: Adherence-adjusted effects, such as the per-protocol effect, can provide valuable information to supplement intention-to-treat analyses, especially in randomized trials with substantial non-adherence and loss to follow-up, or when assessing safety outcomes. However, per-protocol effects have been viewed with skepticism because they require adjusting for post-randomization covariates, which many investigators believe cannot be done without bias. Much of this objection can be traced to analyses of adherence in the placebo arms of trials such as the Coronary Drug Project (CDP). Here, we extend this placebo-arm approach to describe a general framework for checking assumptions about adherence-outcome confounding and describe how to apply these statistical advances to estimating the per-protocol effect. Methods: We present assumptions about adherence-outcome confounding and describe how to apply these statistical advances to estimating the per-protocol effect. Results: We adapted the approach for (1) to generalize per-protocol effects to studies that use the placebo arm and (4) to per-protocol effects generalized to all trials. Conclusion: We illustrate our approach with data from an ongoing trial of PrEP vs placebo in a 1:1 ratio. In the United States, we simulated a population of 400 women and an open label trial of 500 US women. Both trials assigned participants to PrEP vs placebo in a 1:1 ratio. We simulated a baseline treatment effect modifier differing between the settings and condom use as a cofounder of post-randomization adherence and HIV. Parameters (1) and (2) were estimated using standard implementation of g-computation for ITT and per-protocol effects. Parameter (4) was estimated using the approach for (2) by first taking 200 replications of the African data (weighted by inverse odds of sampling) to the African population had a similar age distribution as the US target. For (3), we used the results of (4) and further let adherence be the levels observed in the US. We report RRs averaged over 500 simulations and the expected standard error (SE) for each estimator, IRR and per-protocol effects in Africa were 0.68 (SE: 0.11) and 0.73 (SE: 0.09). In the US, they were 0.48 (SE: 0.08) and 0.24 (SE: 0.08). The mean adherence was further from the null than in Africa because US women were more likely to be over age 22 (which was associated with a stronger PrEP effect) and to adhere (leading to a stronger ITT effect).
DIFFERENCES IN CONDITIONAL VERSUS MARGINAL ESTIMATES IN COLLAPSIBLE ESTIMATORS Ian Shrier* Ian Shrier, Anabelle Redelmeier, Russell Steele, Mireille Schnitzer, (Lady Davis Institute, McGill University)

A study reports "The logistic regression risk ratio (RR) is 200 after adjusting for confounders". Many readers would consider that this implies that treatment doubles the probability of a beneficial outcome. However, regression produces "conditional estimates", which "break" the association between the confounder and the outcome. Alternatively, marginal structural models create "marginal estimates", which "break" the association between the confounder and treatment. It is well-known that conditional and marginal estimates differ with a non-collapsible estimator (odds ratio) when the outcome is common. The purpose of this study is to show how these estimates differ for collapsible estimators (e.g. RR). We first simulated a marginal effect of binary treatment A on binary outcome Y (RR=2), with a binary confounder C creating a (RR=0.07) and Y (RR=0.03) for 1M subjects. Results were unbiased in large samples for both regression (1.99) and marginal structural model (1.99) estimates. Next, we simulated data with the same causal effects as before, but added an interaction A* C on Y (RR=1.5). Conditional estimates yielded RR=2.00 for A, 2.00 for C, and 1.49 for A*C. The marginal structural model estimate was 2.66 for the effect of A on Y. Although the conditional estimates for A and A*C could be combined to estimate the correct marginal effect (which was 2.67 as expected), it is rarely done and many readers would misinterpret the RR=2 as a marginal effect of binary treatment A on binary outcome Y (RR=2), with a binary confounder C creating a (RR=0.07) and Y (RR=0.03) for 1M subjects. Results were unbiased in large samples for both regression (1.99) and marginal structural model (1.99) estimates. Next, we simulated data with the same causal effects as before, but added an interaction A* C on Y (RR=1.5). Conditional estimates yielded RR=2.00 for A, 2.00 for C, and 1.49 for A*C. The marginal structural model estimate was 2.66 for the effect of A on Y. Although the conditional estimates for A and A*C could be combined to estimate the correct marginal effect (which was 2.67 as expected), it is rarely done and many readers would misinterpret the RR=2 as a marginal effect of binary treatment A on binary outcome Y (RR=2), with a binary confounder C creating a (RR=0.07) and Y (RR=0.03) for 1M subjects. Results were unbiased in large samples for both regression (1.99) and marginal structural model (1.99) estimates. Next, we simulated data with the same causal effects as before, but added an interaction A* C on Y (RR=1.5). Conditional estimates yielded RR=2.00 for A, 2.00 for C, and 1.49 for A*C. The marginal structural model estimate was 2.66 for the effect of A on Y. Although the conditional estimates for A and A*C could be combined to estimate the correct marginal effect (which was 2.67 as expected), it is rarely done and many readers would misinterpret the RR=2 as a marginal effect of binary treatment A on binary outcome Y (RR=2)

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S/P indicates work done while a student/postdoc

ARTEFACTUAL CHANGES IN MEASURES OF EFFECT OVER TIME: A CAUSAL APPROACH TO TREND ANALYSIS Luis Segura* Natalie Levy, Luis Segura, Julian Santana, (Department of Epidemiology, Mailman School of Public Health, Columbia University)

Introduction. Trend analysis is a valuable tool for evaluating changes in exposure-outcome relationships over time and informing public health policy. However, this approach has been criticized for the possibility of producing artefactual findings. We aim to describe how misleading results can arise when measures of effect are compared over time and how this might be addressed. Methods. We used directed acyclic graphs and sufficient component cause model to provide a theoretical understanding of how artefactual trends in the measure of effect (e.g. changes in the risk ratio over time) can be seen even in the absence of a true causal effect of the exposure on the outcome. We illustrate this using the example of the effect of alternative tobacco products use on adolescent future intention to smoke. Using simulation, we demonstrate the possible impact of this bias and circumstances under which valid results might be obtained. Results. Under an assumption of no causal effect of the exposure on the outcome, artefactual trends in the measure of effect may be seen when the relationship between a confounder and the exposure and/or outcome changes over time. The magnitude of an apparent trend is dependent on the strength of the effect of the confounder on the exposure and/or outcome and the extent to which those relationships change with time. Valid trends can be estimated when the confounder is stable or can be held constant over time regardless of whether or not the exposure causes the outcome. Conclusion. Conducting a valid trend analysis requires a thoughtful understanding of the underlying causal structures and how this might change when populations are compared at different time points.

MULTIPLE IMPUTATION BY CHAINED ENSEMBLE SUPERLEARNING Aaron Shev* Aaron Shev, Hannah Laqueur, Rose Kagawa, (University of California, Davis)

Background: Multiple Imputation by Chained Equations (MICE) provides a flexible framework in which nearly any model for the distribution of the missing data can be equipped for sampling values. This flexibility also leaves the model open to issues arising from misspecification. We propose an extension of MICE that uses Super Learner, an ensemble predictive algorithm that weights predictions from several models, to improve upon the accuracy of MICE while simultaneously accounting for sample size and reducing variance. We applied this method to a large public health data set in which data is available for a number of clusters and individuals within each cluster. Our preliminary results showed Super Learner performing on par or better than the regression methods. In simulations where the outcome is a non-linear function of the predictors, we obtained a 10% reduction in the root mean square error, when compared to PMM, and a 1% reduction in the width of the confidence intervals. Conclusions. Extending MICE to use Super Learner for sampling missing values provides a robust solution to the problem of misspecification when using the MICE algorithm to impute data. Our preliminary results have shown this approach has promising applications especially when there may be violations of the missing at random assumption.

MULTILEVEL MADNESS Laura B. Balzer* Laura Balzer, Joshua Schwab, Mark J. van der Laan, May L. Petersen, (UMass-Amherst)

Multilevel (hierarchical) data structures are ubiquitous in Public Health and Medicine. Patients are nested within hospitals, students within schools, and households within neighborhoods. In such settings, effect estimation is complicated by dependence arising from shared cluster-level factors (measured or unmeasured) as well as social and biological interactions between subunits with a cluster. In this work, we review common approaches to multilevel data, including generalized estimating equations, random effects models and parametric fixed effects models. For each we discuss the underlying causal and statistical assumptions. We then present targeted maximum likelihood estimation (TMLE) for estimating effects of either cluster-level or individual-level exposures. In non-clustered data settings, TMLE has previously offered several advantages, including robustness to model misspecification, reduced variance, and integration of machine learning. Simulations are used to compare the methods, and each is applied to real data from an ongoing HIV prevention and treatment study. Our theoretical and practical results suggest TMLE with Super Learner is a promising alternative for estimating the effects in multilevel data settings.
EVALUATING MULTIPLE AIR TOXICS ASSOCIATED WITH PRETERM BIRTH USING PENALIZED ESTIMATORS

Ghassan B Hamra* Ghassan B Hamra, Richard MacLennan, Amy Kalkbrenner, (Johns Hopkins University)

It is well known that particulate matter air pollution has negative impacts on health, including preterm birth. Less understood is the identity of the etiologically relevant constituents, whether these are chemicals bound to particulate matter or/and other air pollutants arising from shared sources (e.g. vehicle traffic). Penalized estimators can be a useful tool to study the impact of multiple, highly correlated exposures on health. An example of this includes the hundreds of airborne metals and volatile organic compounds termed air toxics, air pollutants that share sources and spatial gradients with particulate matter. Here, we assessed the relationship of air toxics measured as part of the National Air Toxics Assessment (1999, 2002, 2005) to preterm birth. Air toxics concentrations arising from the emissions-based model were linked to records of live birth using the census tract corresponding to the maternal address at the time of birth, including a complete cohort of births in Milwaukee, Wisconsin from 1998 to 2006 (n = 8,966, 9.4% born preterm). We considered three penalized estimators that have been proposed for use in these types of settings: least absolute shrinkage and selection operator (LASSO), ridge regression, and elastic net, the latter of which is a combination of the penalties applied in the former two. We compared these three estimators in a theoretical and practical setting. When applied to mixtures of air toxics data, these three methods produced different results with substantively different conclusions for many air toxics. We suggest general approaches for moving forward with mixture data as well as with penalized estimators.

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who had previously provided information on their pregnancies were contacted to children of participants even when participants are adults, and initial information on median age at interview was 27, with 17% under the age of 18. Mean age at menarche was 12.7, median 12.0, range 9-20. Mean age at first pregnancy was 21. 3.3% of women 18- were sterilized, while most had 1 or more pregnancies. The range of the grandchildren's age was 0-33 years old; mean age of the youngest child of settings: least absolute shrinkage and selection operator (LASSO), ridge regression, and elastic net, the latter of which is a combination of the penalties applied in the former two. We compared these three estimators in a theoretical and practical setting. When applied to mixtures of air toxics data, these three methods produced different results with substantively different conclusions for many air toxics. We suggest general approaches for moving forward with mixture data as well as with penalized estimators.

USE OF RECORD LINKAGE TO IMPROVE COMPLETENESS OF POPULATION-BASED SURVEILLANCE DATA

Lindsey Dea, Tom Ong, Abhej Khamra, David Kao, Tessa Crute, (Colorado School of Public Health, University of Colorado Anschutz Medical Campus)

Record linkage of individual health care data is important to answer epidemiologic research questions. However when conducting studies that link data from existing healthcare systems, researchers are often faced with the challenge of identifying records in a dataset that refer to the same individual. Since individual healthcare systems do not share common identifiers, record linkage and de-duplication is necessary to implement. We will review our novel record linkage algorithm and linkage results in order to provide a platform to conduct population-based surveillance of chronic diseases. A population-based congenital heart disease (CHD) surveillance system of pregnante 11 to 64, was created through the cross-linkage of multiple electronic data sources across Colorado. Record linkage and de-duplication was performed between five sources used for case ascertainment: healthcare facilities, safety-net clinics, and claims data. Our record linkage method consists of three main steps: pre-processing, encryption, and probabilistic record linkage. Our method extends upon the Fellegi-Sunter scoring technique while also correcting for missing data problems. The performance of our algorithm was evaluated using linkage performance measures: precision, recall, and f-measure. We identified a total of 21,970 CHD cases from five primary care finding sources: Denver Health (n = 953), Kaiser Permanent (n = 2,330), UCHealth (n = 1,234), Centura Health (n = 3,270), and All Payer Claims (n = 7,578). Using first name, last name, date of birth, social security number, and street number as match variables, with a missing data treatment of weight redistribution to pe...
TRANSLATABLE SENSITIVITY ANALYSIS IN EPIDEMIOLOGIC STUDIES


P-values in epidemiology have become increasingly controversial. A proposed alternative is bits of information. Bits of information are $-\log_2(p)$ transformed p-values which relay an easier to interpret metric of the observed data under the null model. A p-value of 0.05 is equivalent to 4.3 bits of information against the null model and conveys an observation about as surprising as 4 tails from 4 coin flips. P-values 5 bits for pregnancy and >3 for live birth. These analyses show that it would remain surprising that preconception low dose aspirin would have shown no effect on pregnancy had pregnancy status been completely observed and how bits of information can be an easy to interpret tool to convey surprisal in the context of early withdrawal.

S/P indicates work done while a student/postdoc

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SIMULATING DIRECTED ACYCLIC GRAPHS TO ADDRESS LIMITATIONS IN TRADITIONAL EPIDEMIOLOGICAL METHODS

Joshua Havumaki* Joshua Havumaki, Marla Eisenberg. (University of Michigan, Department of Epidemiology)

Directed acyclic graphs (DAGs) are used in epidemiological studies to help provide unbiased measurements of the effect of an exposure on an outcome. Compartamental models (CMDs) simulate flows between disease states on the population level and can be used to explore different counterfactual scenarios. In this study, we conduct two distinct modeling exercises to examine the utility of methods that convert DAGs to CMDs. In general, we show how a DAG derived CMD can be used to (1) conduct multifaceted sensitivity analyses and (2) relax statistical assumptions. Our first example is taken from chronic disease literature. We simulate the obesity paradox or the seemingly protective effect of obesity on mortality among a diseased population with shared risk factors (i.e. the protective effect of obesity on mortality among diabetic smokers). Specifically, we use a CMD derived from a published DAG to examine how epidemiological data can inform CMD parameterization and how the proposed causal mechanism (i.e. CMD structure) can lead to the obesity paradox. Our second example is taken from infectious disease literature. A key assumption in traditional causal inference is that the outcome of one individual does not depend on the exposure of other individuals i.e. no interference between units. In this exercise, we conduct a simulation study and quantify the direct and indirect effects of chicken vaccination using a CMD derived from a simplified DAG. We first simulate a cluster-randomized control trial to quantify the effects using traditional methods. We next examine how epidemiological data can inform our CMD parameters. Finally, we examine counterfactually how effects of vaccination change under varying levels of interference between clusters. Ultimately, we aim to develop an operationalized workflow to use CMDs derived from DAGs to address limitations in traditional statistical methods.

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A NOVEL BIAS OFFSET METHOD FOR ADJUSTMENT OF UNMEASURED CONFOUNDERS

Onyebuchi A Arah* Onyebuchi A Arah, (UCLA Fielding School of Public Health, Los Angeles, CA)

Uncontrolled confounding is a critical threat to identifying and estimating causal effects. Expectedly, investigators must make the untenable assumption of no uncontrolled confounding given the covariates they measured and controlled for in their study. When this assumption fails, as is often does in observational studies, investigators are encouraged to conduct bias analysis to quantify how sensitive their findings are to unmeasured confounders. A common approach has been to apply bias formulas externally to the biased effect estimates obtained from data analysis. Often, the external application of bias formulas can be quite involved for new investigators or in complex data settings. Therefore, this study introduces a simple bias offset method that intuitively adapts external bias formulas for use in the generalized linear model framework. We show how this novel generalized bias offset method is based on creating and applying a bias offset variable that is a function of (i) the association of the unmeasured confounder with the outcome adjusted for the exposure and measured confounder, and (ii) the probability model of the unmeasured confounder conditional on the exposure and measured confounder. It is programmable using data steps during planned analysis of targeted level data in standard software, thus avoids cumbersome external programming seen with external bias formulas. The bias offset variable can then be used with appropriate link functions in mean, risk and rate difference or ratio regression models. Simultaneous bias adjustments of the coefficients of the exposure and the measured confounders can be achieved with one offset variable. Bootstrapping can be used to obtain bias adjusted CIs. It also extends into pothobilistic bias analysis where bias parameters are sampled from distributions. Simulated data examples and applications based on Evans cohort data are provided using user-friendly SAS, Stata, SPSS and R codes.

S/P indicates work done while a student/postdoc
REPRODUCTIVE CHARACTERISTIC ASSOCIATIONS WITH LEUKOCYTE TELOMERE LENGTH

Jacob Kresovich, Christine Parks, Dale Sandler, Jack Taylor, (NIEHS)

Background: Telomeres are hexanucleotide repetitive sequences located at the ends of chromosomes that protect against chromosomal shortening during DNA replication. Studies have observed that leukocyte telomere length is longer in females and that telomerase, the enzyme responsible for replenishing telomere length, may be activated by estrogen. We hypothesized that women with reproductive characteristics associated with greater estrogen production will have longer telomeres. Methods: We performed analyses in a case-cohort (n=1,081) subsample of the Sister Study, a prospective study of risk factors for breast cancer. Blood samples were collected at enrollment when women were cancer-free; 353 women were diagnosed with breast cancer through follow-up but breast cancer was unrelated to telomere length. Relative telomere length (rTL) was measured by multiplex qPCR. Age at menarche, parity, breastfeeding, and menopausal status were self-reported at baseline. Linear regression models were adjusted for age, race, paternal age, physical activity, hormone use and case status. Results: In mutually adjusted models, rTL increased for each year of delayed menarche onset (β = 0.02, 95% CI 0.00, 0.03), longer breastfeeding duration (per 12 months, β = 0.006, 95% CI 0.00, 0.01) and postmenopausal status (β = 0.06, 95% CI 0.01, 0.13). rTL was inversely associated with increasing parity (β = -0.02, 95% CI -0.03, -0.00). We sought to replicate these findings in a smaller study of early cohort participants but were unable to detect any associations. Conclusions: We observed reproductive characteristics were associated with rTL, though effect estimates were modest in size. Lack of reproducibility may be due to lower assay precision in the earlier subsample. Although we observed associations, they were generally not in the hypothesized direction. We conclude that reproductive characteristics linked to estrogen production may not explain gender differences in leukocyte telomere length.
RISK OF STROKE AMONG SURVIVORS OF THE SEPTEMBER 11, 2001 WORLD TRADE CENTER DISASTER

Shengchao Yu* Shengchao Yu, Howard Alper, Angela Nguyen, Robert Brackbill, (New York City Department of Health and Mental Hygiene)

September 11 disaster (9/11) related psychological stress and dust cloud exposure were both shown to increase risk of developing several physical conditions. However, risk of stroke among 9/11 survivors has not yet been examined. Using four waves of longitudinal data from the World Trade Center (WTC) Health Registry surveys, this study investigated the association between 9/11-related post-traumatic stress disorder (PTSD), dust cloud exposure, and subsequent development of stroke. This study included 42,527 adult enrollees in the WTC Health Registry who were followed longitudinally up to 14 years after 9/11. Stroke was defined as self-reported physician-diagnosed first stroke, reported between study enrollment (2003-2004) and a follow-up survey. Adjusted hazard ratios (AHR) were estimated to assess associations between 9/11-related PTSD, dust cloud exposure, and risk of developing stroke. Incidence of stroke was significantly higher among those with 9/11-related PTSD (3.53 vs. 1.64 per 1,000 person-years, p<0.001) or intense dust cloud exposure (2.33 vs. 1.77 per 1,000 person-years, p=0.040) than those without; and it was even higher for those who had both than those who reported neither (4.30 vs. 1.61 per 1,000 person-years, p<0.001). While adjusting for socio-demographic characteristics and other risk factors of stroke, participants with PTSD had an increased risk of developing stroke (AHR 1.69, 95% CI 1.42-2.02); and participants with intense dust exposure on 9/11 also had an increased risk of developing stroke (AHR 1.29, 95% CI 1.09-1.53). Our results also indicated that factors related to older age may have larger impact on the risk of developing stroke than 9/11-related PTSD among the older age group (65+). Findings from this study suggest that individuals with 9/11-related PTSD and/or intense dust exposure may have an increased risk of developing stroke.

WEATHER AND RISK OF MIGRAINE HEADACHE ONSET AMONG MIGRAINEURS

Wenyuan Li* Wenyuan Li, Suzie Bertisch, Elizabeth Mostofsky, Catherine Baethner, Michael Rauchstein, Murray A. Mittleman, (Harvard T.H. Chan School of Public Health)

Rationale: Migraine is a common recurrent neurologic disorder that affects about 15% of American adults. Although migraineurs often attribute the headache onset to weather conditions, few studies have used objectively recorded meteorological data to quantify the association, and have had mixed results. Method: We conducted a prospective cohort study (2016-17) among 101 adults in the Boston area with episodic migraine. For 6 weeks, participants wore actigraphs and completed daily questionnaires to record migraine headache onset, duration, and other lifestyle factors. We obtained daily average temperature, relative humidity, and barometric pressure measured at Boston Logan Airport Weather Station. We conducted a nested case-crossover analysis matched on day of week to examine the association of weather with risk of migraine headache onset. By design, each participant was compared to themselves on headache days and referent days. We used a conditional logistic regression model and adjusted for season using sine and cosine of day of the year. Results: The mean age was 35 (standard deviation (SD) 12) years and 88% were women. There were 884 migraine headache days. During follow up, mean(SD) temperature was 56.3(16.0) °F, relative humidity was 67.5(16.6) %, and barometric pressure was 30.0(0.2) inHg. An interquartile range lower daily average temperature (10°F) and higher relative humidity (27%) on the day of migraine headache were associated with 4% (95% CI 0.94, 1.15) and 11% (95% CI 0.98, 1.25) higher odds of migraine headache onset compared to other days. The association for temperature appeared stronger in the cold season (October-March), while the association for relative humidity appeared stronger in the warm season (April-September). Barometric pressure was not associated with migraine headache onset. Conclusions: Lower temperature but higher relative humidity were associated with higher incidence of migraine headache. The associations appeared to differ by season.
THE ASSOCIATION BETWEEN MATERNAL BITTER TASTE SENSITIVITY AND CHILD VEGETABLE INTAKE Heather McGrane Minton
Heather McGrane Minton, Susan Goth, David Q. Rich, Ann Dozier, Diana Fernández. (St. John Fisher College)

Background: The majority of Americans have vegetable intake below the recommended amounts per the United States Department of Agriculture Food Pattern Recommendations. Bitter taste sensitivity, the ability to detect bitter taste, has been shown to influence vegetable intake such that adults with bitter taste sensitivity (tasters) eat fewer vegetables than adults without bitter taste sensitivity (non-tasters). Children's vegetable intake may be influenced by their bitter taste sensitivity, as well as their mothers' sensitivity, as mothers are typically responsible for their child's food intake. The goal of our study was to examine whether bitter taste sensitivity (mother or child) was associated with vegetable intake in 4–6 year olds.

Methods: For our cross-sectional study, we recruited 168 mother–child dyads from an upscale New York community. We assessed taster status phenotype, demographic variables, and maternal report of vegetable intake (self and child) using food frequency questionnaires. Results: Using linear regression models, we found no differences between mother's taster status and the child's mean daily servings of vegetables (intake) and mean talin of types of vegetables consumed in the past year (variety) (β = 0.16, 95% CI: 0.45, 1.81; β = 0.086, 95% CI: 0.09, 0.19, respectively). Of note, mother's mean daily servings of vegetables was associated with child's vegetable intake (β = 0.45, 95% CI: 0.28, 0.61) and variety (β = 0.50, 95% CI: 0.07, 0.93) after adjusting for mother's taster status. Similar estimates were found for child taster status and child vegetable intake and variety. Conclusion: Mother's own vegetable intake, regardless of her own taster status, can override child innate preferences based on bitter taste sensitivity. Longitudinal studies exploring the association between bitter taste sensitivity and child vegetable intake are needed to examine mother's prenatal vegetable intake and postnatal mother and child eating patterns.

ARTIFICIAL SWEETENED BEVERAGES AND LIVER FUNCTION SCORES AMONG WOMEN WITH PRIOR GESTATIONAL DIABETES Stefanie N. Hinkle, Stefanie N. Hinkle, Shruti Rajal, Irene Albrecht Bjerggaard, Thordalur Ingilakdorsont, Sjohardt Olsen, Nguyen Ly, Sylvie H. Ley, Jia Meng, Yosi Zhu, Lim Lei, Carmen Zhang. (Emory Kennedy Shriver National Institute of Child Health and Human Development, NIH)

Objective: Artificial sweetened beverages (ASB) have been purported as an alternative to sugar-sweetened beverages, but the metabolic effects of ASBs are lacking. We aimed to examine associations of ASB intake and liver function among women with prior gestational diabetes (GDM) who are at high risk for liver dysfunction. Methods: We included 566 women from the Danish National Birth Cohort (1996–2002) with GDM at the index pregnancy who completed a clinical exam 9–16 years later for the Diabetes & Women's Health Study 2012-2014). Liver function included alanine aminotransferase (ALT), aspartate aminotransferase (AST), gamma-glutamyltransferase (GGT), and gamma-glutamyltransferase (GGT) measured in fasting blood collected at the clinical exam. Calculated liver function scores included fatty liver index (FLI), hepatic steatosis index (HSL), and non-alcoholic fatty liver disease liver fat score (NAFLD-FLS). A food frequency questionnaire on past year habitual intake was completed at the clinical exam. We estimated adjusted relative risks (RR = 95% CI) for elevated liver scores by ASB quartiles (Q). To investigate reverse causality, we limited the analysis to metabolically healthy women without obesity, prediabetes, diabetes, or elevated triglycerides at follow-up (n = 211). Results: At follow-up, 43.5%, 54.6%, and 36.6% of women had a elevated FLI (≥200), HSL (≥36), and NAFLD-FLS (≥0.64), respectively. Higher ASB intake was associated with increased risk for elevated FLI [RR = 2.1 (1.6–2.9); p trend < 0.001], HSL [RR = 2.0 (1.5–2.5); p trend < 0.001], and NAFLD-FLS [RR = 1.6 (1.1–2.3); p trend = 0.01]. Among “metabolically healthy” women, 9.9%, 12.9%, and 5.7% had elevated FLI, HSL, and NAFLD-FLS, respectively. Higher ASB intake was associated with elevated HSL [RR = 2.5 (1.5–4.2); p trend < 0.001] and HSL [RR = 1.6 (1.1–2.3); p trend = 0.01]. Conclusion: In women with prior GDM, post-year ASB intake was associated with an increased risk for elevated liver scores reflecting abnormal liver function.

LEPTIN CONCENTRATION IN HUMAN BREAST MILK AND INFANT BODY COMPOSITION: RESULTS FROM THE ULM BIRTH COHORT STUDY AND THE ULM SPATZ HEALTH STUDY Chad A. Logan*, Chad A. Logan, Wolfgang Koenig, Viole Walker, Hermann Bremner, Detrich Rottenbacher, Marion Gennser. (ULM University)

Background: Leptin in human breast milk has been implicated as a potential regulator of early-life metabolic programming. To add to current knowledge, we investigated the influence of breast milk leptin on child body composition up to 2 years within two independent birth cohorts. Methods: The Ulm Birth Cohort Study (UBCS) and the Ulm SPATZ Health Study each consist of approximately 1,000 newborns and their mothers recruited from the general population in the University Medical Center Ulm, Germany from 2000–2001 and 2012–2013, respectively. Leptin concentration was measured in skimmed breast milk collected around 6 weeks postpartum in both cohorts and at 6 months and 1 year among long-term breastfeeding mothers in the SPATZ cohort only. Age-adjusted infant weight to length ratio z-scores (WTzL) were calculated from measurements recorded during regular pediatric appointments at about 5 weeks, 4 months, 6 months, 1 year, and 2 years postpartum. Linear regression was used to investigate associations of categorized (quintiles) leptin concentration with WTLz adjusting for maternal prepregnancy BMI, age, breastfeeding frequency, and preceding period WTzL. Results: Breast milk leptin concentrations were available for 754 and 668 mothers of singleton infants in UBCS and SPATZ, respectively. Overall median leptin concentration was lower (p < 0.001) in UBCS [median (IQR) 175.0 (270.2)] compared to SPATZ [266.5 (346.0)]. In both cohorts, 6 week leptin concentrations were inversely associated (p trend < 0.001) with 5 wek WTLzL [p comparing 5th to 1st quintile: 0.15, 0.01 (95% CI: 0.10 to 0.21) for UBCS and 0.15 (0.09 to 0.21) for SPATZ]. No significant associations were observed with WTLzL thereafter. Conclusion: We observed strong evidence implicating breast milk leptin as a potential mediator of concurrent early infant growth up to 6 weeks postpartum but not for concentrations in more mature breast milk (preliminary results, data not shown) or with later growth periods.

Background: physical activity can be associated with bioimpedance phase angle. Methods: We conducted a systematic review and meta-analysis to assess the association between physical activity and bioimpedance phase angle (BPA). MEDLINE, EMBASE, Cochrane Central Register of Controlled Trials, Scielo, Lilacs, SportDiscus, Scopus and Web of Science were searched in. Two reviewers assessed independently study eligibility and risk of bias. We synthesized study results using a random-effects model. The association between physical activity and BPA was assessed considering study design. Results: Nine studies, totaling a total of 575 participants were included in the meta-analysis. Cross-sectional studies: the active subjects presented a higher BPA mean value when compared to controls (MD=0.07; 95% CI: 0.06 to 0.09; P=0.001) with low heterogeneity (I²=0%; P=0.69). Longitudinal studies (clinical trials or follow-up): the mean of BPA differences from baseline are significantly higher for the active group compared to the control group (MD=0.095; 95% CI: 0.11 to 0.49; P=0.001) with low heterogeneity (I²=13%; P=0.33). No evidence of publication bias was found and the overall risk of bias was moderate to high. Conclusions: Physical activity has a positive association with bioimpedance phase angle; these results reinforce the importance of including exercise routinely in health care, both for disease prevention and for a better prognosis in chronic diseases.

MEASURES OF OVERALL DIET AS PREDICTORS OF BODY FAT PERCENTAGE AND BMI IN YOUNG ADULT WOMEN Sofija Zagarins*

Background: There is growing awareness of the importance of studying overall diet as a way to address the complex interrelationships between foods and nutrients, especially in the context of chronic conditions like obesity that have many contributing factors. However, existing studies of the relationship between diet and body composition have largely focused on associations with individual nutrients or dietary components. We examined the association between dietary patterns and body composition in young adult women in the US. To determine whether measures of overall diet are associated with body fat percentage (BF%) and BMI, we assessed diet using a modified version of the Harvard food frequency questionnaire in a cross-sectional study of 288 women in the Boston area. Our results suggest that adipocytokines may not necessarily predict long-term development of eating behaviors.

THE SILENT EPIDEMIC OF OBESITY IN THE GAMBIA: EVIDENCE FROM A NATIONWIDE POPULATION-BASED CROSS SECTIONAL HEALTH EXAMINATION SURVEY Hai Charm, Hai Charm, Shain Scholes, Linda Ng Fat, Nora E Groote, Omari Badjie, Jennifer S Mindell (University College London(UCL))

Introduction: Non-communicable diseases (NCDs) are increasing in Sub-Saharan Africa (SSA). NCDs account for 70% of global deaths; 80% of these occur in low and middle income countries. A great concern is the rapid increase of obesity in SSA. A 1996 study revealed a double burden of over- and under-weight in The Gambia. We recently demonstrated a high prevalence of hypertension in The Gambia with a greater burden in rural areas and the obese. We examined overweight and obesity prevalence and the associated risk factors in Gambian adults. Methods: This study is based on a random nationally-representative sample of 4111 adults aged 25-46 years (78% response rate) collected in 2010 using the WHO STEPwise survey methods. We categorised body mass index (BMI) from measured height and weight to determine overweight and obesity (WHO thresholds). Analysis was restricted to non-pregnant participants with valid weight and height measurements (n=3533). All analyses were weighted for non-response and adjusted for complex survey design using STATA14. We conducted multivariate regression analysis to identify factors associated with overweight/obesity. Results: Two fifths of adults in The Gambia were overweight or obese with a higher prevalence in women (17.0%, 95% CI: 14.7-19.7 vs 8.1% in men, 6.0-11.0), and urban residents. Urban residence (Adjusted Odds Ratio 3.3, 95% CI 1.8-6.0), a low educational level (3.7, 2.2-6.1), higher education (1.96, 1.19-3.25), low fruit and vegetable intake (1.8, 1.13-3.01) and age were the most significant predictors of overweight/obesity among men. Similarly, urban residence (4.1, 2.4-6.8), abdominal obesity (2.6, 1.7-3.9), higher education (2.4, 1.2-4.8), hypertension (1.6, 1.1-2.3) and age were significantly associated with overweight/obesity in women. Conclusion: Preventive strategies should be directed at raising awareness of the risk factors, discouraging harmful beliefs on weight and the promotion of healthy diet and physical activity.

ADIPOCYTOKINES AND INFANT EATING BEHAVIORS Hyojin Park, Rajeshwar Sundaram, Erin M. Bell, Griffith Bell, David A. Lawrence, Edwinn Yeung, (NICHD)

Objective: Adipocytokines are shown to play a role in regulating food intake, but their role in the development of child eating behaviors is unclear. We examined how adipocytokines are prospectively associated with eating behaviors among infants from a population-based birth cohort. Methods: We included 2400 singletons and 1188 twins from the Upstate KIDS Study using punches from newborn dried blood spots to measure biomarkers. Adipocytokines known to be related to food intake include brain-derived neurotrophic factor (BDNF), adiponectin, complement factor 3, complement factor 5, and retinol. Biomarkers were measured by multiplex technology on a Luminox analyzer and log-transformed. Mothers reported infants’ appetite at 12 and 18 months and pickiness at 18 months which were then dichotomized, respectively. Logistic regression for singletons and conditional logistic regression for twins were used to estimate the odds of having poor eating behaviors after adjusting for a priori selected confounders. Results: Singletons with higher BDNF were less likely to have poor appetite at 12 months (AOR: 0.75 per log-unit increase, 95% CI: 0.57-0.98). Higher CRP among singletons was associated with poor appetite at 12 months (1.3; 1.01-1.26). However, at 18 months, no associations were observed with appetite or pickiness. None of the other adipocytokines were prospectively associated with eating behaviors. In twin models matched on maternal-level characteristics within pairs by design, no differences were detected. Conclusion: BDNF has been reported to suppress ad libitum food intake, but we observed that a higher neonatal BDNF level was prospectively associated with better appetite among singletons, while the association was attenuated at infants grew. Higher neonatal CRP was initially associated with lower appetite as expected, but the association was attenuated with age. Our results suggest that adipocytokines may not necessarily predict long-term development of eating behaviors.
PRECONCEPTION AND EARLY PREGNANCY MATERNAL VITAMIN D AND GENOME WIDE CORO BLOOD DNA METHYLATION Sunni L. Mumford,* Sunni Mumford, Weihua Guan, Keewan Kim, Robert Silver, Michael Y. Tsai, Lindsey Sjaarda, Neil Perkins, Lindsey Levine, Enrique F. Schisterman, Edwina H. Yeung, (Epidemiology Branch, DIPHR, NICHD)

Background: Maternal vitamin D deficiency has been associated with adverse perinatal outcomes and later offspring health problems. DNA methylation has been proposed as a potential mechanism for these associations. Therefore, our objective was to conduct an epigenome wide association study to examine DNA methylation in cord blood and maternal serum 25-hydroxy-vitamin D. Methods: Methylation was examined using the Infinium MethylationEPIC BeadChip in DNA extracted from cord blood of 375 singletons from the EAGeR Trial (2007-2011). Maternal levels of serum vitamin D were measured preconception and at 8 weeks' gestation by ELISA. Linear mixed models were used to test for associations between maternal vitamin D (at preconception and early pregnancy) and methylation $\beta$-values at each CpG site (>850,000) with adjustment for maternal age, race, infant sex, smoking, and estimated cell count (using a cord blood reference), while correcting for batch effects with random effects. Results: Suggestive associations ($p<30$ ng/mL to insufficient $\leq30$ concentrations), though none were associated at the Bonferroni corrected genome wide significance level ($p<6x10^{-8}$). Two CpGs (not near any known functional gene regions) also showed suggestive associations (preconception cg07143468, $\beta=-0.01$; early pregnancy cg05902656, $\beta=-0.02$). Conclusions: Maternal preconception and early pregnancy vitamin D status were largely not associated with methylation levels in cord blood. Nevertheless, TRAK1 has been previously identified as a vitamin D target gene with vitamin D receptor binding loci upstream of the gene and its expression responsive to incubation with 1,25(OH)$_2$D3 in both monocytes and adipocytes. Whether levels could induce methylation differences have yet to be determined.

THE ASSOCIATION OF PROCRASTINATION WITH ADULT WEIGHT GAIN IN JAPANESE MALE WORKERS Akihiko Narisada,* Akihiko Narisada, Kohta Suzuki, (Institute for Occupational Health Science, Aichi Medical University)

Background: Time inconsistency, including procrastination, is related to obesity. However, there are a few studies assessing the relationship between time inconsistency and adult weight gain. Objective: The purpose of this study is to examine the relationship between procrastination and adult weight gain in Japanese male workers. Methods: The study participants were 885 Japanese male workers (515 white-collar workers) in a manufacturing company, aged 35 - 64 years, who had health checkups in 2015. According to response to the question "When did you do homework assignments in the vacation in your school days?", we measured the degrees of procrastination. Procrastination was defined as a participant who did homework at the "very end of the vacation". Weight change during adulthood was calculated as the difference between measured current weight and recalled weight at the age of 20 years. Using multiple logistic regression models, we estimated the odds ratio (OR) for adult weight gain (more than 10 kg). Results: There were no significant relationships between procrastination and adult weight gain in whole workers. However, among white-collar workers, procrastination was associated with adult weight gain after adjusting for age, education, long working hours, smoking, drinking and physical activity (OR: 1.85, 95% CI: 1.04-3.29, $p=0.037$). On the other hand, such significant relationships were not observed among blue-collar workers (OR: 0.73, 95% CI: 0.33-1.64, $p=0.447$). Conclusions: Japanese male white-collar workers, but not blue-collar workers, who did homework at the very end of the vacation in school days had an increased risk of adult weight gain. Further study is needed to clarify relationships among procrastination, white-collar works and adult weight gain.
COMPETING RISKS SURVIVAL BIAS AMONG U.S. ASTRONAUTS

In comparison to the general population, U.S. astronauts have been demonstrated to have greatly reduced risk of death by natural causes. However, astronauts have also historically experienced much greater risk of death from accidental causes. As the broad categories of external and natural causes are mutually exclusive, it is possible that early deaths from external causes are biasing subsequent survival from natural causes such that survival hazards and other related summary measures of astronaut mortality are overly-optimistic. To investigate whether or not such bias is present in the cohort of U.S. astronauts between 1959 and 2017, we first characterized the pattern of mortality among astronauts to determine if it is sufficient to cause a bias. We then looked for systematic differences in baseline covariates between the two groups of astronauts defined by cause of death (external or natural). Finally, we compared survival curves generated using standard Kaplan-Meier analyses to those generated using competing risks methodology. The results show that the pattern of death from the two competing causes has a temporal relationship that could lead to bias. Deaths to astronauts from external causes begin sooner after selection, and the risk is highest during the astronauts' active duty years. Conversely, risk for death by natural causes is highest at older ages. Baseline covariates showed imbalance in ways that could explain a bias. Finally, comparisons of conventional Kaplan-Meier curves with competing risk curves show approximately 7% pessimism after 55 years. We conclude that the extremely low chronic disease mortality observed for U.S. astronauts is not due to hazards biased by deaths from competing risks. Future studies of astronaut mortality should continue to attempt to correct for the healthy worker effect to get the most accurate estimates of survival and comparative mortality.

ANTI-MÜLLERIAN HORMONE LEVELS IN NURSES WORKING NIGHT SHIFTS

Background. Associations have been reported between night shift work and women's reproductive health outcomes. We used serum anti-Müllerian hormone (AMH) levels in a cohort of nurses to determine if night shift work is also associated with ovarian reserve (number of eggs remaining in the ovary), a marker of the length of the reproductive lifespan. Methods. Between 1996 and 1999, blood samples were collected from female nurses participating in the Nurses' Health Study II biomarker substudy. 807 samples were later assayed for serum AMH. We used quantile regression to estimate differences and 95% confidence intervals (CI) in serum AMH levels between women working and not working night shifts, accounting for age, body mass index, smoking, and hormone use at the time of blood draw, among women with no missing data on variables of interest. We separately analyzed three measures of night shift work, reported via questionnaire: recent night shifts (shifts worked in the two weeks before blood draw, n = 623), usual night shifts (typical work schedule during the decade of blood draw, n = 507), and history of usual night shifts (typical work schedule before or during the decade of blood draw, n = 543). Results. We found no associations between recent, usual, or history of night shift work and AMH. The difference at the median of the AMH distribution was 0.14 (95% CI: -0.06, 0.26) ng/mL for nurses recently versus not recently working nights, -0.11 (95% CI: -0.28, 0.02) ng/mL for nurses with versus without a history of night shift work and AMH. The difference at the median of the AMH distribution was 0.14 (95% CI: -0.06, 0.26) ng/mL for nurses recently versus not recently working nights, -0.11 (95% CI: -0.28, 0.02) ng/mL for nurses with versus without a history of night shift work and AMH. Conclusion. Night shift work was not associated with ovarian reserve, as measured by serum AMH. This does not preclude associations between night shift work and fertility operating through other mechanisms.

Science advances when independent researchers share their findings widely through oral presentations at scientific meetings, and by publishing in the peer-reviewed literature. In addition to the written discourse that takes the form of letters to the editor and author responses, often a parallel discussion of science takes place in traditional and social media environments print, radio, and television Facebook, Twitter, Reddit, blogs, etc. Coverage of science and scientific advances by the media can bolster financial support from lawmakers and philanthropists, inspire young men and women to the fields of science, inform the public of the miraculous discoveries being made every day, and educate patients on how to extend life, or improve health outcomes when faced with illness. In addition government-supported science is required to be shared with the taxpayers by law.

Reporters—the news media—serve as the liaison between the scientific expert and the reader or viewer. Communicating scientific findings to the media requires a different style—and often different language—than what is used with scientific colleagues. In an age of shrinking newsroom budgets, senior science writers with decades of experience are being replaced with junior reporters who are required to cover not only health, but all fields of science, the environment, economics, or other topics. This means scientists must work harder to prepare for interviews in order to ensure that the right story is captured, and that complex information is interpreted correctly. Regular media training, practice with mock interviews, and writing key messages that the public can understand are tools investigators need to appropriately prepare for the important job of giving a good interview. This workshop will train epidemiologists to effectively communicate their research findings to the media and public. Workshop participants will learn how reporters think and develop skills for successful interviews with journalists.

S/P indicates work done while a student/postdoc

PRE-DONATION EGFR, EARLY POST-DONATION EGFR, AND SUBSEQUENT ESRD RISK IN LIVING KIDNEY DONORS Allan B. Massie* Allan B. Massie, Lara Fahmy, Macey L. Thompson Henderson, Alvin Thomas, Jon Snyder, Dony L. Segov, (Johns Hopkins University)

Living donor kidney transplantation provides substantial survival benefit and improved quality of life to recipients however, accurate predonation screening and postdonation medical care for living donors (LKD) is paramount. The relationship between predonation renal function (estimated glomerular filtration rate; eGFR) and long-term risk of postdonation end-stage renal disease (ESRD) has not been characterized. Moreover, while transplant centers are required to collect postdonation serum creatinine (SCr) in donors, the clinical utility of measuring early postdonation renal function is unknown. Using national registry data from the United States (SRTR), we studied ESRD risk in 66,052 LKDs 1999-2015 who were ESRD-free 9 months post-donation and had at least one SCr reported to the registry between 3 and 9 months post-donation (6m-post-eGFR) using Cox regression and adjusting for donor age, sex, race (black vs all other), highest degree biological relationship to recipient, and BMI. Predonation eGFR and 6m-post eGFR were calculated using the CKD-EPI equation. Donor eGFR declined from median (IQR) 98 (84-110) ml/min/1.73 m2 predonation to 65 (50-74) ml/min/1.73 m2 6m-post. A 10-unit increase in predonation eGFR was associated with 17% decreased risk of ESRD (aHR=0.83 (0.70-0.99), p=0.04). In a separate model, a 10-unit increase in 6m-post eGFR was associated with 40% decreased risk of ESRD (aHR=0.60 (0.46-0.79), p<0.001). In a combined model, the association between predonation eGFR and ESRD risk disappeared (aHR per 10-unit increase 0.98 (0.79-1.21, p=0.9) while the association between 6m-post eGFR and ESRD risk remained the same (aHR per 10-unit increase 0.60 (0.44-0.83), p<0.001), suggesting that the association between predonation eGFR and ESRD is fully mediated by 6m-post eGFR. Both predonation and 6m-post eGFR are inversely associated with postdonation ESRD risk in LKDs. Careful monitoring of early postdonation eGFR is essential to provide adequate postdonation care and counseling.
VITAMIN D STATUS AMONG ADOLESCENTS IN KUWAIT Abdullah Al-Taia* Abdullah Al-Taia, Abdur Rahman, Reem Al-Sabah, Asmar Al-Harbi, (Faculty of Medicine, Kuwait University) Background and objectives: In Kuwait as in many Arab states in the gulf region, there are limited data on the prevalence of vitamin D deficiency among healthy adolescents. This study aimed to estimate the prevalence of vitamin D deficiency in a nationally representative sample of adolescents and investigate factors associated with vitamin D status. Methods: Cross-sectional study was conducted on 1416 adolescents who were randomly selected from middle schools in all governorates of Kuwait. Data were collected from parents and adolescents while vitamin D was measured using liquid chromatography-tandem mass spectrometry (LC-MS/MS). Logistic regression was used to investigate the independent factors associated with vitamin D status. Results: The Prevalence of vitamin D deficiency was 1.150 (81.21%, 95%CI: 71.61-90.81) while severe deficiency was 59.5 (39.08%). Only 51 (3.60%) were vitamin D sufficient. Prevalence was significantly higher among females compared to males (91.69% vs. 70.32%; p<0.001). There was a significant inverse relationship between vitamin D status and preterm birth (OR 2.87, 95% CI 1.84-4.45 for 10-14 vs. 15-26). Conclusions: Higher concentrations of vitamin D were associated with a lower risk of preterm birth.
RECENT INCREASE IN MENTAL HEALTH HOSPITALIZATIONS AMONG CHILDREN: AN AGE-PERIOD-COHORT ANALYSIS IN NEW YORK STATE, 1999-2013

Sze Yan Lin*, Sze Yan Lin, Sangwoo Lim, (NYC DOHMH)

Currently, one in 10 pediatric hospitalizations in the United States are for psychiatric conditions. Adolescent psychiatric hospitalizations have been increasing nationally and locally. To better understand these trends in New York State, we conducted an age-period-cohort analysis of psychiatric hospitalization rates (principal diagnosis with ICD-9 codes 290-316 in ages 3-17), in NYS from 1999-2013. We used data from the Statewide Planning and Research Cooperative System, an administrative database of all hospital discharges reported by New York State hospitals and child population counts from the U.S. Census. We constructed descriptive plots of age by period and age by cohort to visualize trends and ran intrinsic estimator constrained-Poisson regression models. All analyses were repeated for 2005-2013 emergency department (ED) utilization rates and analyses restricted to severe psychiatric conditions. Results suggest the increase is attributable to all three dimensions. Differential age rates were noted, with the largest rates among adolescents. Increased period effects were found about two years after the September 11, 2001 attacks and after the Great Recession in 2008-9 (e.g., period effect for 2004 = 0.36, 95% CI: 0.28, 0.45). All birth cohorts born before 2001 showed small elevated effects. The largest cohort effects were noted among children born in 1992-1995, who were aged 6-9 years at the time of the 9/11 attacks and 13-17 years at the start of the Great Recession (e.g., cohort effect for 1994 = 0.29, 95% CI: 0.16, 0.42). Analyses with ED rates from 2005-2013 and restricting hospitalizations to severe mental health conditions showed similar trends. Our results suggest exposure to mass traumatic events during key childhood developmental periods have cascading mental healthcare utilization consequences. Further research is needed to test mechanisms and to see whether these birth cohort continue to experience elevated mental health risk in adulthood.

INFLUENCE OF MATERNAL EARLY PREGNANCY SERUM THYROID HORMONES ON CORD SERUM THYROID HORMONES Noelle Kotsasek*, Noelle Kotsasek, Yingying Xu, Kimberly Volton, Joseph Baum, Megan Romano, Andy Househag, Bruce Lamprecht, (Barnard College of School of Medicine)

Maternal thyroid hormones play an integral role in fetal neurodevelopment and physical growth. The primary objective of the current study was to assess the influence of maternal thyroid hormones in early pregnancy on cord serum thyroid hormones. We also explored the association between cord serum thyroid hormone concentrations and child thyroid stimulating hormone (TSH) at age three years. TSH, free and total thyroxine (T4), and triiodothyronine (T3) were measured in maternal serum collected at ~16 weeks' gestation, cord serum, and child serum collected at age three years by immunoassay among participants in a prospective pregnancy and birth cohort, the Health Outcomes and Measures of the Environment (HOME) Study. We built multivariable linear regression models adjusting for maternal sociodemographic and perinatal factors collected by survey and medical record abstraction. These include maternal age, race, marital status, parity, body mass index, smoking status, household income, and mode of delivery. There were 151 newborns with mothers for whom thyroid hormone concentrations were available and 120 children for whom delivery thyroid hormone concentrations were available. We observed a 1-4% increase in cord TSH for each doubling of maternal TSH (95% confidence interval (CI), 4.77). Maternal thyroid hormones were not associated with other cord serum thyroid hormones. For every 0.2 ng/dL increase in cord free T4, approx. one standard deviation increase, an 11% decrease in child TSH was observed at age three years (95% CI: 20.2). These findings may inform future directions in which maternal and cord serum thyroid hormone levels are used to predict child thyroid hormone levels at a later time point.

DOES SLEEP MODIFY THE RELATIONSHIP BETWEEN HEALTH RISK BEHAVIORS AND CONTRACEPTION NON-USE? FINDINGS FROM A NATIONAL SAMPLE OF ADOLESCENTS Allison R. Casola, MPH, Allison R. Casola, Freda Patterson, PhD, Alicia J. Lazzaro, MS (Temple University College of Public Health)

Purpose: Restricted sleep (<8 hours/night) is common among adolescents and has been shown to moderate the relationship between health-related risk behaviors and contraceptive non-use, such that restricted sleepers have poorer outcomes. This study examined the extent to which sleep duration moderates the relationship between risk behaviors and correlates and contraception non-use (CNU) in adolescents. Methods: Using data from wave 1 of the National Longitudinal Study of Adolescent to Adult Health (Add Health), weighted multiple logistic regression models were used to examine the association between health behaviors and correlates (e.g., substance use, self-esteem, mental health, and neighborhood and family factors) and CNU. (Weighted N=8,259,923). Analyses were adjusted for sex, race, and age, and subsequently stratified by sleep duration (short [30% in the past month] (adjusted OR=2.38, 95% CI:1-43.4, 66), perceived overweight body image (OR=1.30, 95% CI:1.01,1.67), feeling unsafe in neighborhood (OR=1.41, 95% CI:1.05,1.90), feeling that your family does not pay attention to you (OR=1.35, 95% CI:1.06,2.27), were found to be significant predictors of CNU. However, in stratified models, short sleep moderated only the relationship between heavy marijuana use and CNU (prevalence <8 hours/3%, 28 hours 2%; OR=1.40, 95% CI:1.62,1.2.46, p<0.005) and the relationship between feeling as though your family does not pay attention to you and CNU (OR=1.53, 95% CI:1.07,2.320, p<0.05). Conclusion: Short sleep modified only the relationship between heavy marijuana use and CNU and perceived family attention and CNU. Interventions discussing contraception use should also address sleep duration and marijuana use among adolescents.

AUTISM AND METABOLOMICS IN MATERNAL SERUM Qi Yan*, Qi Yan (UCLA School of Public Health)

Background: The mechanism of autism, especially the development of autism at early stage remains unclear. Identifying maternal metabolic features and pathways associated with autism offers an opportunity for understanding this question. Objective: The aim of this study is to comprehensively profile metabolomics in the blood of women in mid-pregnancy and identify maternal metabolic features and pathways associated with autism in offspring using high-resolution metabolomics. Methods: We retrieved maternal serum samples from the mid-pregnancy alpha-feto protein testing program in California for a largely immigrant Hispanic community of women living in the Central Valley of California. Half of the women had given birth to a child who diagnosed with autism in childhood according to the California Department of Developmental Services records. By using state-of-the-art high-resolution metabolomics (HRM) that can identify nearly half of the metabolites in the KEGG/HMDB/LipidMaps human metabolic databases, we identified 3917 metabolic features and pathways resulting from high-resolution metabolomics were used for discriminant analysis and pathway analysis. We have identified 34 metabolic biomarkers that can potentially classify the autism status with over 90% accuracy. Pathway analysis showed that autism was associated with glycerophospholipid metabolism, alanine and aspartate metabolism, pyrimidine and purine metabolism pathways, and arginine and proline metabolism. Conclusions: By identifying metabolomics features and pathways that are associated with autism, we found that differences in phospholipid metabolism, inflammation and oxidative stress which may contribute.
OBJECTIVE: To prospectively investigate the association of cesarean delivery with metabolic syndrome (MetS) in Chinese children born 1-10 years earlier. Methods: 1467 Chinese children whose mothers had participated in a previous trial of prenatal micronutrient supplementation were followed up at 4-7 years of age in 2013. 737 children were delivered by elective cesarean section (ECS) and 730 by spontaneous vaginal delivery (SVD). MetS was defined as the presence of ≥3 components: high blood pressure, high fasting glucose, abdominal obesity and high blood pressure. Results: 64% (N=47) of children delivered by ECS versus 5.5% (N=40) by SVD were determined to have MetS (P<0.001). Children born by ECS versus SVD were more likely to have abdominal obesity (27.7% vs. 21.4%; P=0.005), high blood pressure (15.1% vs. 11.5%; P = 0.045), ≥ 1 MetS component (72.9% vs. 68.0%; P=0.039) and ≥2 MetS components (22.9% vs. 14.6%; P=0.02) in comparison to SVD. Furthermore, the risk of having ≥2 MetS components was higher in children delivered by ECS versus SVD (odds ratio 1.61; 95% confidence interval 1.11-2.34; P=0.01). When controlling for maternal age, race/ethnicity, tobacco use, and maternal educational attainment, which were identified using the back-door criterion in a multivariable regression, these associations were attenuated. Conclusion: Our results suggest that elective cesarean delivery is associated with higher risk of MetS in Chinese children.
EVIDENCE OF CHRONIC HPA DYSREGULATION IN MOTHERS DELIVERING PRETERM: A NESTED CASE-CONTROL STUDY Bizu Gelaye*…

PRECONCEPTION RISK FACTORS FOR PRETERM DELIVERY: A POPULATION-BASED ASSESSMENT Rachael Hemmert* Rachael Hemmert, Monika McElwan, Karen Schliep, (University of Utah)

Preterm births (PTB), births <37 weeks, in the US have risen 36% since 1984, with currently 1 in 8 babies both preterm, for surpassing other developed countries. Most research has focused on early and mid-trimester pregnancy clinical or biologic indicators to predict PTB. Less research has been done on maternal preconception factors, particularly within different population-based samples using the most recent data. Our objective was to assess preconception risk factors for PTB using the Utah Pregnancy Risk Assessment Monitoring System (UT-PRAMS), 2012-2014 data. A sample of approximately 200 new mothers (6-9 months postpartum) per month was randomly selected from a stratified (by birth weight, education level) sample of birth certificates to participate in UT-PRAMS. Women with preterm birth outcome data were included in the analysis (n=478, 10%). Preconception prediction for PTB among Utah mothers were evaluated via adjusted Position regression to generate prevalence ratios (PR) and 95% CIs, taking into account the stratified sampling design. Factors considered included maternal age, race, education, income, insurance, marital status, smoking, drinking, abuse history, life stressors, health conditions, pregnancy intention, and prior pregnancy outcomes. PTB prevalence among UT women 2012-2014 was 7.8%. In the full multivariable regression model factors positively linked with PTB included having had a prior PTB (PR: 3.79, 95% CI: 1.64, 3.83), depression diagnosis by health care provider (PR: 2.27, 95% CI: 1.42, 3.63), and increased maternal age (PR: 1.04, 95% CI: 1.01, 1.07). Self-reported anxiety 3 months prior to pregnancy was found to be inversely linked with PTB (PR: 0.54, 95% CI: 0.34, 0.86). While our findings are largely in line with a recent preconception normogram created using 2004-2009 national PRAMS data, their exclusion of depression and anxiety within the 21 preconception variables assessed may limit the predictive ability of their nomogram.
USING AGENT-BASED NETWORK MODELS TO EVALUATE AN MRSA SURVEILLANCE PROGRAM IN THE NEONATAL INTENSIVE CARE UNIT Neal D. Goldstein*, Neal D. Goldstein, Samuel M. Jennett, David A. Paul, Stephen C. Eppes. (Department of Pediatrics, Children's Care Health System)

Background: Our group previously constructed a novel agent-based network model reflecting empirically-observed practices in a neonatal intensive care unit (NICU) to study methicillin-resistant Staphylococcus aureus (MRSA) colonization among infants. In this extension, we replicate our surveillance program, including decolonization and isolation, and evaluate program effectiveness by varying the surveillance frequency.

Methods: One hundred NICU networks of 52 infants were simulated over a 6-month period to assess longitudinal transmission of MRSA. Unit-wide surveillance occurred every 28 days for 2 to 4 weeks, according to the NICU policy of dynamic surveillance, weekly when at least one positive screen, otherwise every three weeks. At each surveillance period, colonized infants received a decolonization regimen (56% effective) and were moved to isolation rooms if available (max of 4 infants). Results: Dynamic surveillance resulted in an averaged 24 surveillance episodes, similar to a weekly program (26 episodes). Despite the frequent surveillance of the dynamic policy, in terms of detecting colonized infants it performed comparable to a biweekly program. At each surveillance period, an averaged 1.0 infants were screened positive with a mean duration of colonization of 248 hours in the dynamic setting, compared to 1.3 colonized infants with a mean duration of 270 hours in the biweekly setting. Isolation rooms were available 46% of the time in the dynamic setting and 56% of the time in the biweekly setting. Surveillance 7 or 4 weeks resulted in a more MRSA colonized infants with longer mean colonization durations, yet increased availability of isolation rooms.

Conclusion: An effective MRSA surveillance program needs to balance resource availability with potential for harm to these patients. While more frequent surveilling resulted in more frequent use of a decolonization regimen, it reduced the likelihood of isolation rooms being available.

MATERNAL CARDIOMETABOLIC DETERMINANTS OF BREASTFEEDING NONINITIATION IN SOUTH CAROLINA BY MATERNAL RACE AND ETHNICITY Danielle Stevens*, Danielle Stevens, Kelly Hunt. (Medical University of South Carolina)

Background: In order to inform targeted clinical interventions, we sought to identify maternal cardiometabolic determinants of breastfeeding noninitiation by race/ethnicity. Methods: Our study population is comprised of 12,077 non-Hispanic whites (NHW), 68,877 non-Hispanic Blacks (NHB) and 20,084 Hispanics with live singleton births in South Carolina delivered at a gestational age between 37-44 weeks from January 2004 to 2008. Logistic regression was used to evaluate the association between maternal cardiometabolic factors and breastfeeding noninitiation by hospital discharge, with stratification by race/ethnicity to examine race/ethnic differences in this population. Results: Compared to NHW and Hispanics, NHB were more likely to be overweight or obese, hypertensive, and/or diabetic entering the pregnancy. Breastfeeding noninitiation was also higher among NHB (NHW: 31.5%, NHB: 36.8%, Hispanics: 14.6%). In full models, all race/ethnicities were significantly less likely to initiate breastfeeding if they were obese or diabetic prior to pregnancy, or gained inadequate weight during the pregnancy. Hypertension was significantly associated with higher rates of breastfeeding noninitiation among NHW (Odds Ratio [OR]: 1.06, 95% Confidence Interval [95% CI]: 1.01, 1.17) and NHB (OR: 1.07, 95% CI: 1.02, 1.13), but not Hispanics. NHW women were significantly less likely to initiate breastfeeding if impacted by gestational diabetes (OR: 0.92, 95% CI: 0.86, 0.98) or excessive weight gain during pregnancy (OR: 0.93, 95% CI: 0.90, 0.97). Conclusions: Our study shows that breastfeeding noninitiation in South Carolina varies by maternal cardiometabolic factors and race/ethnicity. This study can aid in the development of tailored clinical and public health breastfeeding interventions and improve maternal and child health.

POOR HOUSING QUALITY IN NEW YORK CITY AND ITS ASSOCIATION WITH TODDLER COGNITIVE DEVELOPMENT Arbor J.L. Quist*, Arbor J.L. Quist, Maida P. Galvez, Mary S. Wolf, Stephanie S. Engel. (University of North Carolina at Chapel Hill, Epidemiology Department, Chapel Hill, NC)

Background: Child cognitive development is influenced by environment, from chemical to built environment. Few studies have assessed the association between housing quality in early life and cognitive development. Methods: We conducted multivariable linear regression of 12-month HQI with the mental development index (MDI) of the Bayley Scale of Toddler Development. We assessed modification by race/ethnicity. Results: The association was imprecise. No association was observed cross-sectionally at 24 months. Associations differed somewhat by race/ethnicity. Insufficient heat was the only housing characteristic most adversely associated with cognitive function. Conclusion: Housing quality may be associated with performance on child cognitive development tests. Individuals residing in public and rental housing lack control over aspects of their housing quality; therefore, housing authorities and homeowners need to be responsive to repair requests to ensure that homes are safe places for child development.

S/P indicates work done while a student/postdoc

Evidence from clinical trials suggests that canagliflozin, a sodium-glucose cotransporter-2 (SGLT-2) inhibitor for the treatment of Type 2 diabetes, may be associated with lower extremity amputation. We quantified the association between oral Type 2 diabetes medication use, foot and leg amputation, and other vascular outcomes, including peripheral arterial disease, critical limb ischemia, osteomyelitis and ulcers. To do so, we conducted a retrospective, new user design cohort study using Truven MarketScan Commercial Claim and Encounter data from September 2012 and September 2015. We focused on 2.0 million commercially insured individuals and used propensity score weighting to balance baseline differences among groups. Sensitivity analyses varied statistical models, assessed the effect of combining DPP-4 inhibitors and GLP-4 agonists as a single referent group, and adjusted for baseline use of older oral agents. Of 20 million potentially eligible individuals, a total of 935,073 were included in the final analyses, including 38,692 (4.2%) new SGLT-2 inhibitor users, 101,408 (10.9%) new DPP-4 inhibitor users, and 37,932 (4.1%) new GLP-4 agonist users. After propensity score weighting and adjustment for demographics, severity of diabetes, comorbidities and medications, there was a non-statistically significant increased risk of amputation associated with new use of SGLT-2 inhibitors compared with DPP-4 inhibitors (adjusted hazard ratio [aHR] 1.50, 95% confidence interval [CI] 0.85-2.67) and GLP-4 agonists (aHR 1.47, CI 0.64-3.36). SGLT-2 inhibitor use was associated with amputation compared with sulfonylureas, metformin, or thiazolidinediones (aHR 2.12, CI 1.19-3.78). These results persisted in sensitivity analyses. SGLT-2 inhibitors may be associated with increased risk of amputations compared with some oral Type 2 diabetes medications. Further observational studies are needed with extended follow-up and larger sample sizes given the importance of the primary outcome of interest.

Efficacy and Safety of Biosimilar Insulins Compared to Their Reference Products: A Systematic Review Carolyn Tien* G Caleb Alexander, Minli DeFaria, Eleanor Lucas, Lori Rosman, (Johns Hopkins Bloomberg School of Public Health)

For nearly a century, no generic insulin has been available in the United States. However, the first biosimilar insulin, Basaglar, was approved by the U.S. Food and Drug Administration in 2015, and more biosimilar insulins are in late stage clinical development. We summarized the scientific evidence comparing the safety, efficacy, pharmacokinetics, and pharmacodynamics of biosimilar and reference insulins. To do so, we conducted a systematic review using PubMed, Cochrane, Embase, Latin America and Caribbean Health Sciences (LILACS), South Asian Database of Controlled Clinical Trials (SADCT), and IndianMED from inception of Basaglar through September 7, 2016. We included randomized controlled trials (RCTs) comparing safety, clinical efficacy, pharmacokinetics and pharmacodynamics of any biosimilar insulin with a reference product in adults regardless of sample size and location. Two researchers independently reviewed all titles, abstracts and text, extracted data and performed quality assessments. Of 898 articles screened, six studies were included in the data synthesis. The trials investigated L2063016t, Basaglar and Basalin, all with insulin glargine (Lantus) as a reference product. Two trials included healthy volunteers, three enrolled type 1 diabetes and one enrolled type 2 diabetes. Of the six studies, three examined pharmacokinetic and/or pharmacodynamic parameters and three examined clinical efficacy and immunogenicity. All studies included adverse events. All PK and/or PD studies showed that comparable parameters of biosimilar and reference products were within the pre-specified equivalence margins. Clinical studies suggested similar clinical efficacy and immunogenicity. Adverse events were similar between the groups across all studies. In conclusion, the published studies have compared biosimilar and reference insulins, though those that have suggest that biosimilar glargine has comparable safety and clinical efficacy as its reference product.

COMPARISON OF ADVERSE EVENTS REPORTED IN FDA DOCUMENTS AND JOURNAL ARTICLES FOR RANDOMIZED CONTROLLED TRIALS ON GLUCOMA DRUGS Jinjin Wen*, Jinjun Wen, Lin Wang, Tianjing Li (Johns Hopkins Bloomberg School of Public Health)

Background In randomized controlled trials (RCTs) conducted for seeking regulatory approval, the Food and Drug Administration (FDA) requires "identify the most commonly occurring adverse reactions". Therefore, adverse events (AEs) data meeting the reporting thresholds are presented in the approval packages. AEs are often under-reported in journal articles. Our objective is to compare the reporting of AEs in RCTs of glaucoma drugs where both a FDA approval package and a corresponding publication are available. Methods We searched the FDA website for RCTs on the first-line medications for open angle glaucoma. We identified matching journal articles of the RCTs through the characteristics of the trials. We extracted AEs from the FDA approval packages and the journal articles. We compared the consistency of reporting thresholds, types and number of AEs reported. Results Of the 31 RCTs we identified, 14 had a matching journal article to a FDA approval package. A reporting threshold was mentioned in the approval packages for all 14 RCTs, however, in the journal articles, 10/14 reported a different reporting threshold and 3/14 did not mention the threshold. For example, for trial NDA #21-257, the FDA approval package noted that "number (%) of patients with clinical adverse experiences (≥ 1 % in any treatment group)". In the matching journal article, a different threshold was presented - "ocular and local adverse events (incidence ≥ 2% in any treatment group)". Journal articles tend to report only ocular and local AEs instead of reporting all AEs by MedDRA System Organ Class (SOC) as was used in the FDA approval packages. On average, 9.1 types of ocular and local AEs are reported in journal articles compared to 17.8 ocular and local AEs in the FDA approval packages (and a total of 38.8 AEs by SOC). Conclusion Under- and over-reporting of AEs in journal articles may lead to biased conclusions about products' safety. AEs reporting should be improved in journal articles to reflect a more precise safety profile.

TRENDS IN PRESCRIPTION OPIOID USE AMONG HEMODIALYSIS PATIENTS IN THE UNITED STATES, 2007-2014 Matthew Daubresse*, Matthew Daubresse, (Johns Hopkins School of Public Health- Department of Epidemiology)

Aim: Hemodialysis (HD) patients frequently experience chronic pain and have an elevated risk of opioid-related adverse events. Few studies have examined opioid utilization among these patients. We estimated annual rates of opioid utilization among HD patients. Design: We used individual-level longitudinal data from the United States Renal Data System and Poison data to estimate rates of opioid utilization among HD patients from 2007 through 2014. We limited our analysis to HD patients 18 years and older with consistent Medicare Part A, B and D coverage. Setting: Continental United States and Hawaii Measurements: Annual rates of opioid (1) prescriptions, (2) pills, (3) days supply, and (4) morphine milligram equivalents (MME) dispensed per 100 person years. Results Of the 485,050 patients who met our inclusion criteria, 47% were females and 50% were over 62 years of age. Our preliminary findings suggest, the percentage of HD patients who received at least one opioid prescription remained stable (57-59%) between 2007 and 2013, then declined substantially in 2014 (50%). Overall rates of opioid prescriptions, pills, days supply and MME increased from 2007 to 2010 then declined until 2014. The incidence of opioid prescriptions among the entire population of HD patients declined from 126 per 100 person days in 2009 to 100 per 100 person days in 2014. The incidence of opioid pills dispensed peaked in 2011 at 78 pills per 100 person days. Conclusion: Although opioid utilization among HD patients has declined in recent years, HD patients continue to receive a substantial amount of opioids.

S/P indicates work done while a student/postdoc
MATERNAL LEVELS OF PERFLUOROALKYL SUBSTANCES DURING PREGNANCY AND GESTATIONAL WEIGHT GAIN IN A CONTEMPORARY BRITISH COHORT

Kristin J Marks*, Kristin J. Marks, Zufa Jafarony, W. Datta Flanders, Kate Northstone, Abigail Fraser, Terryl J. Hartnett, (Emory University Centers for Disease Control and Prevention)

Perfluoroalkyl substances (PFAS) are commercially synthesized chemicals used in consumer products such as nonstick cookware and textiles. PFAS may act as endocrine disruptors, influencing metabolic pathways and growth trajectories. Our objective was to analyze the associations between maternal serum pregnancy levels of four common PFAS (perfluorooctanoate (PFOA), perfluorooctane sulfonate (PFOS), perfluorobutanesulfonate (PFBS), and perfluorooctanesulfonate (PFOSA)) and gestational weight gain (GWG). We used data from 4070 pregnant women in a subsample of the Avon Longitudinal Study of Parents and Children (ALSPAC), a UK prospective pregnancy cohort (baseline: 1991-1992). Women were routinely weighed in antenatal check-ups and measures were abstracted from obstetric medical records; the first weight measurement (if before week 18) was subtracted from the last (if after week 28) to determine absolute GWG. PFAS were measured via the Pregnancy Physical Activity Questionnaire (PPAQ) using a single question per PA level; the first weight measurement (if before week 18) was subtracted from the last (if after week 28) to determine absolute GWG. PFAS were measured in serum at median 18 weeks (interquartile range (IQR): 11-32). Linear regression was used to explore associations between PFAS concentrations and absolute GWG, stratified by levels of pre-pregnancy body mass index (BMI) and offspring sex. Models were adjusted for maternal education, pregestational smoking, maternal age, parity, pre-pregnancy BMI, and gestational age at sample collection. For over weight (n=63) and obese (n=27) mothers of girls, 10% increases in PFOA were associated with a lower GWG of -0.34 kg (95% CI: -0.82, -0.04) and -0.41 kg (95% CI: -0.82, -0.01), respectively, and 10% increases in PFNA were associated with a lower GWG of -0.42 kg (95% CI: -0.73, -0.11) and -0.76 kg (95% CI: -1.69, 0.17), respectively. Associations among mothers of boys and among underweight and normal weight mothers of girls were null. These findings suggest that maternal levels of PFAS during pregnancy are associated with lower absolute GWG primarily among overweight and obese mothers of girls.

REPRODUCTIVE

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0871 SP

THYROID FUNCTION AND IODINE CONCENTRATION AS RISK FACTORS FOR GESTATIONAL DIABETES IN A POPULATION-BASED STUDY

Griffith Bell* Griffith Bell, Turja Mannisto, Aki Ila, Kerttu Nuutinen, Kamatt, Edouard Yeung, Unsung Kim, Ellis Savellit, Helija-Mari Surcel, Mike Glasser, James Mills, (Eunice Kennedy Shriver National Institute of Child Health and Human Development)

Background: Iodine is essential for thyroid function, and iodine deficiency is common in Latin America and the Caribbean, particularly during pregnancy when iodine requirements increase. Thyroid hormones are essential for normal glucose metabolism. However, no published studies have examined the potential role of iodine deficiency in the relationship between thyroid function and gestational diabetes mellitus (GDM).

Methods: We conducted a population-based, nested case-control study within the Finnish Maternity Cohort (FMC) using pregnancy and maternal outcome data from the Finnish Maternal Birth Register (FMBR). We randomly selected 224 GDM cases with singleton pregnancies and 226 controls without GDM from all singleton births occurring in Finland during 2012-2013. Blood was drawn on average at 10-14 weeks gestation and analyzed for serum iodine, thyroglobulin (Tg), and thyroid-stimulating hormone (TSH) concentrations.

Results: Regression was used to estimate ORs and 95% confidence intervals of GDM, with adjustment for age, pre-pregnancy BMI, socio-economic status, smoking during pregnancy, parity and marital status. Results: Very high TSH concentrations (>95th percentile: ≥83 μIU/L) was not associated with significantly altered odds of GDM compared to those with normal levels (OR: 0.41; 95% CI: 0.12, 1.38). High concentrations of TSH (≥31 μIU/mL) were also not associated with increased odds of GDM compared to normal levels of TSH (OR: 0.45; 95% CI: 0.06, 3.18). The women with the lowest quartile (<6 μg/L) of iodine concentration did not have increased odds of GDM compared to those with iodide in the highest quartile (OR: 0.57; 95% CI: 0.32, 0.84) or did women with the lowest 5th percentile (≤1.8 ng/mL) of iodine concentrations did not have increased odds of GDM compared to those with iodide in the highest quartile (OR: 0.61; 95% CI: 0.39, 0.95). In women with TSH ≥31 μIU/mL, low concentrations of iodine were associated with increased risk of GDM.

Conclusions: Our study provides reassuring evidence that low levels of iodine and thyroid function in early pregnancy are not associated with increased risk of GDM in this population.

0872 SP

PHYSICAL ACTIVITY IN PREGNANCY AND THE RISK OF CESAREAN DELIVERY AMONG HISPANIC WOMEN

Lindsey M. Russo, Lindsey M. Russo, Megan W. Harvey, Penelope Pekow, Lisa Chasan-Taber, (Department of Biostatistics & Epidemiology, University of Massachusetts Amherst, Amherst, MA)

Background: Rates of cesarean delivery in the United States (US) have continued to increase among Hispanics, the largest minority group in the US with the highest birth rates. Prior studies of the relationship between physical activity (PA) and cesarean delivery have been conflicting, limited by use of questionnaires not meeting PA guidelines. We evaluated the association between PA and cesarean delivery among participants (n=126) in Proyecto Buena Salud, a prospective cohort study conducted in Massachusetts from 2000-2011. PA in pregnancy was measured via the Pregnancy Physical Activity Questionnaire (PPAQ). PA guidelines were defined as ≥150 minutes of moderate-intensity sports/exercise per week. Cesarean delivery was abstracted from medical records. Results: A total of 320 (24.4%) participants delivered via cesarean. In multivariable analyses, increasing sedentary activity in mid-late pregnancy was associated with an increased risk of cesarean (OR 1.14, 95% CI 1.02-3.33; p=0.05) but there was no clear pattern between PA and cesarean. We then repeated the analysis excluding planned cesareans (n=126). Increasing sedentary activity in pre-, early, and mid-late pregnancy was associated with a 2-fold increased risk of unplanned cesarean (p=0.005). High levels of moderate-intensity activity in pregnancy (OR=0.61, 95% CI 0.38-0.99) and increasing moderate-intensity PA in mid-late pregnancy (p=0.005) were associated with a reduction in risk. Increasing levels of household/caring activity in pre and mid-late pregnancy were associated with a 50% reduction in risk (p=0.05). Meeting PA guidelines was not associated with unplanned cesarean. Conclusions: In this prospective cohort of Hispanic women, moderate-intensity and household/caring PA were associated with a reduction in risk of unplanned cesarean delivery.

0873 SP

MOTHER'S AGE AT BIRTH AND DAUGHTER'S RISK OF PREECLAMPSIA IN FIRST PREGNANCY

Olga Basco, Olga Basco, Christine R Weinberg, Anne D'Aloisio, Dale P. Sundle, (McGill University)

Background: Being born to an older mother has been associated with higher body mass index and blood pressure, which may predispose adult women to preeclampsia/ eclampsia (PE). Here, we examined whether mother's age at delivery predicted the daughter's risk of PE in her 1st birth. Methods. We studied 39,482 Sister Study participants with at least one birth and complete information on maternal age and reproductive history. We estimated ORs (95% CI) of PE as a function of maternal age at birth (8 categories) using log-binomial regression models, including mother's age at 1st pregnancy, number of older siblings, highest educational attainment, children, race/ethnicity, and year of birth cohort. Results. Daughters of older mothers were more likely to have been heavier than their peers at age 10 [e.g., RR: 1.39 (95% CI: 1.29-1.51) in women mother who was ≥35 years, compared with 20-24]. PE in 1st birth was reported by 6.2% of participants, and was more frequent in women with a greater relative weight as children (8.2% vs. 5.7%). In multivariable models, PE risk was highest in daughters of teenage mothers [RR: 1.24 (1.04-1.48), compared with those whose mother had been 20-24 years old] and women born to mothers ≥25 had an approximately 10% lower risk. After stratifying by relative weight at age 10, mother's age at birth was not consistently associated with PE in the women who reported having been heavier as children. In women who did not report being heavier, risk of PE declined as mother's age at birth increased [compared with daughters of 20-24-year-olds, RR: 1.33 (1.01-1.61) in daughters of mothers ≥20 years and 0.78 (0.69-0.93) in daughters of mothers ≥35]. Conclusions. Having been born to an older mother predicted higher relative weight at age 10, but was not associated with PE in 1st pregnancy. Among women who, as girls, were not heavier than their peers, risk of preeclampsia unexpectedly declined with increasing maternal age at birth.
URINARY PHYTOESTROGENS AND MENSTRUAL CYCLE LENGTH
Lindsay Levine*, Lindsay Levine, Keewan Kim, Germaine Back Louis, Raji Sundaram, Enrique Schisterman, Matthew Connell, Elizabeth De Villhies, Mohammad Rahman, Suni Mumford, (NICHD, NIH)

Background: Phytoestrogens, found in soy products, seeds, and whole grains, are known to have estrogenic and antiestrogenic activity. However, their impact on menstrual cycle length as a proxy for the hormonal milieu, remains unclear. Therefore, we investigated associations between urinary phytoestrogens and menstrual cycle length in women attempting pregnancy.

Results: This was a population-based prospective cohort study using data from the Longitudinal Investigation of Fertility and the Environment (LIFE) Study. 301 women ages 18-44 with self-reported cycles 21-42 days and no hormonal contraception in effect in the past year were followed. Women were categorized into quartiles of phytoestrogen levels. Cycle length was determined from daily urine samples that captured morning and evening monitor data and categorized as 35 days. Average cycle length was considered, as well as length of the first cycle only, given the short half-life of phytoestrogens. Logistic regression models were used to assess odds ratios (ORs) and 95% confidence intervals (CIs) of cycles 35 days, compared to the 1st quartile, were associated with increased odds of a cycle only (OR 2.39; 95% CI 1.02, 5.55). No associations were observed for the 2nd and 3rd quartiles, compared to the 1st quartile, were associated with increased odds of a cycle only (OR 2.39; 95% CI 1.02, 5.55). No associations were observed for the 2nd and 3rd quartiles, compared to the 1st quartile, were associated with increased odds of a cycle only (OR 2.39; 95% CI 1.02, 5.55).

Conclusion: Our results suggest that high levels of genistein are associated with shorter menstrual cycle length, highlighting the potential importance of phytoestrogens for reproductive health.

REPRODUCTIVE

ENDOGENOUS STEROID HORMONE CONCENTRATIONS AND RISK OF ENDOMETRIOSIS IN THE NURSES' HEALTH STUDY II Amy ShafrAN, Amy ShafrAN, Fan Ma, A. Heather Elkin, Susan E. Hankinson, Stacey A. Míñster., (Division of Adolescent and Young Adult Medicine, Department of Medicine, Boston Children's Hospital and Harvard Medical School, Boston, MA)

Background: Estrogen is a potent trigger for the endometrium and endometriosis, whereas progesterone appears to have an anti-inflammatory effect on the endometrium. However, data are sparse on associations between endogenous steroid hormone levels and endometriosis risk. We prospectively evaluated associations between plasma sex hormones and risk of laparoscopically-confirmed endometriosis.

Methods: In the Nurses' Health Study II, nested case-control study, we ascertained 509 women with incident endometriosis between blood collection (1996-1999) and 2002. Controls (n=1043) were matched 2:1 to cases. Blood samples were collected in the early follicular and mid-luteal menstrual cycle phases. We conducted a multivariable conditional logistic regression accounting for matching and adjusting for demographic, anthropometric, reproductive, diet, and lifestyle factors to estimate relative risks and 95% CIs.

Results: Women with higher follicular total or free estradiol levels had a significant non-linear increased risk of endometriosis (follicular total: 2nd quartile vs 1st RR=2.21 (CI=1.43-3.42); 3rd quartile RR=1.78 (CI=1.35-2.32); 4th quartile RR=1.67 (CI=1.36-2.06); follicular free: 2nd quartile vs 1st RR=1.75 (CI=0.97-3.25); 3rd quartile RR=1.52 (CI=1.25-1.85); 4th quartile RR=1.46 (CI=1.06-2.01)). Among women with ovulatory cycles, a higher progesterone level was associated with lower risk of endometriosis (2nd quartile vs 1st RR=0.47 (CI=0.26-0.84); 3rd quartile RR=0.60 (CI=0.33-1.07); 4th quartile RR=0.43 (CI=0.23-0.79)). We observed a significant threshold effect between total and free testosterone and endometriosis risk. Conclusion: Higher plasma follicular total and free estradiol levels were associated with a non-linear increased risk of endometriosis. Higher progesterone levels were associated with decreased endometriosis risk in ovulatory cycles. Testosterone levels appeared to have a threshold effect with the highest endometriosis risk observed for the highest levels.

DIFFERENCES IN PLASMA CONCENTRATIONS OF ENDOCRINE DISRUPTING CHEMICALS BY PREGNANCY TRYING INTENTIONS
Melissa M. Smar*, Melissa M. Smar, Kunniah-Kusi Kamara, Mohammad Rahman, Katherine L. Garite, Germaine M. Back Louis. (Department of Environmental Health, Rollins School of Public Health of Emory University)

Pregnancy planning status and exposure to endocrine disrupting chemicals (EDCs) are independently associated with reproductive outcomes; however, understanding of their relationship is limited. We aimed to determine whether women with unplanned pregnancies are more/less exposed than women with planned pregnancies. We compared first trimester plasma concentrations of 44 phthalates (PCBs), 11 organochlorine pesticides (OCPs), and polybrominated diphenyl ethers (PBDEs) in 329 women with unplanned pregnancies and 117 women with planned pregnancies. Results: Women with unplanned pregnancies had higher concentrations of several PBDE congeners and PCBs compared to women with planned pregnancies. Women with unplanned pregnancies were more likely to be exposed to the highest threshold level of PBDE 47 (51% vs 2% of women with planned pregnancies). There were no significant differences in exposure to OCPs and phthalates. Conclusion: Women with unplanned pregnancies are more exposed to PBDEs and PCBs compared to women with planned pregnancies. These findings highlight the importance of considering pregnancy planning status when interpreting exposure assessments.
Background: Postpartum readmission is an important measure of quality of care, yet recent evidence indicates readmission rates may be increasing. In this study, we examine institutional and clinical predictors of postpartum readmission within 30 days. Methods: We examined data from the 2013 and 2014 Nationwide Readmission Databases (NRD). The NRD is a nationally representative survey of discharges that includes data from approximately 70 million discharges (weighted) from 21-22 states. Postpartum women were identified using International Classification of Diseases, 9th Revision (Clinical Modification) diagnosis and procedure codes and All Patients Refined Diagnosis Related Group (APR-DRG). Eligible patients included women 18-50 years who delivered in the first 9 months of the year who were not missing length of stay. Clinical characteristics included APR-DRG severity of illness, number of diagnoses, procedures, external cause and chronic conditions, and 10 specific comorbidities. Odds ratios were estimated using SAS survey procedures to adjust for survey design. Results: Facilities in non-urban areas had lower readmission rates, while teaching hospitals and those in lower income zip codes had higher readmission rates. Multiple comorbidities, including obesity, psychiatric diagnoses, hypertension, and diabetes were associated with a two-fold or larger increase in the odds of readmission. Each medical diagnosis was associated with a 12% increased odds of readmission (OR=1.12, 95% CI 1.12, 1.13) and each diagnosis of a chronic medical condition was associated with a 32% increase in odds (OR=1.32, 95% CI 1.30, 1.33). Risk of readmission increased from 1.7 fold to a 7.0 fold increase as APR-DRG severity of illness increased from moderate to extreme. Conclusion: Facility characteristics and patient medical status predict postpartum readmission within 30 days. Hospital referral practices may increase admissions to teaching and urban facilities.
VITAMIN D INSUFFICIENCY, TH2 CYTOKINES, AND ASTHMA OUTCOMES IN PUERTO RICAN CHILDREN Yueh-Ying Han* Yueh-Ying Han, Erick Forno, Juan C. Celedón, (University of Pittsburgh)

Background: T helper type 2 (Th2) cytokines, including interleukin (IL)-5 and IL-13, are key to the development of atopy and asthma. Increasing evidence also suggests that vitamin D plays a role in asthma pathogenesis. Methods: In a case-control study of asthma, 523 Puerto Rican children (ages 6-14 years) in San Juan, Puerto Rico, completed a respiratory health questionnaire and spirometry testing, and had data on plasma cytokines (IL-5 and IL-13) and atopy markers (total IgE and eosinophils). Asthma was defined as physician-diagnosed asthma and ≥1 episode of wheeze in the previous year. Atopy was defined as ≥1 positive IgE to five common allergens. Multivariate regression was used to evaluate the relation between IL-5 or IL-13 and asthma, lung function, or atopy markers. On the basis of our prior studies, we also conducted an analysis stratified by vitamin D insufficiency (25-hydroxyvitamin D ≤30 ng/ml vs >30 ng/ml). Results: After adjusting for covariates and potential confounders, higher IL-5 (each log10-unit increment) was associated with 1.88 times higher odds of asthma (95% CI=1.01-3.40). Among asthma cases, each log10-unit increment in IL-5 or IL-13 was associated with 136-180 ml lower FEV1, 4.8%-6.3% lower FEV1/FVC, and lower vitamin D levels. IL-5 and IL-13 were associated with total IgE and eosinophils in children with atopic asthma. Moreover, higher IL-5 and IL-13 were associated with increased total IgE and eosinophils among asthmatic children with vitamin D insufficiency, but not among those with sufficient vitamin D. Conclusion: Among children with asthma, IL-5 and IL-13 were associated with total IgE and eosinophils in those with vitamin D insufficiency, but not in those with vitamin D sufficiency. Our results further suggest that vitamin D insufficiency has detrimental effects on atopic asthma.

S/P indicates work done while a student/postdoc
NOVEL FRAILTY SCREENING QUESTIONNAIRE (FSQ) PREDICTS 8-YEAR MORTALITY IN OLDER ADULTS IN CHINA

Lina Ma*, Lina Ma, Zhe Tang, Piu Chan, Jeremy Walston, (Johns Hopkins University; Xuanwu Hospital of Capital Medical University)

Background: Although frailty status greatly impacts health care in countries with rapidly aging populations, little is known about the frailty status in Chinese older adults. Given the increased health care needs associated with frailty, we sought to develop an easily applied self-report screening tool based on four of the syndromic frailty components and sought to validate it in a population of older adults in China. We developed a simple self-reported frailty screening tool—the Frailty Screening Questionnaire (FSQ)—based on the modified Fried frailty components (slowness, weakness, inactivity, and exhaustion). In all, 1724 participants completed the FSQ. An FSQ score of ≥3 indicated frailty; a score of 1 or 2 signified pre-frailty, and 0 indicated robust. We calculated the kappa coefficient to determine the agreement between the FSQ and Frailty index (FI). The predictive ability for outcome was assessed by age and sex using the adjusted Cox proportional hazards model. Results: According to FSQ criteria, 7.1% of the participants were frail. Frailty was associated with poor physical function, fractures, falls, and mortality. Both frailty and pre-frailty were associated with a higher mortality rate: frailty-hazard ratio (HR), 3.94, 95% confidence interval (CI), 3.16-4.92, P<0.001; pre-frailty-HR, 1.89; 95% CI, 1.57-2.27, P <0.001; adjusted models for this variable did not affect the estimates of the association. Among the four frailty components, slowness was the strongest predictor of mortality. The combination of the four components provided the best risk prediction. Conclusions: The self-reported FSQ has a good capacity to identify frailty as measured by the frailty index and predict mortality. This indicates that it could be a useful frailty screening tool for elderly community-living Chinese people.

ASSOCIATION BETWEEN CERVICAL CANCER SCREENING AND HUMAN PAPILLOMA VIRUS VACCINE STATUS AMONG KOREAN WOMEN

Nguyen Thi Ngoc Phuong*, Nguyen Thi Ngoc Phuong, Kui Son Choi, Kim Yeol, Boyoung Park, Yoon Young Lee, Mina Suh, Jae Kwan Jun, (National Cancer Center - Graduate school of Cancer science and Policy, Republic of Korea)

Backgrounds: This study aimed to examine the cervical cancer screening according to Human papillomavirus (HPV) status. We additionally investigated the factors associated with the screening of cervical cancer according to HPV vaccination status. Methods: Data from the Korean National Cervical Cancer Screening Survey (KNCCSS) in 2014 and 2016, an annual nationwide cross-sectional survey, were utilized. A total of 5,986 women were finally included for analysis. Participants who got at least 1 dose of HPV vaccination were considered in the vaccinated group. Screening status was defined as vaccinated for women who underwent Pap smear screening within 2 years for cervical cancer. Logistic regression analysis was employed to identify factors associated with cervical cancer screening by HPV vaccination status. Results: Only 6.9% of women took HPV vaccine. More than half of women (56.2%) received Pap smear within 2 years. Women who received HPV vaccine were 1.53 (95% CI: 1.20-1.94) times more likely to undergo Pap test than those did not. Among women who had had HPV vaccine, those had regular healthcare provider were significantly more likely to have the recent cervical cancer screening than those had not (aOR=2.22, 95% CI: 1.22-4.05). Among women who had not been vaccinated, those living with spouse (aOR=1.70, 95% CI: 1.40-2.05), reporting good health status (aOR=1.17, 95% CI: 1.01-1.34), having private insurance (aOR=1.34, 95% CI: 1.13-1.58), having regular healthcare physicians (aOR=1.40, 95% CI: 1.22-1.62) and frequent health check-up (aOR=1.44, 95% CI: 1.25-1.66) were more likely to undergo cervical cancer screening. Conclusions: Women who had taken HPV vaccines were more likely to receive a recent cervical cancer screening. Efforts will be needed to ensure that unvaccinated women understand the importance of cervical screening.

S/P indicates work done while a student/postdoc
A NOVEL MEASURE OF ECONOMIC INSECURITY IS ASSOCIATED WITH MORTALITY IN US COUNTIES
Emily A. Knapp, Emily A. Knapp, Lorraine T. Dean, Marissa Lazo, Brian S. Schwartz, David D. Celentano
Johns Hopkins School of Public Health

Economic insecurity, or the degree of instability in underlying economic conditions in a community, may affect health through material and psychosocial pathways. However, there are currently no established measures of economic insecurity at the community level that can be used as a proxy measure. Our goal was to create a measure of county economic insecurity for 320 counties in 7 states in the mid-Atlantic region. Using a theoretical framework drawn from existing literature, we identified indicators of county economic insecurity in 2000 from the US Census and the Federal Reserve. Mortality data were obtained from the CDC WONDER database for 2005. We conducted a confirmatory factor analysis using MPLUS and STATA to test our measurement theory. In preliminary validation analyses, we estimated the correlation between county economic insecurity and both traditional measures of community sociodemographic status (education, income) and demographic variables (age, racial composition, population). A measurement model at the county level containing the percent of people not in the labor force, unemployed, with jobs in the service sector, and with subprime credit ratings, as well as percent of income spent on rent, fit the observed data well (standardized root mean square residual = 0.033, comparative fit index = 0.961). Factor scores were estimated from this model for all 320 counties. County economic insecurity had a low correlation with median age (r = 0.14), population density (r = 0.14), and percent black (r = 0.16). It was moderately correlated with having a high school (r = 0.46) and college degree (r = 0.34) and median income (r = 0.68). County economic insecurity was moderately correlated with all-cause mortality (r = 0.43), while unemployment alone had a lower correlation with mortality (r = 0.26). Our findings suggest that this theory-driven, multidimensional measure of county economic insecurity is a novel and potentially important risk factor for mortality.
THE EFFECT OF STATE-LEVEL EARNED INCOME TAX CREDIT LAWS IN THE U.S. ON INFANT MORTALITY
Roman Pabayo* 
Roman Pabayo, Daniel Cook, Gary Harling, Amy Ehntholt, Natalie Rosenquist, Peter Muennig, (University of Alberta, School of Public Health)

Introduction: The U.S. Federal Earned Income Tax Credit (EITC) is a refundable tax credit for low-to moderate-income working individuals and couples, and is augmented for those with children. The EITC is designed to supplement incomes of low-wage workers and to reduce tax burdens. In addition to the federal program available to all states, states may also add a tax credit. From 1988 to 2017, 29 states and Washington DC adopted or expanded an EITC. Previous work has indicated that infants born in states with EITC showed small improvements in infant birth weight and gestation time in comparison to those born in states with no EITC. To our knowledge, there has been no study that investigates the relationship between EITC and infant mortality risk. Methods: We used data on 25,027,409 infants and their mothers from the 2006-2010 United States Statistics Linked Infant Birth and Death Records, and linked this to measures of the generosity of state EITC laws in the year of conception. We used a logistic regression model with fixed effects for year and state to account for unobserved confounders, allowing us to isolate the effect of changes in EITC generosity within states. We also adjusted for maternal characteristics from the birth certificate and whether EITCs were refundable. Results: Between 2006 and 2010, there were 98,002 infant deaths resulting in an infant mortality rate of 0.05 infant deaths per 1,000 live births. During this time, only four states implemented a new EITC. A state EITC payment of 20% of the federal amount was associated with 9% lower odds of infant mortality (OR = 0.91, 95% CI = 0.83, 0.99). Conclusions: These findings indicate that the state EITC might provide health benefits for US newborn infants. However, results should be interpreted with caution since only four states implemented the EITC during the study period. Further studies using more rigorous study designs over a longer time period are needed.

QUANTIFYING MORTALITY DUE TO SOCIAL DETERMINANTS OF HEALTH IN BALTIMORE CITY
Beonna Hair* Beonna Hair, Darcy Phelean-Ernrick, (Baltimore City Health Department)

Social factors are closely linked with health inequities in the U.S. Reducing health disparities requires interventions that target these drivers of health. The purpose of this analysis was to quantify the contribution of social determinants of health to all-cause mortality in Baltimore City. Population attributable fractions were calculated to determine the number of deaths attributable to social factors in Baltimore City according to the methods of Galea et al. Prevalence of area-level social factors (living in census tracts with high poverty, income inequality or area segregation) and individual-level factors (percentage of residents with low educational attainment, living in household poverty or experiencing social isolation) were obtained from the American Community Survey and the Baltimore Community Health Survey. The number of deaths was provided by the Maryland Department of Health. In Baltimore City, there were 30,161 deaths in those aged 25 and older in 2010-2015. An estimated 3,986 of these deaths (11%) were attributed to living in census tracts with high poverty. Living in census tracts with high income inequality and high racial segregation also impacted mortality (n = 777 deaths) (3%) and n = 1,245 deaths (4%), respectively). In those aged 25 to 64 years, 1,212 deaths (11%) were attributed to low education status, 1,004 (9%) to household poverty, and 406 (4%) to low social support. In those aged 65 years and older, 1,257 deaths (7%) were attributed to low education status, 835 (5%) to household poverty, and 376 (2%) to low social support. There is likely overlap among these social factors affecting mortality, so these estimates should not be considered mutually exclusive. Area-level poverty and individual-level low education status were the largest contributors to mortality in Baltimore City, suggesting that interventions aimed at addressing these factors could have greater impact on all-cause mortality than interventions targeting other social factors.

INCOME INEQUALITY AND INFANT AND NEONATAL MORTALITY: EVIDENCE FROM THE 2010 COHORT LINKED BIRTH-INFANT DATA
My Ehntholt* Amy Ehntholt, Daniel Cook, Peter Muennig, Natalie Rosenquist, Roman Pabayo, (University of Nevada Reno)

Background: Ecological studies have provided evidence of an association between income inequality and infant mortality rates (IMR) in the US, but little work has used individual-level data. The combined influence of inequality at county and state levels also remains understudied, and it is known that mechanisms through which inequality might lead to increased risk of infant mortality. Hypothesized pathways include erosion of social capital and decreased healthcare access due to higher income inequality, damaging maternal and infant health. We sought to identify the relationship between income inequality at both county and state level and individual risk of infant and neonatal mortality and to determine whether social capital and access to healthcare act as mediators. Methods: We linked county- and state-level measures to the CDC’s 2010 Cohort Linked Birth/Infant Data Set. We used multilevel logistic regression models to test whether income inequality (Gini coefficient) at each level was associated with likelihood of infant mortality (death before age 1) or neonatal mortality (death within first 28 days of life). Possible mediation by social capital and physician-to-patient ratio was evaluated using Baron-Kenny. Further mediation analyses using structural equation modeling were undertaken. Results: Models adjusting for individual- and area-level covariates indicated that county-level—but not state-level—income inequality was associated with increased odds of both infant (OR: 1.14, 95% CI: 1.10, 1.18) and neonatal (OR: 1.17, 95% CI: 1.12, 1.23) mortality. County-level physician-to-patient ratio and social capital acted as partial mediators. Conclusions: Income inequality at the county level appears more powerful than at the state level in influencing risk of infant and neonatal mortality. Social capital and physician-to-patient ratio may have a protective mediating effect on this association, and may therefore be worthy targets for intervention.
CHANGE IN BINGE DRINKING AFTER HURRICANE SANDY Sean Locke*, Sean Locke, Lisa M. Gargano, (NYC Department of Health and Mental Hygiene)

Several studies have examined the association of post-traumatic exposures and excessive drinking, very few are prospective studies. The objective of this study was to examine changes in drinking behavior after Hurricane Sandy among the World Trade Center Health Registry (Registry) enrollees whose drinking habits were captured before and after Hurricane Sandy prospectively. The Registry is a longitudinal cohort study of over 71,000 individuals exposed to the 9/11 terrorist attacks in the New York City. Hurricane Sandy and the related survey occurred between Wave 3 (2011-12) and Wave 4 data collection (2015-16). The study sample included enrollees who completed all three of these surveys. The 4-level composite Sandy exposure scale included Sandy traumatic experiences measure, financial and other Sandy impacts (none, low, medium, and high). Sandy-related posttraumatic stress disorder (PTSD) was assessed with Sandy-specific PTSD checklist-Civilian Version (PCL-17). A score of 44 or greater indicating probable PTSD. An episode of binge drinking was defined as having ≥5 (for men) or ≥4 (for women) drinks on a single occasion in the last 30 days. Change in binge drinking was categorized into a 4-level scale (never, new, former, and continued). Of the 4,026 enrollees, 61% (n=2,494) were not binge drinkers pre-Sandy, but had at least one binge episode or more post-Sandy (new), and 18% (n=616) had at least one binge episode pre and post-Sandy (continued). In the adjusted analyses, enrollees with high Sandy exposure were 1.9 (95% CI: 1.4-2.7) times more likely to continue binge drinkers compared to those with no Sandy exposure. Enrollees with probable Sandy-related PTSD were 2 times more likely (95% CI: 1.2-3.3) to become binge drinkers (new) after Sandy compared to enrollees without PTSD. These results suggest that Sandy exposure was associated with an increased risk of binge drinking among 9/11 survivors. Sandy-related PTSD was associated with change in binge drinking.

ADOLESCENT PERCEPTIONS OF PARENTAL WARMTH AND MONITORING, DEVIANT BEHAVIOR, AND MARIJUANA USE Shadie J. Moss*, Shadie J. Moss, Silvia S. Martins, Katherine M. Reyes, Pia M. Mauro, (Columbia University)

Aim: Poor parental practices and deviant behaviors are associated with adolescent marijuana use. To 1) assess the association of parental warmth and monitoring and adolescent deviant behavior with marijuana use in the past year, and 2) test the moderating effect of deviant behavior, gender, age, and race/ethnicity on these associations. Methods: Respondents included 12-17 year-olds (N=14,272) from the 2016 National Survey on Drug Use and Health, a nationally representative cross-sectional study. Three dichotomous exposures were past-year youth-reported 1) parental warmth (e.g., parent told kids they had done a good job), 2) parental monitoring (e.g., made youth do chores), and 3) deviant behavior (e.g., youth got into a serious fight alone or with friends) Any past-year marijuana use was the outcome of interest. Separate logistic regression models were used to assess our aims. Models were adjusted for age (12-13, 14-15, 16-17), nicotine, gender, and income. Results: Eighty-three percent of adolescents reported high parental warmth, 58% reported high parental monitoring, 24% reported engaging in deviant behaviors, and 12% reported marijuana use in the past year. High parental warmth (odds ratio [OR]=5.7; p<0.01) and high parental monitoring (OR=5.9; p<0.01) were negatively associated with marijuana use, whereas deviant behavior (OR=3.9; p<0.01) was positively associated with past year marijuana use. We did not find that gender, race/ethnicity, or deviant behavior moderated these associations. Age did moderate the association of parental monitoring (OR=2.58; p<0.01) and warmth (OR=1.95; p<0.01) on marijuana use among 16-17 year olds. Conclusions: Past year marijuana use is higher among adolescents who engage in deviant behavior, and lower among adolescents who self-report perceived high parental warmth and high parental monitoring. Family-based interventions that focus on both parental involvement and youth deviant behavior may reduce adolescent marijuana use.
ESTIMATING THE PREVALENCE OF OPIOID DIVERSION AMONG PLWH USING INDIRECT QUESTIONING Chelsea Canan* Chelsea Canan, Geetanjali Chander, Jeanne Keruly, Richard Moore, G. Caleb Alexander, Bryan Loe. (University of Virginia)

Background. Research suggests that over 70% of abused prescription painkillers are obtained illegally. However, the prevalence of diversion is difficult to measure because of social desirability bias, as a result there is a dearth of information on opioid diversion. We applied a method designed to provide a more accurate estimate of sensitive behaviors to assess the prevalence of opioid diversion among patients in a longitudinal cohort of people living with HIV (PLWH). Methods. From October 2016 to November 2017, we randomized opioid recipients in the Johns Hopkins HIV Clinical Cohort to answer either a direct or indirect question about opioid diversion. Indirect questioning is an approach to ask a sensitive question that allows for valid population estimates while the participant is protected from revealing their true status. We estimated the prevalence of diversion under each method. We further estimated diversion prevalence in subsets of the sample by sex, race, HIV risk group, illicit drug use, smoking status, depressive symptoms, and anxiety.

Results. Of 1,745 patients screened, 829 (47.5%) reported that they had ever received an opioid prescription. Of these, 323 answered the indirect question and 288 directly answered whether they had ever diverted opioids. The prevalence of opioid diversion using the indirect and direct questioning methods were 14.9% (95% CI 10.6%-18.3%) and 6.3% (95% CI 3.7%-9.7%), respectively. Males, non-African Americans, and patients with a history of any illicit drug use had a higher prevalence of opioid diversion. Conclusions. We found a high rate of opioid diversion in an HIV clinical practice under indirect questioning, with over twice the estimated prevalence compared to direct questioning. Following strict prescribing practices may reduce the abundance of opioids and decrease the likelihood of diversion, which is a main contributor to the opioid epidemic.

INCREASES IN OVERDOSE FATALITIES IN THE BEGINNING OF THE MONTH: REVISITING THE "CHECK EFFECT" THROUGH A SPATIAL LENS William C. Goeckel* William C. Goeckel, BA, Traci C. Green, PhD, MSc, Josiah D. Rich, MD, MPH, Brandon D.L. Marshall, PhD. (Brown University School of Public Health Department of Epidemiology)

Previous research has suggested that social service benefit issuance on the first day of a month is associated with increased overdose fatalities. However, the extent to which this excess mortality is spatially clustered in communities with higher levels of social service benefit receipt has not been studied. We sought to examine if public assistance receipt, among other social and structural factors at the census block group level, were associated with the spatiotemporal patterns of overdose fatalities in Rhode Island, a state with the fifth highest overdose mortality rate in 2015. We conducted a retrospective review of all overdose deaths recorded from 2014 to 2016 (n = 838). Overdose incident locations were geocoded to the census block group level. Clusters of census block groups with excess overdose-related mortality at the beginning and end of a month were identified using spatial scan methods. Logistic regression analyses were performed to assess social and structural characteristics associated with cluster memberships. Increased numbers of overdose fatalities were observed at the beginning of a month relative to the end of a month (Ratio: 1.08; 95% CI: 1.03, 1.12). Fatal overdose at the beginning and end of a month clustered in distinct, non-overlapping areas, but no significant association was observed between the proportion of residents receiving cash public assistance and cluster membership. Increasing proportions of households paying more than 30% of their income towards housing costs were associated with increased odds of a census block group being included within a cluster (OR: 1.04; 95% CI: 1.01, 1.07). Future research should seek to elucidate the temporal ordering of the association between housing costs, psychological distress due to housing-related financial obligations, the intensity of substance use, and risk of fatal overdose.
Background: Clinical trials and systematic reviews are cornerstone methodology for clinical epidemiology and public health. Massive open online courses (MOOCs) can provide a new and transformative model for teaching a global community on the foundational methods of evidence-based healthcare. Objective: To describe our experience teaching “Design and Interpretation of Clinical Trials” (CT) and “Introduction to Systematic Review and Meta-analysis” (SRMA) as MOOCs. Methods: Faculty at the Johns Hopkins Center for Clinical Trials and Evidence Synthesis offer two MOOCs through Coursera. Both courses are open-access and free of charge. Alternatively, participants may opt-in to earning a Coursera certificate ($49). The MOOCs comprise six to nine 1-hour video modules, which participants viewed and completed at their own pace over a 6-week period. Participants are evaluated based on multiple-choice quizzes and peer-graded assignments. Teaching assistants (TAs) facilitated the online discussion forums. Results: As of January 12, 2018, 43,300 participants (21,081 and 21,919 CT and SRMA, respectively) from over 170 unique countries had enrolled in the two courses. Of these, 4201 (20%) and 2660 (12%) participants had completed each course. 85% connected from outside of the United States (e.g., India, Egypt, the United Kingdom, Brazil, and China); 88% hold a Bachelor’s degree or higher; and 60% were employed full-time. Participants used the discussion forums to discuss reading materials and find research collaborators. Discussion: MOOCs provide benefits to a wide range of participants. Students globally have open learning and collaborative opportunities. Faculty and schools benefit from making their products more widely accessible. TAs benefit from personal and academic discussions with students. The field benefits from increases in the numbers of individuals who will contribute to the generation, synthesis, critical appraisal, and application of research to health and healthcare.
LEFT VENTRICULAR MASS INCREASE IN WOMEN DURING CHILDBEARING YEARS IS ASSOCIATED WITH PARITY: THE CARDIA STUDY Gabrielle G. Snyder1, Gabriele G. Snyder, Erica P. Gundersen, Con E. Lewis, Juno A. C. Lima, Donald Lloyd-Jones, Marinie Berkot, Jane M. Calot (Department of Epidemiology, Graduate School of Public Health, University of Pittsburgh)

Objective: Increased left ventricular (LV) mass is a marker of vascular remodeling and is consistently greater in black versus white women. The reproductive years are a critical period for weight changes in women, yet it is unknown if pregnancy history is related to changes in LV mass. We examined total parity at exam year 25 and 20-year change in LV mass in white and black women in the Coronary Artery Risk Development in Young Adults (CARDIA) Study. Methods: We studied 1373 women (50.3% black) with echocardiograms at baseline (1990-91, ages 23-35 years) and again 20 years later and direct measures of visceral and subcutaneous adipose tissue at exam year 25. Parity categories were: 385 (28.0%) nulliparous (no live births >20 weeks), 284 (20.7%) primiparous (parity=1), and 704 (51.3%) multiparous (parity>2). Nulliparous was the referent. LV mass change was calculated between baseline and year 25 and indexed for height2.7. Restricted Linear regression models were controlled for baseline age, race, systolic blood pressure, body mass index, physical activity, education, and 20-year change in systolic blood pressure and weight. Primiparity was associated with a 20-year increase in LV mass (2.15 g/m2.7, p=0.01) but multiparity was not (0.79 g/m2.7, p=0.26). Separately controlling for visceral (v) (2.00 g/m2.7, p=0.02) and subcutaneous adipose tissue (s) (2.11 g/m2.7, p=0.01) produced similar results among primiparous. While race interaction was not significant (p=0.23), greater change in LV mass was associated with primarily in black women (3.59 g/m2.7, p<0.01) but not in white women (0.81 g/m2.7, p=0.45). Conditions: Primiparity was associated with greater change in LV mass versus multiparity, particularly among black women. Higher parity was not associated with change in LV mass and adjustment for weight gain and direct measures of fat did not explain the association.

WOMEN’S HEALTH

ASSOCIATION BETWEEN DIETARY INTAKE AND THE COMPOSITION OF THE VAGINAL MICROBIOTA Rapak Shivakoti1, Rapak Shivakoti, Susan Taddottir, Latra Cauhfield, Courtney Robinson, Jacques Ravel, Khalil Glashammer, Rebecca Brotman (Johns Hopkins University)

Objective: Based on the composition of their vaginal microbiota, women can broadly be classified into five community state types (CST). Women with CST-I, a low-Lactobacillus state, have a higher risk of various adverse health outcomes including bacterial vaginosis. Our objective was to determine the association between dietary intake and the composition of the vaginal microbiota. Methods: From a cohort study of 125 non-pregnant reproductive-age women recruited from Gynecology clinics within the Johns Hopkins Hospital, we studied the association between dietary intake and the composition/structure of the Vaginal microbiota at enrollment. Dietary intake data were obtained using the Block 2000 food frequency questionnaire. Vaginal microbiota composition was characterized by sequencing and analysis of the V3-V4 regions of 16S rRNA gene and clustering into CST. Logistic regression analyses were used to determine the association of dietary intake, as assessed by nutrient variables (total energy, protein, carbohydrate, fat, types of fat, fiber, and food group intakes), with the structure of vaginal microbiota (CST-I vs. Lactobacillus-dominated CSTs). Results: Characteristics of 101 women with available data were a median age of 25 (interquartile range: 22-30), 57% white (31% black), 52% overweight/obese and 51% on hormonal contraception. Only cholesterol (adjusted OR: 2.13 per standard deviation increase, 95% CI: 1.004-4.53, p=0.049) was associated with vaginal CST-I in multivariable models adjusting for total energy, race, age, body mass index, income, education, hormonal contraception use and vitamin supplement use. Conclusions: Our results indicate that cholesterol intake is associated with a less optimal low-Lactobacillus vaginal microbiota. Further studies are needed to replicate this finding and to test whether altering dietary cholesterol would influence the structure of vaginal microbiota and health outcomes.

HPV VACCINE ACCEPTABILITY AMONG PARENTS OF ADOLESCENT GIRLS IN A RURAL AREA MYSORE, INDIA Abraham Degeare Mengist, Abraham Degeare Mengist, Karl Krupp, Vijoje Srinivas, Christopher Fentice, Tan Li, Domin P. Skepens, Lata A. V. Marlow, Anjali Attala, Furminin Mahmudvani (Department of Epidemiology, Robert Stempel College of Public Health & Social Work, Florida International University, Miami, USA)

The purpose of this study was to examine factors predicting HPV vaccine acceptability among parents of adolescent girls in a rural area in Mysore district, India. A cross-sectional study was conducted among a random sample of 831 parents of adolescent girls (ages 11 to 15 years) attending schools in rural Mysore between September and October, 2011. A validated questionnaire in Kannada was used to measure factors affecting willingness of parent to vaccinate their daughter with HPV vaccine. Of the 831 parents, 79.9% were willing to vaccinate their daughter with HPV vaccine sometime soon if they were invited to receive it. Higher odds of parental willingness to vaccinate their daughter with HPV vaccine was observed among those who believed that HPV vaccine is safe (Adjusted Odds Ratio [aOR] 2.11; 95%CI: 1.01, 4.45), daughters may become sexually active (aOR 1.84, 95%CI: 1.06, 3.13); they have support of other family members to vaccinate their daughter (aOR 2.86, 95%CI: 1.47, 5.57); HPV infection causes severe health problems (aOR 1.64, 95%CI: 1.04, 2.57). On the other hand parents who believed that there is low risk that daughter will get cervical cancer (aOR 0.52, 95%CI: 0.29, 0.93); family will disapprove of getting daughter vaccinated (aOR 0.45, 95%CI: 0.22, 0.76); the injection may cause pain (aOR 0.53, 95%CI: 0.31, 0.89) and were older age (aOR 0.96, 95%CI: 0.93, 0.99) had lesser odds of willingness to vaccinate daughters with HPV vaccine. In conclusion, acceptance of HPV vaccination for daughters was high among rural parents in Mysore, India. However, public health education to reduce the belief that injection is painful and daughters are at low risk to get cervical cancer is important to reduce cervical cancer rates in Mysore and further improve parental acceptability of HPV vaccine in the district. The public health education should target older aged parents and extended family members. Key words: HPV, vaccine acceptability, India, Mysore, Parents, Rural
INTAKE OF RED AND PROCESSED MEAT AND LIVER FUNCTION INDICES AMONG WOMEN WITH A HISTORY OF GESTATIONAL DIABETES

Shruti Rawal, Shruti Rawal, Sjarder F. Olsen, Stefanie N. Hinck, Jing Wu, Anne Ahrendt Bjerggaard, Mengying Li, Sylvie H. Ley, Louise G. Grümmer, Yeiyi Zhu, Liwei Chen, Cuhin Zhang, (Department of Nutritional Sciences, Rutgers school of Health Professions, Newark, NJ)

Objectives: Red and processed meat intake are known to be dietary risk factors for cardiovascular diseases, but little is known about their associations with liver function. We aimed to examine associations of red and processed meat intake with liver function indices in a high-risk population of women with a history of gestational diabetes (GDM). Methods: We included 550 women who had GDM-complicated pregnancies in the Danish National Birth Cohort (1996-2002), and were followed up 9-16 years later in the Diabetes & Women's Health Study (2012-2014). At follow-up, alanine aminotransferase (ALT), aspartate aminotransferase (AST), and gamma-glutamyltransferase (GGT) were measured from fasting blood samples. Dietary intake in the past year was assessed with a food frequency questionnaire. We estimated RR (95% CI) for elevated liver scores by quartiles of red and processed meat intake, adjusting for sociodemographics, physical activity, and other dietary factors. Results: At follow-up, 54.0%, 45.5%, and 36.7% of women had elevated HSI (≥3), FLI (≥60), and non-alcoholic fatty liver disease liver fat score (NAFLD-LFS) respectively. Compared to women in the lowest quartile (<47.6 g/day) of red meat intake, women in the highest quartile (>80.7 g/day) had an increased risk of elevated HSI [aRR=1.43 (1.05-1.94); p-trend=0.01] and NAFLD-LFS [aRR=1.48 (1.09-1.98); p-trend=0.01]. Compared to women in the lowest quartile (<4.9 g/day) of processed meat intake, women in the highest quartile (>11.5 g/day) had an increased risk of elevated HSI [aRR=1.32 (1.05-1.67); p-trend=0.009]. No significant associations were observed with other liver function indices. Conclusion: In a high-risk population of women with GDM history, greater red meat intake may be related to increased risk for liver dysfunction.

S/P indicates work done while a student/postdoc

POST-PREGNANCY BODY MASS INDEX IN THE PROGRESSION FROM HYPERTENSIVE DISORDERS OF PREGNANCY TO TYPE 2 DIABETES

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Background: Women with a history of hypertensive disorders of pregnancy (HDP) are at elevated risk of type 2 diabetes (T2D) after pregnancy. In this study we examined the extent to which post-pregnancy body mass index (BMI) adds to the elevated risk of T2D in women with HDP compared to women with only normotensive pregnancies. Methods: We utilized data from the Nurses’ Health Study II, a prospective cohort study initiated in 1989. In women aged 45 to 54 years without prior gestational diabetes mellitus, we investigated the additive interaction between BMI after pregnancy and history of HDP on the risk of T2D. Main outcome measures were the relative excess risk due to interaction (RERI) and the attributable proportion of risk due to the interaction, which we calculated from multivariable Cox regression models. The main model was adjusted for race/ethnicity, age, parity, BMI at age 18 years, menopausal status, parental history of diabetes mellitus, diet quality, physical activity, alcohol intake, smoking. Results: In total, 6,563 (11.7%) of 56,159 participants had a history of HDP and 1,341 women developed T2D during 436,333 person-years of follow-up. BMI was a risk factor for T2D regardless of HDP history. For example, obesity class I (BMI 30.0-34.9) was associated with a hazard ratio of 14.4 for T2D compared to normal weight (BMI 18.5-24.9) in women with a history of HDP. However, there was evidence of an additive interaction between BMI and HDP history for the risk of T2D (p<0.004 across categories of BMI). The attributable proportion of risk due to the interaction ranged from 0.12 (95% CI: 0.05-0.22) in women with overweight (BMI 25.0-29.9) to 0.36 (95% CI: 0.13, 0.59) in women with obesity class I. Conclusions: Maintaining a healthy weight may be of even greater importance in middle-aged women with a history of HDP, compared to previous women without history of HDP, to reduce the risk of T2D.
LONGER PAID MATERNITY LEAVE INCREASES BREASTFEEDING DURATION: LONGITUDINAL EVIDENCE FROM 41 LOW- AND MIDDLE-INCOME COUNTRIES Yan Chai*, Yan Chai†, (University of California, Los Angeles)

Maternity leave's impacts on breastfeeding practice have not been studied extensively in low- and middle-income countries due to limited comparative data at the global level. In this study, we applied the difference-in-differences approach to examine how more paid maternity leave policy in place prior to birth affects breastfeeding duration in low- and middle-income countries. We merged newly developed longitudinal data quantitatively measuring maternity leave policy with breastfeeding information from Demographic and Health Surveys in 41 low- and middle-income countries to construct a multi-level panel of nutritional policies and breastfeeding data on 798,531 children born between 1996 and 2014. We used linear regression models to compare changes in breastfeeding duration among countries that lengthened their paid maternity leave between 1995 and 2013 (i.e., Bangladesh, Kenya, Lesotho, Malawi, Uganda, Zambia, and Zimbabwe) to the remaining 34 countries did not change their paid maternity leave. Country and year were included as fixed effects to account for, respectively, unobserved time-invariant confounders across countries and shared trends over time in breastfeeding duration. Covariates, including household-level characteristics as well as country-level confounders, were adjusted. All models incorporated robust standard errors and respondent-level sampling weights. For paid maternity leave measured in weeks, an extended breastfeeding duration of 4.1 months (95% CI: 3.0-5.1) was observed when comparing, respectively, 4-8 weeks of paid maternity leave, 8-12 weeks of paid maternity leave, 12-16 weeks of paid maternity leave, and 16-20 weeks of paid maternity leave to 0-4 weeks of paid maternity leave. Sensitivity analyses using exposures with different lag and lead times provided the robustness of our main estimates.

DEPRESSIVE SYMPTOMS AMONG MARRIED WOMEN IN RURAL BANGLADESH: IMPACT OF INTIMATE PARTNER VIOLENCE EXPOSURE AND SEVERITY Precious Etiche*, Precious Etiche, Lisa Bates (Mailman School of Public Health, Columbia University)

Recent high-profile calls for greater attention to global mental health are not currently matched by sufficient community-based prevalence estimates and etiologic research in low- and middle-income countries. In many of these settings, the prevalence of intimate partner violence (IPV) is high yet understudied as a factor related to depressive symptoms. Within the context of rural Bangladesh, this study aims to examine the relationship between women's experiences of marital IPV and depressive symptoms, and whether the severity of IPV is related to depressive symptoms. Data were drawn from a nationally-representative study focused on individual and contextual determinants of IPV risk among women in rural Bangladesh. Primary data were collected among a multistage, stratified sample of female respondents in 77 villages in 2014. This study used data from the sub-sample of women married in the prior 4-12 years. Multivariable logistic regression models were used to estimate the association between various types of recent IPV (physical, sexual, psychological) and depressive symptoms. Measures were adapted from the Revised Conflict Tactics Scale and the Edinburgh Postnatal Depression Scale. 17% of women reported depressive symptoms. Adjusting for potential confounders, depressive symptoms were associated with physical (OR=1.57; 95% CI 1.25-1.98) and psychological (OR=1.51; 95% CI 1.05-2.16) but not sexual IPV. Furthermore, there was a clear dose-response in the severity—more, low, medium, high—of each type of IPV (including sexual) and depressive symptoms. In the context of rural Bangladesh, marital IPV and, in particular, the severity of various forms of IPV, are positively related to women's risk of depressive symptoms. Results underscore the importance of IPV prevention interventions and attention to IPV as a risk factor for depression, especially in low-income settings.
Gender Differences in Nonmedical Prescription Drug Use Trends Among Adolescents in Three South American Countries from 2007-2015

Alexander Perlmutter*, Alexander S. Perlmutter, Ariadne E. Rivera-Aguirre, Pat M. Minucc, Alfredo Castillo-Carniglia, Magdalena Cesa, Silvia S. Martíns, (Columbia University)

Aim: Little is known about nonmedical use of prescription drugs in South America. We evaluated trends in past year (PY) nonmedical prescription stimulant (NMPS) and tranquilizer (NMPT) use among adolescents in three South American countries overall and by gender. Methods: We used separately nationally representative complex weighted data from school-based surveys conducted in Argentina, Chile, and Uruguay. We estimated the prevalence of PY NMPS and NMPT use among students in 8th to 12th grades from 2007-2015. Logistic regression models estimated the log odds (back-transformed to prevalence) of NMPS and NMPT use by gender, adjusting for school type (private, public, subsidized in Chile only) and year. Results: Argentinian students' overall PY NMPT use prevalence was stable from 2007-2014 (2.6%-2.5%); females had a slightly higher average prevalence than males (diff: +0.5% pts; 95% CI [0.4-0.7]). Uruguay's PY NMPT use decreased overall (4.2%-3.2%) and for females only (4.3%-4.1%) from 2007-2014; females had a higher average prevalence than males (diff: +2.4% pts; 95% CI [1.5-3.0]). Chilean students' PY NMPT use prevalence increased (3.6%-4.5%) for males (3.1%-4.5%) and females (4.3%-4.0%) from 2007-2015; females had a higher average prevalence than males (diff: +1.8% pts; 95% CI [1.5-2.1]). Argentinean (1.8%-1.4%) and Uruguayan (1.8%-0.5%) students' PY NMPS use decreased from 2007-2014, with no gender differences. From 2007-2009, Chilean students' PY NMPS prevalence decreased from 2007 to 2009 (1.8%-1.2%), then increased in 2015 (1.6%); females used marginally less than males. Conclusion: PY NMPT use did not change in Argentina, decreased in Uruguay and more than doubled in Chile. NMPT use was higher among females in all countries, which widened over time in Chile. PY NMPS use decreased in Argentina, Uruguay, and Chile, but recovered in Chile to early levels. Gender differences are an important aspect of the nonmedical prescription drug use problem in these populations.

Questioning the Gold Standard: Methodological Concerns in Cluster Randomized Trials of Public Health Interventions in Low-and Middle-Income Countries

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Background: Cluster-randomized controlled trials (CRTs), which involve allocation of groups of individuals to treatment arms, are increasingly used to evaluate public health interventions in low and middle-income countries (LMIC). Though frequently perceived as analogs of clinical trials, CRTs have unique features that may call into question their common perception as gold-standard designs. Aim: To synthesize the methodological concerns threatening internal validity in CRTs, with a view to improve their design and reporting. Methods: We conducted a systematic review of CRTs of public health interventions in LMIC (published Jan 2012-May 2016, indexed in MEDLINE/PubMed, CINAHL, EMBASE). Two reviewers assessed risk of bias using the Cochrane collaboration tool, adding domains specific to CRTs identified from additional guidelines (e.g. CONSORT). The assessment was repeated for certain domains using a recent tool developed for observational studies (ROBINS-I). We present judgement results in a frequency table and narratively contrast the tools, providing examples. Results/Discussion: 90 studies were included. 7/10 bias domains were judged at high or unclear risk for at least 20% of studies using the Cochrane tool. Domains prone to bias in CRTs included recruitment bias and individual-level attrition (27% and 58% of studies judged at high or unclear risk, respectively). ROBINS-I clarifies several conceptual issues absent from previous guidelines. Bias from attrition, typically high in CRTs, remains ill-addressed, particularly for intention-to-treat analyses. Complications include the need to consider bias at two levels (cluster, individual) and in distinct, complex designs (e.g. repeated cross-sectional survey, follow-up cohort). Conclusion: Several issues render CRTs vulnerable to biases traditionally associated with observational designs. Current reporting and risk of bias guidelines poorly address these methodological limitations; improvements to domains proposed above are warranted.
LIFE-COURSE IMPACT OF CHILDHOOD MALTREATMENT ON MIDLIFE HEALTH-RELATED QUALITY OF LIFE IN WOMEN: LONGITUDINAL MEDIATION ANALYSIS FOR POTENTIAL PATHWAYS Hsing-Hua S Lin, Hsing-Hua X Lin, Ashley I. Naimi, Maria M. Brooks, Galé A. Richardson, Jessica G. Burke, Joyce T. Bromberger. (Department of Epidemiology, Graduate School of Public Health, University of Pittsburgh, PA)

Background: Few studies have assessed the life-course impact of childhood maltreatment (CM) on health-related quality of life (HRQoL) or quality-adjusted life years (QALY) in women during midlife. We evaluated 1) if CM is associated with lower midlife HRQoL/QALY over a 9-year follow-up, and 2) if these associations are explained by adulthood psychosocial mediators over time. Methods: A community sample of 443 black and white women ages 42-52 were enrolled in the Pittsburgh site of the longitudinal Study of Women's Health Across the Nation: Menstrual Health Study in 1996-97. The analyses included 342 women who completed Childhood Trauma Questionnaire and Short Form-36 (SF-36) from 2002-2014. The mental (MCS) and physical (PCS) component scores of SF-36 were the two primary longitudinal HRQoL outcomes. QALY was based on SF-6D. Generalized estimating equations were used to assess the association between CM and HRQoL/QALY over time. The mediating role of each psychosocial factor in the relationship between CM and QALY was investigated by a series of sequential structural nested mean models estimated via doubly robust estimation. Missing data were addressed using multiple imputations by chained equations. Results: Thirty-eight percent of women reported any CM type and 20% reported multiple CM types. Any CM was associated with both reduced midlife mental and physical HRQoL in women over 9 years. Women with multiple CM types had 28.3 fewer healthy days per year than those without CM. In separate mediation analyses, lower levels of optimism, time-varying sleep problems, and time-varying low social support partially explained the relationship between multiple CM types and HRQoL/QALY over time. Conclusions: CM is a life-course social determinant of HRQoL and QALY in women throughout midlife. Several partial mediators are potentially modifiable and could be targets of interventions to mitigate the negative impact of CM on midlife HRQoL/QALY in women.

POLICE USE OF FORCE TRAINING REFORMS AND INJURIES AND DEATHS DUE TO LEGAL INTERVENTION IN RICHMOND, CALIFORNIA Krista Farkas, Krista Farkas, Elliott C. Mathey, Jennifer Ahern. (Division of Epidemiology, University of California, Berkeley School of Public Health)

In recent years, police use of force (legal intervention) has become a critical public health challenge in the U.S. There was an estimated 1,093 deaths and 75,564 nonfatal injuries requiring hospital-based care due to legal intervention in the U.S. A variety of interventions at the individual and organizational levels have been proposed to reduce legal intervention injuries and deaths. These include community policing, improved officer training, and use of body cameras, among others. However, research on the effects of these kinds of police reform is limited. We aim to address this gap by examining the relationship between an insertive use of force training program implemented in 2018 by the Richmond, California (CA) Police Department and legal intervention injuries and deaths in Richmond. The program exceeded the CA once per year training requirement, with monthly firearm training and quarterly role-playing scenarios for training suspects. Using police-based data on all CA deaths, hospitalizations, and emergency department visits due to legal intervention between 2005 and 2018, we constructed rates of combined fatal and nonfatal injuries due to legal intervention. We used the Synthetic Control Method to compare the observed legal intervention injury rates in Richmond to an estimate of the expected rates in the absence of the intervention during the 2009-2015 post-intervention period. The synthetic control was constructed as the optimal weighted average of rates from all non-intervention cities and towns in CA. In preliminary analyses, we did not detect a relationship between the use of force training program and lower legal intervention injury rates in Richmond. Further research should assess whether there were improvements in outcomes not captured in our data (e.g., police-community relations). Further research is also needed to identify police reforms that are effective at reducing legal intervention injuries and deaths.
FATAL AND NON-FATAL FIREARM INJURIES AMONG POST-9/11 VETERANS IN OREGON

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Firearms are a leading cause of fatal and nonfatal injuries in the United States. Military Veterans are at an increased risk of injury after combat deployment. The combined impact (fatal and nonfatal; violent and unintentional) of firearm injuries among Veterans has not been examined. This study uses multiple administrative databases to enumerate fatal and nonfatal firearm injuries among post-9/11 Veterans in Oregon. We probabilistically linked a roster of all post-9/11 Veterans (n=27 million) to three Oregon statewide databases - Vital Records, Trauma Registry, and Hospital Discharge Index - spanning 2007 through 2016. International Classification of Diseases codes were used to identify firearm injury events and to categorize intent. Events were categorized as those involving a Veteran versus non-Veteran. We examined frequencies of fatal and non-fatal injury events by Veteran status and intent. We identified 93 firearm-related events in Oregon between 2007 and 2016 among Veterans. More than half of the events were nonfatal (56%) and 32% were self-inflicted. While differences in intent were noted between Veterans and non-Veterans firearm fatalities (p=0.06), most were self-inflicted for both groups (76% and 82%, respectively). Differences in nonfatal injury intent were identified in Trauma Registry (p=0.06) and Hospital Discharge Index (p=0.12) data; unintentional injuries were more common among Veterans (49% and 55%, respectively) than non-Veterans (32% and 39%). Assaults were less common among Veterans (26% and 27%) than non-Veterans (36% and 43%). Results suggest systematic differences in the intent of firearm injuries between post-9/11 Veterans and non-Veterans in Oregon. Prevention efforts should address risk of unintentional firearm injuries in addition to the established programs focused on suicide prevention. Future research will compile rates of, and examine potential risk factors for, firearm injury events among Veterans and non-Veterans.

HOW COULD FIREARM DISQUALIFICATION AMONG THOSE WITH A HISTORY OF INTIMATE PARTNER VIOLENCE AFFECT POPULATION AND FEMALE-SPECIFIC RATES OF HOMICIDE? AN AGENT-BASED MODELING APPROACH

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Intimate partner homicides account for approximately 50% of female homicides in the US, with an increase in risk if the perpetrator has access to a firearm. Although federal and several state laws prohibit the possession of firearms by anyone convicted of an intimate partner violent (IPV) felony or misdemeanor, enforcement is a challenge in most jurisdictions. Furthermore, although possession of firearms is prohibited, many of the laws do not require the surrender of existing firearms. We used an agent-based model to attempt to estimate how many individuals with a history of IPV would need to be disqualified from purchasing firearms and would need to surrender existing firearms to have an influence on population and female-specific rates of homicide. The model was calibrated using 260,000 agents with demographics of New York City. In each time step, agents could interact, purchase or illegally obtain firearms, and engage in violence. The model incorporated extensive national and city-level data on IPV. We estimated two disqualifications: 1) anyone who has been issued a domestic violence restraining order (DVRO) and 2) any IPV perpetrator. The simulations assumed complete enforcement of purchase prohibitions, and removal of existing firearms from prohibited persons. Results over 30 years of simulation indicated that disqualification based on having a DVRO would reduce overall gun-related homicide by 1.92% (95% CI: -6.41% to 6.72%) and decrease female gun-related homicide by 2.43% (95% CI: -14.46% to 19.25%). Disqualification based on IPV perpetration would reduce gun-related homicide by 3.09% (95% CI: -5.04% to 8.69%) and gun-related homicide among women by 8.49% (95% CI: -17.15% to 19.25%). In summary, removing firearms from IPV perpetrators has the potential to produce a small reduction in the overall gun-related homicide rate for women.
Effects of early life conditions on Alzheimer's disease (AD) and related dementia (RD) risk have been hypothesized. However, prospective assessment is potentially cost prohibitive. Retrospective studies using routinely collected medical records in large cohorts may be an ideal way to assess early risk factors for later AD/WD. We aimed to determine accuracy of AD/WD diagnoses in electronic medical records (EMR) (inpatient and ambulatory surgery) and death certificates (DC) compared to gold standard. The Cache County study on Memory in Aging (CACHÉ, 1995–2008) enrolled 99% of the county's residents age ≥65 years (N=6,092). Over the course of 12 years and 4 triennial waves of thorough dementia ascertainment, 546 persons (10.7%) were identified with AD and 396 (7.8%) with RD. We used the Utah Population Database, which had linked EMR/DCs (1995–2008) to CACHÉ diagnoses for 97% of the participants. The prevalence of AD and RD in EMR/DCs was 7.1% and 13.4%. Among linked CACHÉ participants diagnosed with AD (n=521), 283 (54%) were captured by EMR/DCs as having AD and/or RD(Kappa =0.635) and 54 (11%) with AD (Kappa =0.633). Among those with AD (n=396), 148 (37%) were captured by EMR/DCs as having AD and/or RD (Kappa =0.16) and 84 (21%) with RD (Kappa =0.015). Sensitivity, specificity, and positive predictive values were 32%, 96%, and 48% for AD, 31%, 88%, and 19% for RD. Our results show that EMR/DCs tend to under-diagnose AD and over-diagnose RD, with only fair agreement compared to gold standard. Additionally, while EMR/DCs are well able to classify individuals as AD or RD-free, they are poor at classifying individuals as AD or RD-differentiated. We conclude that EMR/DCs alone are insufficient at capturing AD/WD. Expanding beyond inpatient and ambulatory surgery records to include full Medicare claims (with prescription drug data) will be warranted in determining additional features of a person's medical record that may be predictive of AD/WD via formal classification modeling.
Heart failure (HF) has a large public health burden; persons with HF are at risk for recurrent hospitalization and are susceptible to negative health impacts from environmental exposures. In Pennsylvania, UNGD has increased since 2005 with potential community, environmental, and population health impacts. To evaluate if UNGD activity was associated with HF hospitalization, we conducted a nested case-control study of hospitalization among persons with HF seen at a Geisinger (an integrated health system with many inpatient and outpatient sites serving 40 counties) facility between 2008-2015. We obtained information for hospitalization, comorbidities, medications, body mass index, smoking status, and demographics from electronic health records. We linked subject residential address with metrics of proximity (inverse distance-squared) and intensity (number and size of wells) for four phases of UNGD activity: pad preparation, well drilling, well stimulation, and natural gas production. We frequency-matched control encounters to case events 1:1 by sex, year, and age at HF diagnosis. We identified 9,143 persons with HF, 5,845 of whom were hospitalized at least once. We evaluated adjusted associations between UNGD activity metrics and hospitalization for 30-day periods at 1-day lags prior to hospitalization using mixed effects logistic regression. We evaluated model fit and stability with several sensitivity analyses and goodness of fit tests. Comparing subjects in the 4th to the 1st quartile of UNGD activity for each metric, we found associations (OR [95% CI]) of 1.59 (1.32-1.78), 0.75 (0.64-0.87), 1.61 (1.38-1.89), and 1.76 (1.50-2.08) for pad preparation, well drilling, well stimulation, and natural gas production, respectively; several of the metrics evidenced exposure-effect relations. Our findings suggest that UNGD in Pennsylvania is associated with increased odds of HF hospitalization among HF patients.
ASSOCIATION BETWEEN MATERNAL ACETAMINOPHEN USE AND ADVERSE BIRTH OUTCOMES IN A PREGNANCY AND BIRTH COHORT: Jasken S. Arneja, Rayeun J. Hung, Ryan A. Seeto, Sheryl L. Hewko, Kellie E. Murphy, Jennifer D. Brooks. (Dalla Lana School of Public Health, University of Toronto)

acetaminophen is the most non-prescription pain medication taken during pregnancy. While considered safer than aspirin and ibuprofen, its use has been associated with the development of attention deficit hyperactivity disorder, autism spectrum disorder, asthma, and male fertility issues in offspring. Adverse birth outcomes including low birthweight, preterm birth, and small-for-gestational-age are leading causes of neonatal morbidity and mortality, and have been associated with an increased risk for developmental disorders. These indicators can serve as intermediary outcomes predictive of later negative developmental outcomes. The relationship between acetaminophen use prior to and during pregnancy, and the aforementioned adverse birth outcomes has not been explored in a Canadian population. The Ontario Birth Study is an ongoing pregnancy and birth cohort study in Toronto. Baseline and antenatal clinical data, and lifestyle factor data, was gathered from 1,011 women who delivered between January 2013 and June 2017. RRs and 95% CIs for the relationship between acetaminophen use at three time points (three months before pregnancy, early-pregnancy, and mid-late pregnancy) and birth outcomes (low birthweight, preterm birth, and small for gestational age) were estimated using modified Poisson regression adjusting for maternal age, body mass index, smoking, education, fever during pregnancy, comorbidities, and paternal smoking. Pre-pregnancy acetaminophen use was associated with a higher risk of the baby being small for gestational age; RR=1.54, 95% CI 1.11, 2.15. No significant associations were found between acetaminophen use at any time prior to or during pregnancy and low birthweight or preterm birth. Overall, we found no significant association between maternal use of acetaminophen during pregnancy and adverse birth outcomes in the Ontario Birth Study. Future analyses will examine the impact of maternal acetaminophen use on early childhood neurodevelopment.


Introduction: The potential for paternal cannabis use to adversely affect fetal development remains understudied. We investigated the association between paternal cannabis use during the 3-months prior to conception and 21 types of structural birth defects in the National Birth Defects Prevention Study (1997-2017). Methods: Logistic regression was used to estimate crude and adjusted odds ratios (aOR) and 95% confidence intervals (CI) using 22,522 cases and 11,798 population-based controls without major birth defects. Mothers reported paternal cannabis use and lifestyle factors retrospectively through computer-assisted telephone interviews. Results: Cannabis use was reported for 8.8% of control fathers. Paternal cannabis use was associated with anencephaly (aOR: 1.43, 95% CI: 1.11, 1.84), cleft lip and palate (aOR: 1.21, 95% CI: 1.04, 1.43), cleft lip alone (aOR: 1.34, 95% CI: 1.09, 1.63), transverse lie and breech (aOR: 1.41, 95% CI: 1.11, 1.79), diaphragmatic hernia (aOR: 1.28, 95% CI: 1.02, 1.61), and gastroschisis (aOR: 3.07, 95% CI: 2.66, 3.54). After adjustment for confounders (study site, study year, household income, maternal age, education, cannabis, cigarette, other drug use; paternal age, education, other drug use) paternal cannabis use was associated with diaphragmatic hernia (aOR: 1.33, 95% CI: 0.99, 1.80), cleft lip alone (aOR: 1.23, 95% CI: 0.95, 1.60), gastroschisis (aOR: 1.26, 95% CI: 1.00, 1.52), and hypoplastic left heart syndrome (aOR: 1.38, 95% CI: 0.99, 1.24). Next steps include probabilistic bias analyses to assess potential impacts of exposure misclassification. Conclusions: Results are consistent with slightly increased risk of some structural birth defects following paternal cannabis use. Future research is needed to understand how paternal cannabis use affects fetal development, especially in light of changing cannabis policies and documented increases in the prevalence of use.
TRENDS IN OPIOID USE DISORDER REPORTED AT DELIVERY HOSPITALIZATION, 1999-2014
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Introduction: The increasing number of pregnant women with opioid use disorder presents a significant public health concern given the adverse maternal outcomes (e.g. maternal mortality) and neonatal outcomes (e.g. neonatal abstinence syndrome) associated with opioid exposure. We update U.S. national trends and describe previously undocumented state-specific trends of opioid use disorder present at delivery hospitalization. Methods: Data from the Healthcare Cost and Utilization Project's State Inpatient Databases and Nationwide Inpatient Sample, 1999-2014, were analyzed. International Classification of Diseases, Ninth Revision, Clinical Modification diagnostic and procedure codes were used to identify opioid use disorder diagnoses and delivery hospitalizations. We estimated national and state-specific prevalence rates of opioid use disorder during delivery hospitalization. We calculated linear trends across time and the average annual percentage point change of the prevalence rate (APC) nationally and among 28 states with at least 3 years of data. Results: Nationally, the prevalence rate per 1,000 delivery hospitalizations increased from 1.5 in 1999 to 6.5 in 2014 with an APC of 0.41% (p<0.0001). During 1999-2014, the APC significantly increased in all states, with Maine, New Mexico, Vermont, and West Virginia APCs >2%. Conclusion: Opioid use disorder observed at delivery hospitalization has increased significantly nationally and in the 28 states with data. States with high prevalence of opioid use disorder during delivery hospitalization mirror those highly impacted by the opioid epidemic in the general population. These data indicate a continued need for national and state efforts to prevent and monitor opioid use disorders among reproductive age women.

S/P indicates work done while a student/postdoc

AGE VARIATIONS IN THE PREVALENCE OF OPIOID USE DISORDERS, TREATMENT, AND TREATMENT TYPES IN A COMMERCIALY INSURED POPULATION OF PREGNANT WOMEN IN THE UNITED STATES Laura Gressler* Laura Gressler, Fadia Shaya, (University of Maryland)

Objective: To evaluate the age variations in prevalence of opioid use disorder (OUD), treatment, and treatment types in commercially insured pregnant women in the US. Methods: The study was a retrospective cohort analysis using the IMS Lifelink database which contains electronic records for the commercially insured population from 2007 to 2015. Pregnant women with an ICD9 code of V22.2 were identified and classified as having an OUD (ICD9 304.00) if they had a diagnosis before or during their pregnancy. Women were grouped into the following two categories based on their age during pregnancy: between 18 and 30 and between 31 and 45. Receipt of treatment was recorded if an NDC code for the following medications was present during pregnancy: methadone, buprenorphine, or a combination of buprenorphine and naltrexone. Results: Of 310,861 pregnant women, 174,037 (55.98%) were between the ages of 18 and 30 and 136,284 were between the ages of 31 and 45. The prevalence of OUD was significantly higher in women between 18 and 30 compared to women between 31 and 45 (0.51% vs. 0.13%; p<0.0001). The overall prevalence of treatment was similar overall between the two age groups (0.12% vs. 0.09%; p<0.0001). The proportion of women among those with OUD, however, was higher among the older age group than among the younger age group (30.30% vs. 24.58%; p<.0001). Methadone use in both groups was 0.2%. Buprenorphine and buprenorphine/naltrexone use was slightly higher among the younger age group (0.08% vs. 0.05%; p=0.0019 and 0.07% vs. 0.04%; p=0.0067). Conclusion: The prevalence of OUD is significantly higher among younger pregnant women, yet the prevalence of treatment is significantly lower among this age group compared to older pregnant women. The distributions of treatment types are similar. Such age variations in the prevalence of OUD but not in treatment types, calls for further studies to inform targeted interventions.

S/P indicates work done while a student/postdoc
**IMPACT OF MARIJUANA LEGALIZATION IN URUGUAY ON ADOLESCENT USE OF OTHER SUBSTANCES**

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Background: In 2013, Uruguay became the first country in the world to legalize the production, supply, and use of recreational marijuana. Legalization-driven changes in pricing, availability, and perceived riskiness may affect adolescent marijuana use, and in turn, this may impact use of other substances, depending on whether marijuana is a substitute or complement. Methods: We use the synthetic control method to examine the impact of legalization on past year and month adolescent use of tobacco, cocaine, and alcohol. We use Behavioral Risk Factor Surveillance System (BRFSS) data (grades 8-12) to compute self-reported use among adolescents in Montevideo, Uruguay in a synthetic control group calibrated by data from 16 metropolitan areas of Argentina and Chile. The synthetic control municipalities are weighted based on demographic characteristics and marijuana use. Results: In 2014-15, after the enactment of marijuana legalization, adolescent use of tobacco, cocaine, and alcohol were all lower in Montevideo than in the synthetic control. We estimate an absolute difference of 10% in the prevalence of past year and month tobacco use, a 2% difference in past year prevalence, and a difference of 8% and 7% in the prevalence of alcohol use within the past year and month, respectively. Discussion: Legalization of marijuana is associated with short-term reductions in tobacco and alcohol use among adolescents. Related work also finds reductions in marijuana use. These results comport with studies showing adolescent use of marijuana and cigarettes is positively associated.

**LONG-TERM IMPACT OF DISASTER EXPERIENCES ON CARDIOMETABOLIC RISK: A NATURAL EXPERIMENT FROM THE 2011 GREAT EAST JAPAN EARTHQUAKE AND TSUNAMI**

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Background: Limited evidence exists on whether experiences of natural disasters can worsen cardiometabolic risk profiles of survivors. We investigated this association using natural experiment data from the 2011 Great East Japan Earthquake and Tsunami in Japan. Methods: We used longitudinal data from a cohort of community-dwelling elderly adults aged 65 years or older living in Iwate, Miyagi, and Fukushima Prefectures. The baseline survey was conducted 6 months before the disaster, and the follow-up survey among survivors was performed approximately 2.5 years after. Subjects in the study were linked to medical record data, including systolic and diastolic blood pressure, body mass index, waist circumference, and serum triglyceride, HDL, and LDL cholesterol levels. We estimated the causal effect of disaster experiences (harm to property, loss of loved ones) on cardiometabolic risks using two-sample regression adjusting for all time-invariant confounders as well as observed time-varying confounders. Results: Our results showed that the most severe level of damage (i.e., complete destruction) was significantly associated with a 0.65 kg/m² decrease in BMI (95% CI 0.12 to 1.19), 2.8 cm increase in waist circumference (95% CI 0.17 to 5.33), and 3.59 mg/dL decrease in HDL cholesterol (95% CI 0.64 to 0.78). Less severe housing damage and loss of relatives, friends, and pets were not associated with cardiometabolic outcomes. Discussion: Loss of homes is associated with a persistent adverse impact on survivors’ cardiometabolic risk profiles several years after the disaster. Changes in the living environment following post-disaster relocation may explain the association.

**USING LINKED PUBLIC HEALTH DATA SYSTEMS TO INVESTIGATE THE RELATIONSHIP BETWEEN EARLY INTERVENTION SERVICES AND 3RD GRADE STANDARDIZED TEST SCORES AMONG LEAD-EXPOSED CHILDREN**

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Research has shown that early intervention programs can improve academic outcomes for children with developmental delays. However, in our knowledge, there are no published studies examining this relationship. The objective of this study was to investigate the association between early intervention services and third-grade standardized test scores among children exposed to lead in the first 3 years of life. We used linked data from Vital Statistics, childhood lead poisoning surveillance, the Early Intervention Program, and the Department of Education for children born in New York City from 1994 to 1998. There were 97,541 children with blood lead levels greater than 3 mcg/dL. Of these, 4,281 children received early intervention services within this time period. Children who received early intervention were randomly matched by propensity score to three children who did not receive services and had the same special education status. Propensity score matching improved covariate balance, reducing the average standardized absolute mean difference to below 0.10. Differences in test scores were assessed using a linear regression. Lead-exposed children who received early intervention services scored 7% (95% CI 3%, 11%) and 9% (95% CI 5%, 13%) of a standard deviation higher on math and English language tests than those who did not receive services. Among children with blood lead levels of 10 mcg/dL or greater, the estimated effect of early intervention on test scores was larger (math: 9% 95% CI 3%, 15% and English: 13% 95% CI 4%, 26%). By leveraging existing public health data, this study found evidence that early intervention programs may benefit lead-exposed children.

**UNDERSTANDING THE EFFECT OF A PUBLIC HEALTH DETAILING CAMPAIGN ON INITIAL EXPOSURE TO OPIOID ANALGESIC PRESCRIPTIONS**

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Background: In response to increasing opioid analgesic (OA) overdoses and deaths in the New York City (NYC) Department of Health and Mental Hygiene, conducted a public health detailing campaign with over 1000 Staten Island (SI) prescribers. The campaign’s goal was to reduce exposure to risky prescribing. An initial population-level evaluation identified a greater decrease in rates of high dose prescriptions among SI prescribers compared to the rest of NYC counties. We present an individual-level analysis examining the campaign’s impact on reducing initial exposure to OAs and the number of patients initiating high dose OA prescriptions. Methods: Data were obtained from the New York State Prescription Monitoring Program. For each month March 2013 – December 2014, we calculated the number of “new starts” (defined as patients without an OA prescription in the prior two calendar months), the percent of “new starts” who received one prescription in a calendar month for less than eight days, and the number of new “high dose” patients (defined as patients without an OA prescription for 100 or more daily morphine milligram equivalents in the prior two months). Changes in the prescribing indicators for SI prescribers and the rest of NYC were compared before and after the intervention using a difference-in-difference approach. Results: Following the intervention, the number of “new starts” increased among SI prescribers, although decreased among prescribers in the rest of NYC. Difference-in-difference analysis showed no significant differences in trends in the number of patients receiving an initial OA prescription for less than eight days or the number of new “high dose” OA patients between SI prescribers and prescribers in the rest of NYC. Conclusion: Although decreases in high dose prescription rates were observed at the population-level, the campaign was not associated with a decrease in initial exposure to opioid analogues or initial exposure to high dose prescriptions.
THE EFFECT OF THE AFFORDABLE CARE ACT ON HUMAN 
PAPILLOMAVIRUS VACCINE UPTAKE AMONG YOUNG WOMEN: 
FINDINGS FROM NHANES, 2007-2014 Samantha Raymond, Samantha 
Raymond, Bian Liu, Denis Nash, (Department of Epidemiology and Biostatistics, 
CUNY School of Public Health)

Background Human papillomavirus (HPV) serotypes 16 and 18 cause cervical 
cancer, and there is an HPV vaccine that protects against these oncogenic serotypes. 
The Affordable Care Act (ACA) significantly expanded dependent coverage and 
preventative services. This study assessed trends in HPV vaccination initiation 
among young women, as well as HPV vaccine completion, HPV infection status, and 
health insurance coverage, including before and after the implementation of the 
(ACA). Methods Using 2007-2014 data from the National Health and Nutrition 
Examination Survey (NHANES), 1,970 female participants were examined. The 
four outcomes were examined over time before (2007-2010) and after (2011-2014) 
ACA implementation. ACA exposure was operationalized by age, with the age 
group expected to be most affected (ages 19-25) serving as the intervention group 
and those similar in age and expected to be unaffected (ages 18 and 26) serving as 
the control group. Difference-in-difference analyses with multivariable logistic 
regressions, controlling for survey year, race/ethnicity, age, income, education, and 
family employment, were used to examine the four outcomes, taking into account 
NHANES's complex survey design. Results Health insurance coverage remained 
stable, while HPV vaccination initiation and completion increased over time. HPV 
infection with types 16 and 18 decreased. Among those ages 19-25, HPV vaccine 
initiation increased from 7.1% in 2007-2008 to 48.2% in 2013-2014, and 
completion increased from 0.0% to 31.6%. HPV infection decreased from 13.4% to 
6.8%. After taking secular trends into account, ACA exposure was not associated 
with any of the four outcomes in adjusted models. Conclusions ACA 
implementation was not related to an increase in HPV vaccination initiation, 
completion or insurance coverage, or a decrease in HPV infection among females 
aged 19-25. Future research should continue to explore novel ways to evaluate the 
ACA and its effect on preventative services.
DIFERENTIAL SEX EFFECTS OF X CHROMOSOME METHYLATION ON DEVELOPMENT OF TYPE 1 DIABETES: THE DIABETES AUTOIMMUNITY STUDY IN THE YOUNG Ranid K Johnson, Ranid K, Frank Lautens A Vanderinden, Patrick Catry, Jennifer Seifert, Tasha Fingelton, Brigitte Fisch-Hert, basil Yang, Katerina Kuchkar, Marian Rewers, IIM Norris, (Colorado School of Public Health)

DNA methylation may serve as a mechanistic link between genetic susceptibility and environmental exposures in the development of autoimmune type 1 diabetes (T1D). Previous studies have not focused on sex chromosomes due to interpretation challenges—females have higher methylation levels due to X chromosome inactivation. While incidence of early-onset T1D does not differ by sex, offspring risk of T1D is greater in affected males than females. Therefore, we investigated whether the association between X chromosome DNA methylation and T1D differed by sex using data from the Illumina 450K platform in a nested case-control study from the Diabetes Autoimmunity Study in the Young prospective cohort. In linear growth curve models adjusted for age and repeated measures, we identified 65 regions on the X chromosome where the differential methylation between 42 cases and 42 controls differed by sex (interaction p-value<0.05). For one region in the PZID gene, male cases had 3% more methylation on average compared to female controls, while female cases had 1% less methylation compared to female controls (interaction p-value=0.016). All other 64 regions were characterized by average hypermethylation in female cases compared to controls, and slight hypomethylation of no difference between male cases and controls. Several differentially methylated regions mapped to genes involved in regulating MAPK pathways that can lead to cytokine-induced beta-cell apoptosis, including DSFS, MRI723, and NRK. There are sex-specific X chromosome methylation differences between T1D cases and controls, with greater effects in females than males. These differences are apparent prior to diagnosis of T1D, and therefore may reflect or contribute to different disease processes in females and males. Given the sex-specific risk factors for familial transmission of T1D across generations, future work should examine how these sex-effects on the X chromosome may be related to sex of T1D-affected parents.

THE ASSOCIATION BETWEEN GESTATIONAL WEIGHT PATTERNS IN EARLY PREGNANCY AND LARGE-FOR-GESTATIONAL AGE INFANTS AMONG WOMEN WITH TYPE 1 INSULIN-DEPENDENT DIABETES Kettle I. McWhorter, Kettle I. McWhorter, Katelynne Bowers, Lawrence M Bohan, Ranjan Deka, Claudia L. Jackson, Jant C. Klsoury, (Epidemiology Branch, National Institute of Environmental Health Sciences, National Institutes of Health, Department of Health and Human Services)

Objective: Variability in gestational weight gain (GWG) may be an independent predictor of large-for-gestational-age (LGA) infants. Therefore, we aimed to determine the association between GWG patterns in the first 20 weeks of gestation and odds of delivering an LGA infant among women with Type 1 Insulin-Dependent Diabetes (T1DM). Methods: We conducted a longitudinal cohort study of women with T1DM enrolled in the Diabetic in Pregnancy Program Project. Sparse functional principal component analysis (FPCA) was used to identify clusters (or phenotypes) based on degree of variation in GWG in the first 20 weeks of gestation. Generalized estimating equations were used to examine the association between maternal cluster membership and odds of LGA in the infant, adjusting for age, race, parity, insulin dose per kilogram weight over gestation, mean pre- and post-prandial glucose, peroxisomal and pre-pregnancy body mass index (BMI). Results: Relative to the overall mean response, 3 distinct phenotypes, characterized by tertiles from the FPCA, were classified as low (cluster 3, n=167), moderate (cluster 2, n=184) and high (cluster 1, n=78) mean weight and variability in GWG. Phenotype variability was positively associated with pre-pregnancy BMI (p<0.001) and exceeding Institute of Medicine guidelines (p<0.001). Similarity among women with a history of T1DM enrolled in the Diabetes in Pregnancy Program Project: 0.09%

PLASMA LEVELS OF PROLACTIN AND PROGESTERONE IN ASSOCIATION WITH GESTATIONAL DIABETES RISK AND CARDIOMYOLYSIS/ABOLIC PROFILE IN A PROSPECTIVE MULTI-RACIAL PREGNANCY COHORT Mengying Li, Mengying Li, Shrihari Raval, Stefanie N. Hedke, Fasil Tekola Ayele, Michael Y. Tsai, Cuilin Li, Hangzhou, Zhejiang, China, (Epidemiology and Research, Division of Intramural Population Health Research, Francis Keeny Shriver National Institute of Child Health and Human Development)

Background: Prolactin and progesterone are implicated in the physiologic adaptation of glucose metabolism to pregnancy. However, it is unclear if they play a role in the development of gestational diabetes (GDM). Objectives: To examine the association of prolactin levels and progesterone levels with GDM risk and cardiomyolysis/abolic profile during pregnancy. Methods: This was a nested case-control study of 107 GDM cases and 214 matched controls without GDM from the NICHD Fetal Growth Study, a longitudinal cohort study of 2,334 healthy non-obese women with low-risk singleton pregnancies. Seventy-four GDM cases were identified based on medical records review. Adjusted risk ratios (RRs) and 95% confidence intervals (CIs) were estimated using multivariate Poisson regression with robust variance adjusted for maternal age, education, body mass index, parity, race/ethnicity, serum cotinine, and serum lipids (except for PFCs). Results: Among women with a history of type 2 diabetes (n=44), significantly elevated GDM risk (crude odds ratio [OR]: 1.8, 95% CI: 1.0-3.2; adjusted OR: 1.4, 95% CI: 0.8-2.3) was related to per-1SD increment in maternal plasma concentrations of PCB congeners with 6 chlorine atoms (158, 158, 146, 161, 153, 156, 170, 180, 182, 187, 183, 184, 186, 203, 202) and four PFCs (fluorononanone, perfluorooctanoic, perfluorohexanoic, and perfluorobutyric acids). Among women without a history of type 2 diabetes (n=1,789), plasma concentrations of PCB congeners with 6 chlorine atoms were significantly associated with higher GDM risk (range of RRs: 1.18-1.23 per 1SD increment; p < 0.05). Women with a history of type 2 diabetes were observed for other measured chemicals. Conclusion: Our results suggest that first trimester exposure to POPs at environmentally relevant levels may be related to increased risk of GDM and the associations were modified by women's family history of type 2 diabetes.

PERSISTENT ORGANIC POLLUTANTS AND GESTATIONAL DIABETES AMONG HEALTHY NON-OBSE NEW IN NICHID FETAL GROWTH STUDIES, SINGLETONS Mohammad L. Rahman, Mohammad L. Rahman, Culing Zhang, Melissa M. Strutz, Kathryn M. Kamati, Sanjii Lee, Fasil Tekola Ayele, Germaine M. Back Loux, (Francis Keeny Shriver National Institute of Child Health and Human Development)

Background: Persistent organic pollutants (POPs) are ubiquitously detected in the environment and in humans. Exposure to POPs has been linked with impaired glucose tolerance. However, epidemiological evidence for an association between POPs and gestational diabetes (GDM) is limited. Methods: In prospectively followed NICHD Fetal Growth Study, plasma levels of 11 organochlorine pesticides (OCPs), 3 polybrominated diphenyl ethers (PBDEs), 4 polyhalogenated dibenzo-p-dioxins (PCDDs), 11 polyhalogenated dibenzofurans (PCDFs), and 11 perfluoroalkyl substances (PFCs) were measured at enrollment (800 to 1200) among 3,344 healthy non-obese women with low-risk singleton pregnancies. Seventy-four GDM cases were identified based on medical records review. Adjusted risk ratios (RRs) and 95% confidence intervals (CIs) were estimated using multivariate Poisson regression with robust variance adjusted for maternal age, education, body mass index, parity, race/ethnicity, serum lipids (except for PFCs). Results: Among women with a history of type 2 diabetes (n=44), significantly elevated GDM risk (crude OR: 1.8, 95% CI: 1.0-3.2; adjusted OR: 1.4, 95% CI: 0.8-2.3) was related to per-1SD increment in maternal plasma concentrations of PCB congeners with 6 chlorine atoms (158, 158, 146, 161, 153, 156, 170, 180, 182, 187, 183, 184, 186, 203, 202) and four PFCs (fluorononanone, perfluorooctanoic, perfluorohexanoic, and perfluorobutyric acids). Among women without a history of type 2 diabetes (n=1,789), plasma concentrations of PCB congeners with 6 chlorine atoms were significantly associated with higher GDM risk (range of RRs: 1.18-1.23 per 1SD increment; p < 0.05). Women with a history of type 2 diabetes were observed for other measured chemicals. Conclusion: Our results suggest that first trimester exposure to POPs at environmentally relevant levels may be related to increased risk of GDM and the associations were modified by women's family history of type 2 diabetes.

S/P indicates work done while a student/postdoc
DO SUPPORTIVE FAMILY BEHAVIORS PROMOTE DIABETES SELF-MANAGEMENT IN RESOURCE LIMITED URBAN SETTINGS? - A CROSS SECTIONAL STUDY.

Saranya Ravi*, Saranya Ravi, Vijayaprasad Gopichandran, Swetha K. (ESIC Medical College and PGIMSR)

Background: Self-management is an essential component of prevention and treatment of type 2 diabetes. Social and family support has been shown to influence self-management behaviors as well as glycemic control and complications.

Objectives: To assess whether diabetes family support improves diabetes self-management and glycemic control in a typical urban population in India.

Methods: A cross-sectional study using a questionnaire that had items from the Summary of Diabetes Self Care Activities Scale (SDSCA), the Diabetes Family Behavior Checklist (DFBC) and some sociodemographic and diabetes-related clinical data. The participants were consecutively sampled from the diabetes outpatient department in a tertiary care hospital in Chennai, south India.

Results: A total of 200 consecutive patients from the diabetes outpatient department were interviewed. Diabetes self-management practices were good with respect to avoiding fatty foods and carbohydrates and undergoing regular blood testing for glucose. But the self-management with respect to exercise and foot-related care was rare. It was observed that a vast majority of the patients did not report receiving any support from their families. However, in the small proportion who did receive good family support, there is an association between diabetes self-management and diabetes family support ($r = 0.527; p=0.015$). Further, the path model showed that there is a positive statistically significant association between family support score and the diabetes self-management score ($r = 0.254; p<0.001$). However, the negative association between the diabetes self-management score and the mean plasma glucose did not reach statistical significance ($r = -0.082; p=0.082$).

Conclusions: In the urban south Indian setting, family support was significantly associated with better self-management activities, but better self-management did not translate to better glycemic control.


Melanie Jacobson*, Melanie Jacobson, Aldo Crossa, Sze Yan Liu, Sean Locke, Cheryl Stein, Sungwoo Lim, Eugenie Poirrot (New York City Department of Health and Mental Hygiene)

Gentrification is characterized by rapid socioeconomic change in lower income neighborhoods, which can displace long-term residents to more disadvantaged areas. Little has been studied on this residential movement in relation to health impacts using longitudinal data. This study examined enrollees from the World Trade Center Health Registry, a longitudinal cohort study of first responders, residents, area workers, and others present in lower Manhattan on September 11, 2001 (9/11).

Enrollees that completed ≥2 health surveys between 2003 and 2016, had ≥2 annual geocoded addresses in the New York City (NYC) metropolitan area, and did not have prevalent diabetes at the start of follow-up were included (N=45,394). Using a composite measure of neighborhood disadvantage based on U.S. Census Bureau and American Community Survey data, we categorized all 156 New York metropolitan area Public Use Microdata Areas (PUMAs) as gentrifying, non-deprived, deprived, or declining. Using address history, we defined displaced persons (n=855) as those who moved from gentrifying or non-deprived PUMAs to deprived or declining PUMAs. The comparison group were persons who never moved from gentrifying or non-deprived PUMAs (n=24,024). We fit adjusted Cox proportional hazards models to evaluate associations between neighborhood displacement as well as any moving to a different PUMA, and incident diabetes. Although 17.4% of enrollees ever lived in a gentrifying neighborhood, displacement was rare (1.9%), and primarily constituted moves from non-deprived to deprived (47.4%) or declining PUMAs (25.7%). Displacement was positively associated with diabetes (hazard ratio [HR]=1.30; 95% CI 1.0, 1.5). Additionally, those who ever moved were more likely to report diabetes compared with those who never moved (HR=1.11; 95% CI 1.0, 1.2). Neighborhood displacement, and moving more generally, were associated with diabetes among persons in the World Trade Center Health Registry.
THE INFLUENCE OF BREAST CANCER DIAGNOSIS ON CHANGES IN SERUM 25-HYDROXYVITAMIN D OVER TIME Katie O'Brien, Katie M. O'Brien, Dale P. Sandler, Charles R. Weinberg, (National Institute of Environmental Health Sciences)

Results of prospective and retrospective studies of vitamin D and breast cancer have been somewhat conflicting. This may be explained by variation in serum 25-hydroxyvitamin D (25(OH)D) concentrations over time and as a consequence of breast cancer diagnosis or treatment. We investigated the relationship between 25(OH)D concentrations measured before and after breast cancer diagnosis. We conducted these analyses in a nested case-control sample of women from the Sister Study, a prospective cohort of women who were breast cancer-free at baseline, but had a sister previously diagnosed with the disease. The included women (623 cases, 769 controls) provided two serum samples—one at baseline (2003-04) and one 4-10 years later (2013-14). Total serum 25(OH)D was assessed using liquid chromatography tandem mass spectrometry. 25(OH)D concentrations were correlated over time (Spearman R=0.42, p<0.01) and were greater in cases (65% to 81%) than controls (56% to 72%). Decreased hormonal birth control use also predicted changes in 25(OH)D. Our results do not explain the previously observed differences between retrospective and prospective studies of 25(OH)D and breast cancer, but do demonstrate how reverse causation and temporal trends in exposure can have bias effect estimates in retrospective studies.

SURVIVOR BIAS, SELECTIVE ATTRITION, AND REVERSE CAUSALITY, OH MY Hailey Barack, Andrew Stokes, Jennifer W. Bui, Kathleen M. Hovey, Jean Wactawski-Wende, (University at Buffalo)

The nature of the relationship between body weight and mortality in older adults remains unclear. The objective of this presentation is to examine the impact of differential survival to cohort entry (survivor bias), selective attrition, and reverse causality on the relationship between body mass index (BMI) and mortality in postmenopausal women. In this context, reverse causality refers to the notion that preexisting disease causes weight loss and is similar to the concept of confounding by pre-existing disease. Selective attrition refers to informative censoring. In this analysis, we used data from the Women's Health Initiative clinical trial (n=683,320). The exposure is a time-varying categorical BMI variable (kg/m2) and the outcome is all-cause mortality. We examined potential survivor bias by stratifying analyses by age at entry (50-59, 60-69, 70-79). We fit inverse probability of treatment and censoring weights to account for reverse causality and selective attrition and used the weights to estimate a binomial marginal structural model. We computed risk ratios (RR) and 95% CI from an adjusted binomial generalized linear model with results from the marginal structural model. Results indicated that across all BMI categories, effect estimates were attenuated among women who were older at cohort entry. As well, among women with high BMI values, results from weighted models were lower than unweighted models. For example, using BMI 25-29.9 in the referent group, the weighted mortality RR for women with BMI 35-39.9 was 1.17 (1.01, 1.36) for women aged 50-59 and 1.04 (0.92, 1.19) for women 70-79 while corresponding unweighted RRs were 1.45 (2.09, 1.63) and 1.24 (1.13, 1.37) for women aged 50-59 and 70-79. These findings demonstrate the influence of survivor bias, selective attrition, and reverse causality on estimates of the BMI-mortality relationship in postmenopausal women and highlight the methodological techniques that can be used to account for these forms of bias.

A COMPARISON OF METHODOLOGICAL APPROACHES TO THE ASSOCIATION BETWEEN DE NOVO VITAMIN D SUPPLEMENT USE POST-DIAGNOSIS AND BREAST CANCER MORTALITY Jamie Maddon, Jamie Maddon, Lisa Zaga, Fintiere Loery, Kathleen Bennett, (NSC, Population Health Sciences Division, Dublin, Ireland)

Pharmacy claims data offers a unique opportunity for non-randomized comparative effectiveness research studies. Our group compared different methodological approaches to overcome inherent bias while examining the relationship between vitamin D supplementation and breast cancer mortality. This study investigates different methodological approaches to overcome inherent bias while examining the association between vitamin D supplementation and breast cancer mortality. Women aged 50-80 years with a record of invasive breast cancer were identified from the National Cancer Registry Ireland database (NCRI). We used the first observation of de novo vitamin D supplementation identified from linked prescription data (n=2581, 49%). We first implemented a standard multivariate Cox proportional hazards (PH) model to estimate adjusted HRs (95% CI) for breast cancer-specific mortality. We compared these findings to a propensity score analysis approach. We subsequently sought to account for the time-varying nature of vitamin D use and time-varying confounding by high-sodium intake using inverse probability of treatment weighted marginal structural models (MSMs), exploring the impact various weighting techniques have on the effect estimates. Using the standard Cox PH model, we found a 20% reduction in breast cancer-specific mortality in de novo vitamin D users compared to non-users (HR 0.80, 95% CI 0.64-0.99). A similar point estimate was observed, but larger CIs for the association between vitamin D use and breast cancer-specific mortality (HR 0.83, 95% CI 0.60-1.13) when correcting for confounders and adjusting for treatment group baseline using propensity score analysis (1:1 exact matching). Using truncated stabilized weights (truncated fraction=0.01) in a MSM, we obtained a similar result (HR 0.76; 95% CI 0.47-1.24) however, point estimates of treatment effects varied greatly depending on weight trimming. Our results highlight the importance of treatment model specification on MSM estimates.

OBESITY AND PROSTATE CANCER RECURRENT FOLLOWING RADICAL PROSTATECTOMY Crystal S. Langlais, Crystal S. Langlais, Janet E. Clinton, Jennifer M. Broering, Stacey A. Dillin, Van Borgan, Matthew R. Cooperberg, Peter B. Carroll, June M. Chua, (Department of Epidemiology and Biostatistics, University of California, San Francisco)

Purpose: To examine the association between obesity and risk of prostate cancer recurrence in the CaPSureSM (CAncer of the Prostate Strategic UDuration Endpoints) study. Methods: We included 3,491 men with prostate cancer from CaPSureSM who underwent prostatectomy (RP) between 1998-2017 and had body mass index (BMI) available at baseline. BMI was examined continuously and categorically (<25, 25-29, 30-34.9, 35 kg/m2). Cancer recurrence was defined as two consecutive prostate-specific antigen (PSA) levels ≥0.2 ng/mL after RP or any second treatment. We used Cox proportional hazards models to estimate hazards ratios (HR) and 95% CI for BMI with adjustment for ethnicity, age, clinical site of recruitment, and diagnostic PSA level, Gleason grade, and T stage. Results: Patients were followed for a median of 4.7 years [IQR: 2.3, 8.1] after RP. Recurrence occurred in 452 (13%) patients a median of 21 months [IQR: 10.4, 41.4] after RP (66% due to PSA rise). There was a positive association between continuous BMI and risk of recurrence (multivariate HR 1.16; CI: 1.04, 1.29, per 5-unit increase in BMI). Men who were very obese had a higher hazard of recurrence (multivariate HR 1.93, CI: 1.27, 2.92) compared to those with normal BMI. Other BMI categories were associated positively, but not statistically significantly, with recurrence (overweight HR 1.13, CI: 0.87, 1.46; obese HR 1.26, CI: 0.92, 1.71). Conclusion: Extreme obesity was associated with a higher risk of prostate cancer recurrence, after adjustment for baseline demographic and clinical factors. These results are consistent with prior reports on BMI and post-diagnostic clinical outcomes. Our findings support careful follow-up among these patients following RP. Additional research is needed to determine if this association is independent of lifestyle behaviors (diet, physical activity) or if losing weight after prostate cancer diagnosis is associated with improved outcomes after RP.
RECONSTRUCTING CAREGIVING FAMILY NETWORKS AMONG CANCER DECEDENTS USING DANISH POPULATION-BASED REGISTRIES

Katherine Ornstein* Katherine Ornstein, Marie Kristensen, Melissa Aldridge, Mogens Groenvold, Lau Caspar Thygesen, (Icahn School of Medicine at Mount Sinai)

Caregiving for individuals with cancer at the end of life can be very burdensome impacting the health and well-being of the entire family. Yet existing studies limit our ability to understand the family caregiver experience with serious illness and bereavement by focusing on the spouse or one “primary” caregiver. We used population registry data to evaluate the complete composition of family caregiving networks at the time of death to assess the potential for bias in bereavement and caregiver outcome research. We conducted a prospective cohort study of adult Danish decedents 2009-2015 who died from cancer. Using registry linkages we constructed family network linkages for decedents by identifying all parents, spouses, cohabiting partners and adult children, grandchildren, and great grandchildren living in Denmark at the time of death. We identified 107,762 decedents with cancer as cause of death (mean age 72.7). Among these decedents, 13.8% had no living family at the time of death. This group was more likely to be female and older and less likely to receive supportive specialized palliative care services than those with identified family members. While almost half of cancer decedents lived alone at the time of death, each decedent was linked on average to 5.1 relatives (range=0-63). Among those with living family members, the vast majority (89.2%) had multiple family members at the time of their death. Furthermore, cancer deaths did not occur in isolation within families- 5% of family members bereaved by cancer experienced >=2 deaths over two years. Using complete population registries we have determined that dyadic research on end-of-life caregiving and bereavement in cancer that is limited to spouses or even primary caregivers does not fully capture the end-of-life experience for most caregiving families. Research on family caregiving networks that link multiple family members and decedents may substantially expand our knowledge of key caregiving outcomes.
LOCAL IMMIGRATION ENFORCEMENT AND PRETERM BIRTH IN CALIFORNIA COUNTIES Jacqueline M. Torres* Jacqueline M. Torres, Juan A. Catey, Maria-Elena De-Trinidad Yosting, Ralph A. Catalano, Rachel Moreno-Frosch, (University of California, San Francisco)

There is growing interest in the health effects of immigration enforcement, although it is known about the relationship between the intensity of immigration enforcement enacted over longer periods and health. We examine the relationship in California between immigration enforcement intensity and preterm birth (PTB) during the “Secure Communities” (SCOMM) program (2009-2014). We linked data on county-level immigration enforcement for each month of SCOMM to birth records for Latina and non-Latina white women in 11 of California’s most populous counties. Preliminary analyses use the 4 million birth records from 2009-2011. We separately estimated associations between immigration enforcement (as measured by number of deportations and submissions to federal immigration authorities) during the months just prior to birth and the odds of PTB for each county. We tested for interactions between maternal ethnicity and exposure measures. Models controlled for maternal age and education, infant sex, and accounted for temporal trends in preterm birth. Exposure measures were mean-centered and standardized. Each standard deviation above the county-specific mean number of deportations in the months just prior to birth was associated with greater odds of PTB for both Latina and non-Latina white women in five California counties (e.g. San Bernardino OR: 1.07, 95% CI: 1.05, 1.09). In four counties, the odds of PTB for significantly higher for Latina women at each standard deviation above the county mean level of exposure (e.g. Fresno County, OR for interaction term: 1.08, 95% CI: 1.04, 1.13) compared to the reference group of non-Latina white women experiencing the mean number of deportations in the months just before birth. Patterns were similar, albeit with some cross-county variation, in models that used submissions as the measure of interest. Greater immigration enforcement intensity may contribute to higher risk of PTB among women in many California counties.

S/P indicates work done while a student/postdoc

A LONGITUDINAL STUDY OF THE ASSOCIATION BETWEEN CHILDHOOD FAMILY FOOD INSECURITY AND YOUNG ADULTHOOD MENTAL HEALTH: Laura Pryor* Laura Pryor, Maria Melchior, Maetricio Avendano, Patrícia Serkan, (Department of International Health, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD, USA)

Introduction: Food insecurity affects nearly 10% of US homes with children and has been associated with increased mental health problems. This study will examine the association between growing up in households affected by food insecurity and young adult mental health. Methods: Data was drawn from the Panel Study of Income Dynamics (PSID). Participants were children in PSID household from 1997-2003 (n=5365, ages 1-13 years at baseline). Household food insecurity was measured using the US Department of Agriculture’s (USDA) 6-item questionnaire and considered in a continuous measure of affirmative items. Group-based developmental trajectories of household food insecurity from 1997-2003 were modeled using a semiparametric, group-based multinomial modelling approach (Proc Traj program in SAS). Outcomes measured in young adulthood (2005 until 2015) include non-specific psychological distress, measured with the Kessler (K6) scale (6=serious psychological distress). Interactions between trajectory group and parental mental health and food assistance are being examined. Results: A three group trajectory of food insecurity across time was identified: 1) High food security (no/very low food insecurity items at any assessment across childhood); 2) Moderate (some affirmative food insecurity items across time; 76%); and 3) Low food security (high number of affirmative items indicative of chronic food insecurity across childhood: 5.14%). Significant associations were found between being in the moderate and low food insecurity groups during childhood with high levels of psychological distress in young adulthood, which remained significant when controlling for patients’ educational attainment, child’s sex and age. ORs (95% CI): 1.8 (1.3; 2.5) and 2.7 (1.6; 4.7), respectively. Conclusion: Growing up in a household affected by food insecurity was associated with higher risk of young adult mental health problems. Policies that aim to improve food insecurity may help reduce the risk of mental health problems in young adulthood.

INCOME INEQUITIES IN WOMEN’S MENTAL HEALTH: EXPLORING THE ROLE OF UNPAID FAMILY WORK Bonnie Janzen* Bonnie Janzen, Lataniché M. Heiltsen, (University of Saskatchewan)

Background. The psychosocial hazards associated with unpaid family work have not been a prominent focus in epidemiological research aimed at understanding social inequalities in women’s health. Research attention has been further impeded by a scarcity of psychometrically sound instruments available to measure family work. Using a newly developed family work measure with evidence of validity and reliability, the goal of this study was to determine whether psychosocial inequalities of unpaid family work contribute to income inequalities in women’s mental health. Methods: Study participants in this cross-sectional study were 512 employed partnered mothers living in a Canadian province. The dependent variable was psychological distress. In addition to 28-item measure assessing five dimensions of unpaid family work quality (i.e., Demands, Autonomy, Equity, Social Resources, Caregiving Rewards), independent variables included material deprivation, job control, job demands and several measures of the work-family interface. A series of linear regression models were performed to meet study goals. Results: Higher household income was associated with lower psychological distress. Although all dimensions of unpaid family work quality were significantly associated with distress (with the exception of caregiving rewards), equity was also related to income; that is, women with higher income reported higher levels of equity and responsibility for unpaid family work compared to those with lower income. Material deprivation made the largest contribution to the income disparity in psychological distress, followed by work-family conflict, equity in family work and job control. Equity in responsibility for unpaid family work may contribute to income-related disparities in women’s mental health. Longitudinal research with diverse populations of women and in other countries with varying gender policy regimes are required to confirm these findings.

CERVICAL CANCER SCREENING, IMMIGRANT STATUS, AND ACCESS TO PRIMARY CARE PHYSICIANS IN MONTREAL, CANADA: A CAUSAL MEDIATION ANALYSIS Geetaji D Datta* Geetaji D Datta, Samira Qureshi, Alexandra Bilan, Marie-Pierre Sylvestre, Lisa Gaivin, Marie-Helene Mayrand, (ERCHUM/Université de Montréal)

Background. Social inequalities in cervical cancer screening have been documented in many contexts, including Canada. Increased access to primary care is one potential avenue through which inequalities could be mitigated. Objectives: To examine the mediating effect of having a primary care physician (PCP) on the association between immigrant status and cervical cancer screening in Montreal, Quebec. Methods: Four waves of the population-based Canadian Community Health Survey (2003, 2005, 2007, 2012) were utilized (N=6,939) and analyses were limited to women aged 18-65 years residing in the Greater Montreal Area who had not had a hysterectomy. The outcome of interest was never having been screened for cervical cancer and immigrant status was categorized dichotomously. Information on all variables was self-reported by survey participants. A counterfactual approach for assessing mediation was used to calculate controlled direct effects, natural direct effects, and natural indirect effects. Access to a PCP was treated both as a mediator and an effect modifier. Age, marital status, educational attainment, and income were considered confounding factors. Results: Twenty-seven percent of women reported not having a PCP. The odds of never having been screened was 3 times higher among immigrants than non-immigrants (OR: 3.2, 95% CI: 2.6, 3.8). The controlled direct effect, the association that is not mediated by having a PCP, was nearly equivalent (OR: 3.0, 95% CI: 2.6, 3.4). Similar results were observed for the natural direct effect. Conclusion: Solely increasing primary care access among immigrants is not likely to appreciably decrease immigrant-related inequalities in cervical cancer screening among women in Montreal. Other types of interventions, such as integrating self-sampling modalities or implementing elements of organizational screening, should be investigated for their potential to mitigate screening inequalities. Funding: CIHR and CCSRI.
A growing body of research has shown that people living in neighborhoods with more severe socio-economic deprivation tend to have higher risks for colorectal cancer. However, most previous studies have only examined neighborhood socioeconomic status (SES) factors at one point in time, so it is unclear whether long-term trajectories in neighborhood SES can also influence health outcomes. We examined the 10-year change in neighborhood SES in relation to the incidence of colorectal cancer among 266,362 participants (age 51-70) in the NIH-AARP Diet and Health Study who reported living in the same neighborhood in baseline (1995-1996) and in 2005 follow-up. To measure long-term trajectories in neighborhood SES, we derived an index using census data for 1990 and 2000 separately, and further grouped neighborhoods into four categories based on the median of the SES index in 1990 and 2000 (low-low, low-high, high-low, high-high). We found that compared to residents whose neighborhoods were in the high SES groups in both 1990 and 2000 (reference), those whose neighborhoods were consistently in the low SES groups in both years had a 11% (HR: 1.11 (95% CI: 1.04, 1.18)) increase in the risk of developing colorectal cancer. Moreover, we also found an increase in colorectal cancer risk among those whose neighborhoods changed from the high SES group in 1990 to the low SES group in 2000 (1.16 (1.04, 1.30)). Our findings suggest that exposure to consistently low SES neighborhoods and/or a decrease in neighborhood SES over a period of time may be associated with higher risks of colorectal cancer.
OPIOID PRESCRIPTIONS AND SUICIDAL OVERDOSE Anita Spiess*
Anita Spiess, Nkechinyere Nwatie Gibson, Maisha N. Touissant, Raisan D. Brooks, Elizabeth R. Corrigan. (U.S. Army Public Health Center Behavioral and Social Health Outcomes Practice Division)

Suicide overdoses involving opioids doubled among U.S. civilians from 1999 to 2014. Veterans with opioid prescriptions were twice as likely to suffer adverse outcomes including overdose and suicide attempt as those without opioid prescriptions. To our knowledge, connections between suicidal behavior and opioid prescriptions in the U.S. Army have not been investigated previously. This study evaluated the association between prescription opioids and overdose among U.S. Army Soldiers who died by suicide or attempted suicide from 2007 through 2016. Logistic regression was used to calculate the odds of suicide or attempt by overdose compared to other methods, as predicted by opioid prescription status. Potential confounders that were considered included sex, age, rank, substance use disorders (alcohol, opioid, and other drugs), mental disorders, recent history of positive drug test for opioids or other drugs, and screening for entry in the Army Substance Abuse Program Of 1,498 suicide cases, 5% overdosed and 25% had received an opioid prescription in the 6 months preceding their death. Of 4,027 attempt cases, 56% overdosed and 34% received an opioid prescription in the previous 6 months. Opioid prescriptions were independently associated with overdose for both suicide cases (AOR 2.29, 95% CI 1.40–3.76) and attempt cases (AOR 1.13, 95% CI 1.23–1.58), after adjustment for sex, rank, substance use and other mental disorders. These results are in line with the findings among veterans, suggesting that Soldiers with opioid prescriptions might benefit from targeted suicide prevention efforts and regular suicide screening.

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USE OF NATURAL LANGUAGE PROCESSING IN ELECTRONIC MEDICAL RECORDS TO IDENTIFY PREGNANT WOMEN WITH SUICIDAL BEHAVIOR: TOWARDS A SOLUTION TO THE COMPLEX CLASSIFICATION PROBLEM Qi-Yue Zhang* Qi-Yue Zhang, Leon P. Mirin, Liang D. Nathan, Karen M. Brown, Deborah Kneubuhl Gonclez, Tiana Sun, Sean Finner, Ben Galese, Paul Avylko, Jordan W. Stroble, Elizabeth W. Karkon, Tiao Cui, Michelle A. Williams. (Harvard)

Objective: Suicide, one of the leading cause of maternal deaths, may be prevented if prompt action and immediate interventions are taken to mitigate risk as part of prenatal care. We sought to develop algorithms to identify pregnant women with suicidal behavior using information extracted from clinical notes by natural language processing (NLP) in electronic medical records (EMRs). Methods: Using both codified data and NLP applied to unstructured clinical notes, we first screened pregnant women enrolled in Partners HealthCare for suicidal behavior. Psychiatrists and a trained researcher manually reviewed clinical charts to identify relevant features for suicidal behavior and to obtain gold-standard labels in training and validation datasets. Using the adaptive elastic net, we developed an algorithm to classify suicidal behavior. We then validated the algorithm in an independent validation dataset, and applied it to the dataset including women who screened positive for suicidal behavior to confirm the presence of suicidal behavior. Results: From 275,843 women with at least one diagnostic code related to pregnancy or delivery in the Partners HealthCare EMRs, 9,331 women (3.8%) were screened positive for suicidal behavior by either codified data (N=186) or NLP (N=9,145). Using expert-curated features, our algorithm achieved an area under the receiver operating characteristic curve of 0.83. By setting the specificity level at 0.90, we obtained a sensitivity of 0.86, a positive predictive value (PPV) of 0.63, and a negative predictive value (NPV) of 0.88. The algorithm was used to identify 2,446 pregnant women with suicidal behavior among the 9,331 patients who screened positive for suicidal behavior. The sensitivity of suicidal behavior in Partners HealthCare EMRs was 77.98 per 100,000 pregnant women. Conclusions: Mining unstructured clinical notes using NLP resulted in a more than 10-fold increase in the number of pregnant women identified with suicidal behavior. Extracting...
EXAMINING TRENDS IN FATAL AND NONFATAL SUICIDE ATTEMPTS TO UNDERSTAND INCREASING SUICIDE RATES, UNITED STATES, 2006-2014 Jing Wang*, Jing Wang, Steven A. Sumner, Thomas Simon, Alex E. Crosby, Francis Annor, Kristin M. Holland, (CDC)

Objective: The suicide rate in the United States increased 18% between 2006 and 2014. However, it is unclear whether the increase is due to more individuals attempting suicide, increases in fatal suicide attempts, or both. This study examined national trends in the incidence of suicides and medically treated suicide attempts among persons aged 10 years or older from 2006-2014. Methods: Non-fatal suicide attempts were identified from the National Inpatient Sample and National Emergency Department Sample. Suicides were identified from the National Vital Statistics System. Census population estimates served as denominators to calculate incidence of all suicide attempts. Case fatality rates were calculated by dividing the number of suicides by all fatal and non-fatal suicide attempts. Results: Overall suicide attempt incidence rates were stable from 166.5 per 100,000 in 2006 to 172.4 per 100,000 in 2014 (p=0.5), while the case fatality rates increased 14% from 2006 to 2014 (p<0.01). However, the trends varied by sex and age subgroups. Adolescents showed upward trends in both suicides and suicide attempts. Persons aged 20-64 years showed 3.1% - 7.1% annual relative increase (all p<0.01) in case fatality rates after 2010 except for men aged 45-64 years who did not show a change. Suicide attempt rates were stable for all subgroups after 2010. Persons aged 65 years or older had 2.0% - 3.3% annual relative increases in suicide attempts (p<0.01) but stable case fatality rates. Conclusion: This study reveals how trends in suicide attempts and case fatality rates vary across subgroups. These results underscore the importance of comprehensive suicide prevention strategies that include upstream approaches to prevention, such as those that promote social connections and teach coping and problem-solving skills, as well as more proximal strategies that provide support and reduce access to lethal means among persons at risk for suicide.

DRUGS AND DESPAIR: AN ANALYSIS OF COMMUNITY-LEVEL OPIOID OVERDOSES AND SUICIDE Veronica A. Pear*, Veronica A. Pear, Julian Santaella-Tenorio, Katherine M. Keyes, Silvia S. Martins, Ariadne Rivera, Garen J. Wintemute, Magdalena Cerda, (Violence Prevention Research Program, University of California Davis School of Medicine)

Background: Findings from previous studies suggest that opioid abuse is a risk factor for suicide at the individual level, but less is known about the impact that recent increases in opioid abuse in the community have had on rates of suicide. In this study, we examined whether spikes in community-level opioid overdose rates were associated with community-level suicide rates. Methods: We used county-level hospital discharge data and Multiple Cause of Death Mortality Files to identify all nonfatal opioid overdoses and suicides in 14 states from 2003-2014. Heroin and prescription opioid overdose (HOD and POD, respectively) were analyzed separately, and suicide was analyzed overall and by method (firearm, poisoning, and other). To identify spikes, we fit ARIMA models and calculated the residuals and their standard deviations (SD); county-years with residuals greater than twice the SD of the model residuals were spikes. We used random intercept logistic regression models to account for clustering at the county level, while controlling for time-varying confounders (i.e., yearly county-level demographic and socioeconomic characteristics) and for time-fixed, between-state confounding (via state fixed effects). Models with and without a 1-year distributed lag for opioid overdose were tested. Results: Spikes in POD were significantly associated with same-year spikes in firearm-related suicides (OR: 1.69, 95% CI 1.04, 2.74), but this association fell from significance when a 1-year lag was added to the model. No other association reached statistical significance. Conclusions: Spikes in community-level opioid overdose rates were not generally associated with later spikes in community suicide rates, suggesting that recent increases in opioid abuse may not be contributing to the recent increase in suicide rates. Given that spikes in POD were only associated with concurrent spikes in firearm suicide, the possibility of reverse causation cannot be excluded.

S/P indicates work done while a student/postdoc
Background: Caffeine is a central nervous system stimulant of the methylxanthine class and is the world's most widely consumed psychoactive drug. Many observational studies have been conducted to assess a direct link between caffeine consumption and cardiovascular disease (CVD), producing conflicting results. To date, more rigorous studies, such as randomized control trials, are lacking on this topic. This study aimed to investigate the causal relationship behind this association using a Mendelian Randomization (MR) study. Methods: Twenty-four SNPs predicting blood caffeine were obtained from a publicly available genome-wide association study of 1960 adults with blood metabolites. Genetic associations with ischemic heart disease (IHD) were obtained from CARDIoGRAMplusC4D1000 Genomics meta-analyzed with the UK Biobank SOFT CAD GWAS (cases=10201, controls=137,371) and the MacCordish Infarction Genetics and CARDIGRAM Exome (UK Biobank meta-analyses), with validation in an independent sample of 4,412 cases and 3,910 controls, giving up to 340,799 individuals in total. Wald estimates were calculated for each SNP, and overall estimates were obtained using inverse weighting with random effects, a weighted median, and MR-Egger. Results: No association was found between caffeine and IHD using inverse variance weighting (odds ratio (OR)= 0.98 (95% confidence interval (CI) 0.96, 1.01) p=0.29), weighted median (OR =0.99 (95% CI 0.96, 1.02) p=0.49), or MR-Egger (OR= 0.99 (95% CI 0.94, 1.04) p=.71) methods. Conclusion: Findings from this study suggest no causal association between caffeine and IHD. Observational studies that found an association may have been subject to unmeasured or uncontrolled confounding. Alternatively, many of the observational studies assessing the association between caffeine and IHD have specifically tested for a link between coffee drinking and IHD; perhaps other ingredients in coffee should be tested more rigorously as potential causal factors.

A COMPARISON OF TWO-STAGE LEAST SQUARES INSTRUMENTAL VARIABLE METHODS FOR ESTIMATING CAUSAL EXPOSURE EFFECTS IN SOCIAL EPIDEMIOLOGY Jerzy Eisenberg-Guyot*, Jerzy Eisenberg-Guyot, Ajitumu Hajat, (University of Washington Department of Epidemiology)

Background: Unbiased causal estimation of the effects of certain exposures can be difficult given the potential for unmeasured confounding and reverse causation that frequently plagues social epidemiologic research. Though instrumental variable (IV) methods are often used in such settings to estimate an exposure, they often have poor precision. In this study, we compare traditional two-stage least squares (2SLS) with two 2SLS-based methods aimed at improving precision. We illustrate the comparison using the following study question: Does frugal borrowing cause poor/fair self-rated health (SRH)? Methods: Exposure, outcome, and confounder data came from the Current Population Survey from 2011-2016. We defined frugal borrowing as past-year pawnshop, payday, or car title loan use. SRH was measured 9 months after exposure. First, we assessed the validity of the instruments, which were state payday, pawn, and cash-checking regulations. Next, to estimate the difference in prevalence (PD) of poor/fair SRH between frugal borrowers and non-frugal borrowers, we used three approaches: 1) 2SLS 2) 2SLS after near-far matching, which makes respondents similar on confounders and different on the instruments; and 3) 2SLS after propensity-score matching (PSM). We used robust standard errors for approaches 1-2 and bootstrapping for approach 3. Results: All 2SLS analyses found that frugal borrowing was associated with worse SRH. Although point estimates were similar across analyses (PD range 0.33, 0.44), precision varied substantially. PSM prior to 2SLS improved precision (confidence limit difference (CLD) 0.73) over traditional 2SLS (CLD -0.25), while near/far matching worsened precision (CLD 2.55). Discussion: In settings with rare exposures, PSM prior to 2SLS can improve precision by restricting the outcome analysis to those whose exposure is affected by the instrument. Near-far matching, however, can worsen precision by reducing the number of exposed used in the outcome analysis.
Mendelian randomization (MR) continues to increase in popularity and is being applied in many different settings. However, while many MR study results are interpreted as vaguely-defined "lifetime effects" of sustained exposures, instrumental variable analysis, which is at the heart of MR, has historically been developed for and focused on the estimation of the effect of point exposures. This has led to some confusion about how to interpret MR estimates. We begin by providing one possible definition of a lifetime effect: the average change in outcome measured at time t when the entire exposure trajectory from conception to time t is shifted by one unit. Using simulations and an empirical example from a Rotterdam cohort, we demonstrate that MR analyses will only validly estimate this effect in certain settings: e.g., when the relationship between the genetic variant and the exposure is not a function of age and the effect of exposure on the outcome is linear. This is important because most MR studies use time-varying exposures and never investigate whether the relationship between the genetic variant and exposure varies with age. Previous studies have shown this type of age-dependent relationship in genetic variant/exposure pairs commonly used in MR. Finally, we explore cases in which valid estimation of the effect of a point intervention on the exposure could be achievable. We demonstrate with causal graphs and a derived bias formula that detailed substantive knowledge of the relevant exposure window for the outcome and of the longitudinal effects of the genetic variant on the exposure are required to determine whether valid estimation of the effect of a point intervention is possible. In sum, by using causal graphs, bias derivations, simulations, and empirical examples, we sought to bring clarity to different potential interpretations of MR effect estimates and the situations in which such estimates are particularly susceptible to misinterpretation or bias.
THE VAGINAL MICROBIOTA AND BEHAVIORAL FACTORS ASSOCIATED WITH GENITAL CANDIDA ALBICANS DETECTION IN REPRODUCTIVE-AGE WOMEN

Sarah Brown, Sarah Brown, Vincent Bruno, Jennifer A. Schwartz, L. Larry Brandon, Jacques Revel, Rebecca M. Brown, (Institute for Genome Sciences, University of Maryland School of Medicine; Department of Epidemiology and Public Health, University of Maryland School of Medicine)

Background: Vaginal candidiasis is common in 5%-8% of women experiencing multiple episodes per year. Presence of C. albicans in the vagina has been associated with HIV acquisition and preterm delivery. Little is available on how the composition of the vaginal microbiota, along with other risk factors, are associated with molecular detection of C. albicans. Methods: Self-collected vaginal swabs were obtained cross-sectionally from 394 and 135 reproductive-age women in two studies. Exclusion criteria for the first study included self-report of vaginitis discharge and pregnancy. The second study excludes women who had vaginal infections or were pregnant. C. albicans was detected by PCR targeting the 18S rRNA gene. Vaginal microbiota was characterized by 16S rRNA gene sequencing of the V3-V4 hypervariable regions and clustered into community state types (CSTs).

We used multiple logistic regression, adjusted for study site, to identify factors associated with C. albicans detection. Results: Twenty-one percent of participants (n=112) had C. albicans detected. There was a significant 24-fold increase in C. albicans if a woman was L. crispatus-dominated compared to samples that had low-Lactobacillus CST. Results were consistent across multiple CSTs. L. gasseri, L. iners and L. jensenii-dominated samples were positively associated with C. albicans but were not statistically significant. Receptive oral sex once or more per week (OR: 274, 95% CI 1.8-4.97) compared to no reported practice and prior antifungal use (OR: 1.71, 95% CI 0.95-2.95) were associated with C. albicans detection. Conclusions: L. crispatus-dominated vaginal microbiotas are thought to protect women from development of bacterial vaginosis and sexually transmitted infections. However, our data reflect that the L. crispatus-dominated CST was significantly associated with C. albicans detection compared to the low-Lactobacillus state. Receptive oral sex may also be a significant risk factor for C. albicans.

PREVALENCE OF PREEXISTING MENTAL ILLNESS IN SEER-MEDICARE ER+ BREAST CANCER PATIENTS

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Objective: Determine the effect of length of lookback period on pre-cancer mental illness (MI) prevalence and describe MI prevalence prior to breast cancer (BC) diagnosis. Methods: Included women were part of a study about pre-existing MI and inflammatory on endocrine therapy use, aged 63+ at their first estrogen receptor positive ER+ BC diagnosed 2007-2013. All had continuous Medicare parts A and B for 12+ months prior and 18+ months after BC diagnosis, 18+ months of continuous eligibility, and no established causes of MI. MI was identified using one of two patient LIDC9 diagnoses occurring 30+ days apart. Results: Increasing lookback periods resulted in cohorts with 37095, 34095 (78% fewer) and 32336 (15% fewer) patients for 12, 24, and 36 months, respectively. Estimates of any MI prevalent increased with longer lookback periods: 5066 (13.4%), 7012 (20.1%), and 7971 (24.7%). Mood (11.3% at 36 months, 10.5% at 12 months, and 9.5%), anxiety (5.8%, 4.5%), and psychoses (3.3%, 3.1%) were the most prevalent disorders, followed by dystemias (6.2%, 2.9%), drug use (6.2%, 4.9%), and bipolar disorders (1.3%, 0%). Less common were delirium (1.2%, 0.5%), adjustment disorders (0.4%, 0.1%), alcohol disorders (0.3%, 0.1%), and personality disorders (0.3%, 0.1%). Mood, anxiety, and drug use disorders prevalence increased in recent diagnosis years. Mood disorders and dystemias increased with age, whereas psychoses, drug use, and bipolar disorders increased with age association was observed with anxiety. Any MI prevalence was highest in black, white, and Hispanic women (12-month prevalence 13.4%, 16.6%, and 14.8%, respectively) and less common among Asian (8.3%) and other race (8.4%) women. Conclusions: As many as one-fourth of women have evidence of MI preceding BC diagnosis. A 36-month lookback identified more diagnoses but resulted in a 15% smaller cohort. However, the remaining sample size is sufficiently robust to test relevant, specific MI hypotheses.
ASSOCIATION OF BACK PAIN WITH ALL-CAUSE AND CAUSE-SPECIFIC MORTALITY AMONG OLDER WHITE WOMEN IN THE STUDY OF OSTEOPOROTIC FRACTURES

Eric J. Roseen*, Eric J. Roseen, Michael P. LaValley, Shanshan Li, Robert B. Saper, David T. Felson, Lisa Fredman, (Department of Family Medicine, Boston Medical Center)

BACKGROUND: While the impact of back pain on disability in older women is well-understood, the influence of back pain on mortality is unclear. We hypothesized that compared to older women without back pain, those with frequent persistent pain would have a higher risk of mortality and those with less frequent pain would have an intermediate risk, and that disability would mediate these associations.

METHODS: The sample included 8321 women (mean age 71.5, SD=5.1) participating in the Study of Osteoporotic Fractures who answered back pain questions at visit 1 (1986-88) and visit 2 (1989-90). Self-reported back pain frequency from the first 2 visits was used to create a 4-category back pain exposure: 1) no back pain; 2) non-persistent; and 3) infrequent or 4) frequent persistent back pain. All-cause and cause-specific mortality was measured by hazard ratios (HR) adjusted for sociodemographic and health variables. Three measures of disability (Instrumental Activities of Daily Living [IADL], walking speed, chair stand) at visit 3 (1991) were considered a priori potential mediators of back pain and subsequent mortality. RESULTS: Between Visit 2 and Visit 9 (2006-08), 4975 (56%) women died. A higher proportion of women with frequent persistent back pain died (66%) than those without back pain (54%) (aHR=1.24; 95%CI: 1.11-1.39). No association was observed for other back pain groups. Increased risks were also observed for cardiovascular (HR=1.34, 95%CI: 1.12-1.62) and cancer (HR=1.33, 95%CI: 1.03-1.71) mortality. In mediation analyses, IADL limitations explained 47% (95%CI: 36-100%) of the association between frequent persistent back pain and mortality, slow walking and chair stand speed explained 28% (95%CI: 19-100%) and 28% (95%CI: 22-100%), respectively. CONCLUSION: Compared to older women with no back pain, those with frequent persistent back pain had an increased risk of all-cause, cardiovascular and cancer mortality. Much of the association was mediated by disability.
A PROPENSITY SCORE WEIGHTED DIFFERENCE-IN-DIFFERENCES ANALYSIS TO TEST BEVERAGE TAX IMPACTS ON BEVERAGE CONSUMPTION

Yuchen Zheng, Yuchen Zong, Amy H. Audeh, Brian K. Lee, Genevieve P. Kastner (Drexel University College of Public Health)

On January 1, 2017, Philadelphia implemented a beverage tax of $0.015/ounce on sugar-sweetened and diet beverages. A repeat cross-sectional study was conducted to evaluate the short-term impact of the tax on residents’ consumption of soda, fruit drinks, energy drinks, and bottled water. This study utilizes data from a random digit dialing phone survey during a no-tax period (December 6-31, 2016) and a tax period (January 15-February 31, 2017) among 899 respondents in Philadelphia, PA, and 878 respondents in three nearby comparison cities (Trenton, NJ; Camden, NJ; and Wilmingon, DE). Difference-in-differences analysis accounted for secular time trends by estimating the change in beverage consumption in Philadelphia relative to the comparison cities. Propensity score weighting was used to adjust for confounding due to compositional differences in groups over time in the repeat cross-sectional setting. Outcomes were daily consumption, 30-day consumption frequency and volume of beverages and bottled water. After propensity score weighting, the groups were balanced in socio-demographics, BMI, covariates to be doubly robust. Within the first two months of tax implementation, the odds of daily consumption of regular soda was 40% lower (OR: 0.6, 95% CI: 0.37, 0.97), energy drink was 64% lower (OR: 0.36, CI: 0.17, 0.76), bottled water was 58% higher (OR: 1.58, CI: 1.13, 2.20), and the 30-day regular-soda consumption frequency was 38% lower (ratio of consumption frequency: 0.62, 95% CI: 0.40, 0.98) in Philadelphia relative to comparison cities. Early results suggest that the tax influenced daily consumption of regular soda, energy drinks and bottled water. Future studies are needed to evaluate longer term impact of the tax on sugared beverage consumption and substitutions.

THE ASSOCIATION BETWEEN NON-STANDARD WORK SCHEDULES AND OVERWEIGHT

Vanessa M. Oddo, Vanessa M. Oddo, Jessica C. Jones-Smith, (University of Washington School of Public Health)

Work schedule unpredictability may increase body mass index (BMI) through multiple mechanisms including, stress, consumption of processed foods due to time constraints, and changing eligibility for safety-net programs. This study investigated the association between work schedules and overweight, as the regulation of work schedules is modifiable through policy-level changes. This study used logistic regression models to investigate the association between work schedules and overweight/obesity (BMI ≥25) to budget control (e.g., hours decided by employer), work schedule type (e.g., regular day shift), and advance notice of schedule (e.g., 6-2 weeks notice). Models adjusted for age, marital status, race/ethnicity, education, sex, geography, and employment industry. A majority of respondents had limited (51%) or very limited (42%) control of their hours and 10% and 20% worked a regular night shift or an irregular shift, respectively. One-third of respondents received their work schedule 2-6 weeks in advance. There was no association between having limited control (OR=1.1, 95% CI: 0.65, 1.7) or very limited control (OR=1.3, 95% CI: 0.37, 2.2) over one’s work schedule compared to having full control, and overweight. Working an irregular shift (OR=1.1, 95% CI: 0.88, 1.3), compared to a regular day shift, was not associated with overweight. However, working a regular night shift, compared to day shift, was associated with higher odds of overweight (OR=1.3, 95% CI: 1.1, 1.7). People who received 0-2 weeks notice (OR=0.68, 95% CI: 0.45, 1.0; p=0.06) had lower odds of overweight compared to adults with fixed schedules. Only selected aspects of work schedules were associated with overweight, the direction of which varied by schedule characteristic.

CLASSIFYING PREGNANCY WEIGHT GAIN TRAJECTORIES IN THE NICHD FETAL GROWTH STUDIES

Elizabeth Widens, Elizabeth Widen, Carin Nisent, Jatishwar Grewal, Chia-Ling Nisent, Chakraborty, Rother Bokowski, Michael Daniels, (Department of Nutritional Sciences, University of Texas at Austin)

The pattern of gestational weight gain (GWG) is clinically important for maternal and child health and potentially modifiable. We sought to describe pregnancy weight gain trajectories and examine racial/ethnic differences. We conducted a secondary analysis of a prospective cohort of singleton pregnancies (n=2530) enrolled from 12 US prenatal centers from 2009 to 2013, including 27.3% Non-Hispanic White, 27.8% Non-Hispanic Black, 28.5% Hispanic, and 14.2% Asian/Pacific Islander. Prepregnancy weight was self-reported and abstracted from medical records. Using the R package lccy, we fit a latent class trajectory model with splines and individual random slopes: pre-pregnancy BMI trajectories were identified. Six trajectories were identified, 6 trajectory classes were identified. Four groups had different patterns, but similar total GWG (estimated GWG within 1st T at 40 wk gestation): 1) Low-Fixed-Stable (37.2%) gained 0.2 kg/wk in the 1st Trimester (T), 0.7 kg/wk in 2nd T and 0.4 kg/wk in 3rd T; 2) Steady-Low (27.9%) gained 0.4 kg/wk in 1st T, 0.6 kg/wk in 2nd T, and 0.2 kg/wk in 3rd T; 3) High-Low (12.1%) gained 0.8 kg/wk in 1st T, 0.3 kg/wk in 2nd T, and 0.2 kg/wk in 3rd T; and 4) Low-Steady-Medium (18.3%) had weight loss in the 1st T (-0.1 kg/wk) and gain of 0.8 kg/wk in 2nd T and 0.5 kg/wk in 3rd T. The 5) Early-High-Stable (1.2%) estimated 22 total GWG at 40 wk gained 1.7 kg/wk in the 1st T, and then showed minimal gain thereafter, while the 6) Steady Gain group (15.8%) estimated 14 kg/wk at 40 wk gained 0.4, 0.4 and 0.3 kg/wk in the 1st, 2nd and 3rd, respectively. When stratified by race/ethnicity some minor differences in trajectories were observed, but overall the classes were similar to the full sample. Our findings suggest that parametric methods can allow for a detailed understanding of pregnancy weight gain trajectories with potential to identify patterns associated with adverse pregnancy outcomes.

RESIDENTIAL RELOCATION AND RISK OF OBESITY: A NATURAL EXPERIMENT FROM THE 2011 GREAT EAST JAPAN EARTHQUAKE AND TSUNAMI

Hirokatsu Hikichi, Hikichi, Hiro, Kikuchi, Ichiro Kikuchi, Hiroshi Kikuchi, (Harvard T. H. Chan School of Public Health)

Objective: Studies have attempted to identify the causal effect of local food environment on body weight by studying residents who move. However, most studies have examined voluntary moves, which is subject to endogeneity. We examined prospectively whether change in proximity to food outlets/restaurants due to involuntary, residential relocation affected body mass index over pre- and post-dating the 2011 Great East Japan Earthquake and Tsunami. Methods: The baseline data from our natural experiment came from a nationwide cohort study of older community-dwelling adults conducted 7 months prior to the disaster. By chance, one of the field sites (Hiroshima city, Miyagi prefecture) was directly in the line of the tsunami. Approximately 2.5 years after the disaster, we ascertained the residential addresses and health status of 3,944 survivors (82.1% follow-up rate) including 179 displaced respondents. The outcome was categorized body mass index (BMI) on the basis of World Health Organization classification for Asian populations (<18.5 [underweight], 18.5-22.9 [normal weight], 23.0-24.9 [overweight], ≥25.0 [obese]). Results: Displaced residents had a marked increase in the prevalence of obesity after the disaster (53.8% compared to non-displaced residents: 26.7%). Fixed effects multinomial logistic regression showed that shorter distances to food outlets/restaurants due to involuntarily relocated increased the risk of transitioning from BMI in the normal range (18.5-22.9) to obesity (≥25.0) (OR=2.08, 95% CI: 1.18, 3.69, for moving closer to supermarkets; OR=2.2, 95% CI: 1.1, 1.7, for fast food outlets). Conclusions: Shortened nearest distances to food outlets due to involuntary relocation increased the risk of obesity among older adults. Policy planners should take into consideration the unintended consequence of improved local service access from the public health point of view.

Background: Bisphenol F (BPF) and bisphenol S (BPS) are increasingly used as substitutes for bisphenol A (BPA) in plastic containers or other consumer products. Previous studies have linked BPA exposure to obesity and obesity-related disorders. Although BPF and BPS are structurally and functionally similar to BPA, little is known about the effects of BPF and BPS in humans. In this study, we evaluated the associations of BPA, BPF, and BPS exposure with obesity in a nationally representative sample of U.S. children and adolescents. Methods: We included 745 children and adolescents aged 6-17 years old from the National Health and Nutrition Examination Survey (NHANES) 2013-2014. Urinary levels of BPA, BPF, and BPS (ng/ml) were measured by on-line solid phase extraction coupled to high performance liquid chromatography and tandem mass spectrometry. Obesity was defined based on the 2000 CDC BMI-for-age growth charts for the United States. Results: The median levels of bisphenols were higher in obese children compared to non-obese children. 1.34 vs. 1.21 ng/ml for BPA, 0.32 vs. 0.30 ng/ml for BPF, and 0.30 vs. 0.27 ng/ml for BPS, respectively. After adjustment for demographic, socioeconomic and lifestyle factors, and urinary creatinine levels, the odds ratio (OR) of obesity comparing the highest with lowest quartile of urinary bisphenol levels was 1.74 (95% CI, 0.92-3.31) for BPA, 1.54 (95% CI, 1.02-2.32) for BPF, and 1.36 (95% CI, 0.53-3.51) for BPS. Moreover, the associations were stronger in boys than in girls for BPA (OR [95% CI], 2.78 [1.07-7.27] in boys vs 1.10 [0.42-2.91] in girls; P for interaction 0.02) and BPF (3.35 [2.02-5.53] in boys vs 0.55 [0.25-1.25] in girls; P for interaction <0.001). Conclusion and Relevance: This study for the first time showed that exposure to BPF, a commonly used substitute for BPA, was significantly associated with obesity in humans. Further investigations on the underlying mechanisms are needed.

DISENTANGLING THE CONTRIBUTION OF COMMUNITY-LEVEL FACTORS TO CHILD BODY MASS INDEX ACROSS DIVERSE GEOGRAPHIES Melissa N. Poulter* Melissa N. Poulter, Jonathan Pollak, Karen Bendixen-Roche, Annemarie G. Hirsch, Lisa Bailey-Davis, Brian S. Schwartz, (Geisinger, Department of Epidemiology and Health Services Research)

Background: To understand contextual effects on health, heterogeneous communities must be compared to capture a range of community conditions. We assessed community-level factors theorized to influence obesity risk across a large, diverse geography. Methods: Using confirmatory factor analysis, we developed 4 community-level factors—socioeconomic deprivation, food outlet abundance, fitness assets, and utilitarian physical activity favorability—and assigned them to communities (sociologically-relevant divisions: townships, boroughs, city census tracts). We used medical record data to evaluate factors in their associations with body mass index (BMI) trajectories among youth aged 3-18 years in a 38-county region of Pennsylvania, using multilevel linear regression with a cross product of factor quintiles with age (linear, quadratic, and cubic terms) to allow for non-linearity in BMI trajectories. Models controlled for sex, age, race/ethnicity, and Medical Assistance. Results: We identified 163,820 youth with 524,862 BMI measurements in 1,286 communities. Factor scores were lowest in townships, indicating less deprivation and fewer food and physical activity outlets. BMI at average age and BMI growth over time were lower in townships (vs. boroughs and cities, p<0.001). Factor distributions across community type did not overlap, requiring stratified analyses to avoid regression extrapolation. Models showed complex relations between community-level factors and BMI trajectories that differed in townships, boroughs, and cities. Conclusion: Although community type was a strong predictor of average BMI and BMI growth over time, it cannot be compared to capture a range of community conditions. We developed factors to address this limitation, with all higher on BMI trajectories for all community types. This study highlights a methodological hurdle to studying contextual effects on health across large, diverse geographies.
FINANCIAL RESOURCES PREDICT INCIDENT DEMENTIA INDEPENDENT OF EDUCATION IN A NATIONALLY REPRESENTATIVE COHORT OF U.S. OLDER ADULTS
Laura J. Samuel, Sarah L. Shaytan, Jennifer L. Wolff, Lauren Parker, Laura N. Gilkin, John Hopkins University School of Nursing

Low education consistently predicts higher risk of incident dementia but other socioeconomic measures do not. The education effect is attributed to cognitive reserve rather than financial resources. This study tested the effect of five socioeconomic measures on four-year incident dementia. The National Health and Aging Trends Study classified dementia status annually in a nationally representative sample of adults aged 65 years based on diagnostic, cognitive test scores, and daily living activities. Greater baseline socioeconomic measures (2011 or 2012) included income to poverty ratio with a spline knot at 500% poverty threshold, financial strain (lack of money for housing, utilities, health care, or food), education (< high school, high school, some college, and Bachelor's degree), employment for participant and/or partner, and history of professional occupation. A discrete survival model tested hypothesized associations with incident dementia (2013 to 2016) among those dementia-free in 2012 (N=5055) adjusting for demographics, socioeconomic measures and known risk factors (heart disease, high blood pressure, diabetes, stroke, smoking, BMI, and depression symptoms). Baseline simple weight adjusted for sampling design and nonresponse. Coefficients were standardized to allow comparison. Annual incidence rates ranged from 3.5% to 6.5% over four years. In the adjusted model, higher income, <500% poverty (β=-0.172, p<0.012), employment (β=-0.216, p<0.018) and higher education (β=-0.174, p<0.005) were associated with lower ORs, and financial strain with higher odds (β=0.114, p=0.013), of incident dementia. These results show that lack of financial resources, including low income, financial strain and unemployment, predict higher risk of incident dementia and have comparable effects to that of education. Greater attention should be given to the links between financial resources and incident dementia.

HEARING IMPAIRMENT AND DEMENTIA RISK: EVALUATING REVERSE CAUSATION USING A GENETIC RISK SCORE FOR ALZHEIMER'S DISEASE
Wille D. Brenowitz, Wille D. Brenowitz, Teresa J. Filiotis, Stefan Walker, Thomas J. Hofmann, Eric Jorgenson, Rachel A. Whitmer, Kristine Yaffe, M. Maria Glymour, (withbrenowitz@ucsd.edu)

Background: Hearing loss is a major modifiable risk factor for dementia, with a population attributable risk of 9%. However, the association between hearing impairment and dementia may be due to reverse causation or shared biological mechanisms, e.g., neurodegeneration or vascular disease. If the association is due to such biases, genetic risk factors for dementia are likely to influence hearing loss. Methods: Health and Retirement Study participants (whites aged ≥50) who participated in the 2008 were rated hearing as poor, fair, good, very good, or excellent. A genetic risk score (GRS) for Alzheimer's disease (AD) was calculated as a weighted sum of 10 single nucleotide polymorphisms previously confirmed to be genome-wide significant predictors of AD. Neurological assessment and proxy reports for impaired respondents were used to calculate a memory score and estimate probability of dementia in 2008. We confirmed that self-rated hearing was associated with memory and dementia probability and evaluated whether the GRS for AD predicted self-rated hearing (evidence of reverse causation), using age, sex, and genetic ancestry-adjusted logistic and linear regression models. Results: Lower rated hearing was associated with a lower memory score (β=-0.27; 95% CI -0.33, -0.20) and higher dementia probability (β=0.50; 95% CI 0.34, 0.68). Despite strong associations with both memory (F-statistic=54) and dementia probability (F-statistic=81), the GRS did not predict self-rated hearing (β=0.01; 95% CI -0.05, 0.07). Conclusions: We found no evidence for reverse causation from dementia risk to hearing loss using a novel methodological approach. There are two important caveats. First, effect estimates for the GRS and hearing association were imprecise. Second, we cannot rule out mechanisms other than those influenced by GRS that predict hearing loss.
MEMORY CHANGE AFTER STROKE: HAS THE RELATIONSHIP 
WEAKENED IN RECENT YEARS? Chloe W. Eng* Chloe W. Eng, Elizabeth 
Rose Mayeda, Maria Glymour, (UCSF)

Introduction: Recent research in the Framingham Heart Study suggested that 
changes in dementia incidence rates over the last 4 decades may be partially 
attributable to attenuation of the relationship between stroke and dementia risk, with 
stroke only modestly increasing risk of dementia in recent epochs. We investigated 
evidence for this trend before and after event of first stroke in an independent 
cohort. Methods: We examined trajectories of memory functioning before and after 
first stroke in adults age 50+ in the Health and Retirement Study (HRS) across two 
a composite memory score before and after stroke were compared using 
demographic-adjusted linear regression models for 3 groups: 1,389 stroke survivors, 
486 stroke decedents, and 16,486 participants who remained stroke-free throughout 
follow-up. Results: Memory deterioration prior to stroke onset was slower in the 
first epoch [-0.04 points per year (95% CI: -0.04, -0.03)] than the second epoch 
[-0.10 points per year (95% CI: -0.13, -0.08)], but was faster than the rate of decline 
for non-stroke participants in both the first [-0.03 points per year (95% CI: -0.03, 
-0.03)] and second [-0.05 points per year (95% CI: -0.05, -0.05)] epochs. At stroke 
onset, memory declined slower in the first [-0.04 (95% CI: -0.10, 0.02)] epoch than 
second [-0.07 (95% CI: -0.15, 0.02)]. Similarly, post-stroke rate of memory decline 
was slower in the first [-0.04 points per year (95% CI: -0.06, -0.02)] epoch than in 
the second [-0.08 points per year (95% CI: -0.11, -0.05)]. Conclusion: Trajectories 
for memory decline in stroke survivors and decedents differed across epochs, but 
the impact of stroke on memory decline did not appear to be attenuated in more 
recent years. Further research with additional cognitive outcomes and in 
independent samples is needed to investigate the potential period effects on the 
relationship between memory functioning and stroke.
QUALITY OF LIFE SCORES ARE ASSOCIATED WITH INCIDENCE OF COGNITIVE IMPAIRMENTS: RESULTS FROM PREADVISE Xiuhua Ding*, Xiuhua Ding, Erin Abner, Frederick Schmitt, Richard Kryscio, (Western Kentucky University)

The purpose of this study is to determine how quality of life (QOL) as measured by the total score on the short form of the general health survey of the Medical Outcomes Study (SF-36) varies over time and how baseline scores associated with the occurrence of future cognitive impairment. We analyzed data from the Prevention of Alzheimer’s Disease (AD) by Vitamin E and Selenium (PREADVISE) trial, which recruited 7,547 non-demented men who were enrolled between 2002 and 2009 and randomized into 4 groups: placebo, vitamin E, selenium, vitamin E plus selenium combination. A subset of 2,746 PREADVISE participants who completed up to 5 SF-36 assessments at annual visits were included in the current study. SF-36 total score were recorded as standardized Z-score at each assessment. Linear mixed models (LMM) were applied to determine if mean SF-36 Z score varied over time. Cox proportional hazards regression was used to determine if the baseline SF-36 score was associated with incidence of dementia with adjustments for baseline age, black race, APOE-4 status, diabetes, and memory complaint at baseline. LMM analysis showed significant effects for dementia and time on SF-36 Z scores. SF-36 Z scores given at the same visit for participants who developed dementia were on average 0.28 standard deviations (SD) lower than those without eventual dementia. Furthermore, SF-36 Z scores remained relatively stable over time, and declined at the rate of 0.02 SD per year over the 8 year follow-up period. The participants who developed dementia tended to decline faster over time on average, but this was not statistically significant. Given adjustments for other risk factors, results from the Cox model showed one standard deviation increase in the SF-36 Z score decreases the hazard of a future dementia by 32%. QOL may be a modifiable risk factor for dementia.

SELECTION BIAS IN THE PROTECTIVE RELATIONSHIP BETWEEN CAREGIVING AND MORTALITY Meghian L. Smith*, Meghian L. Smith, Timothy C. Heeren, Lynise R. Ranker, Lisa Fredman, (Boston University School of Public Health)

Selection bias is a concern in prospective studies, particularly studies of caregiving outcomes. In contrast to what theories of stress would predict, most population-based studies have found lower rates of mortality in caregivers than non-caregivers. We examined the potential role of selection bias due to 1) study design and 2) selective participation in Caregiver-SOF (CG-SOF), an ancillary study to the Study of Osteoporotic Fractures (SOF), which comprised the source population of 10,699 SOF participants (7,973 caregivers, each matched to 1-2 non-caregivers) identified in 2 phases screening all SOF participants for caregiver status at SOF Visit 6 (1997-99, n=3,066 women, 2,358 caregivers) and re-screening all caregivers and a subset of non-caregivers matched on SOF site, age, race, and ZIP code. 1-2 years later. Mean age at initial screening was 79 years. Women who were older and had poorer physical or cognitive functioning were less likely to participate; caregivers had better functioning than non-caregivers at each screening. We used Cox proportional hazards models to assess associations between caregiving and 10-year mortality in all 4,036 initially screened women; women invited to participate (all caregivers and selected matched non-caregivers, n=1,499) and the CG-SOF sample (74% of those invited). Adjusting for functioning and matching variables, the association between caregiving and mortality in invited women (48% died; aHR=0.79 (95% CI: 0.65-0.97)) was similar to that in initially screened women (37% died; aHR=0.84 (95% CI: 0.73-0.96), indicating minimal bias due to study design, and to that in CG-SOF (48% died; aHR=0.80 (95% CI: 0.63-1.03), indicating nearly no participation bias. We also repeated analyses using a propensity score matched subsample of SOF, and observed a similar aHR. Our results lend validity to findings that caregivers have lower risk of mortality, and should be used to inform ancillary studies for analyses of hard-to-measure biases.

THE FRAILTY PHENOTYPE IN VISUAL IMPAIRMENT: AN NHANES ANALYSIS Moon Jeong Lee*, Moon Jeong Lee, Varshini Varadaraj, MD, MPH, Jing Tian, MS, Karen Bédec-Roche, PhD, Brinidil K. Swen, MPH, PhD, (Wistar Eye Institute, The Johns Hopkins University School of Medicine, Baltimore, MD, USA)

Purpose Prior research indicates that older adults with visual impairment (VI) have worse health outcomes than those without VI; however, there is limited research examining the relationship between VI and frailty - an important geriatric syndrome, in which individuals have reduced capacity to overcome stressors. Here, we examine the cross-sectional association between VI and frailty using the National Health and Nutrition Examination Survey (NHANES) data. Methods We analyzed NHANES data from 1999-2002 to assess the association between corrected visual acuity (VA) worse than 20/40 in the better-seeing eye and the frailty phenotype (shrinking, weakness, poor endurance and energy, slowness and low physical activity level) among participants 260 years. frail and prefrail individuals were defined as meeting ≥3 and 1-2 criteria, respectively. Chi square and t-tests were used to compute demographic characteristics and frailty components by group (VI vs non-VI) and multivarical logistic regression was used to determine the odds of frailty and frailty by VI status after adjusting for age, sex, race, smoking status, diabetes status and total number of co-morbidities. Results This sample included 2,600 participants, of which 2.2% had VI (n=57). The VI group was older (73.3±19 vs 70.0±0.3, p<0.001) and less likely to be white than the non-VI group (75% vs 89% white, p<0.001). In adjusted models, individuals with VI were greater than three times more likely to be prefrail and 4 times more likely to be frail (OR: 3.30, 4.08 respectively, p<0.005) than those without VI. Conclusions In this population-based sample, older adults with VI were substantially more likely to be frail than those without VI, suggesting that VI may be an important risk factor for frailty. Further research is needed to investigate the underlying mechanisms and establish the temporality of the VI-frailty relationship.

SECULAR TRENDS OF MORTALITY AND DEMENTIA-FREE LIFE EXPECTANCY OVER A 10-YEAR PERIOD IN FRANCE Leslie Graasset*, Leslie Graasset, Karine Pérot, Pierre Joly, Camille Saltath, Alexandra Samier-Foillet, Jean-François Dartigues, Catherine Helmer, (Université de Bordeaux)

Whether the increase of life expectancy is associated to greater years of life spent without dementia has been poorly investigated. The aims of this work were to investigate the evolution of mortality and life expectancies according to dementia status between two French populations 10 years apart. We examined two populations of subjects aged 65 years or older who were dementia-free at baseline and followed up over 10 years. These included 1,472 participants from the Personnes A Géneres QUId (PAQUID) study who were enrolled in 1988-1989 (90% population) and 1,966 participants from the Three-City (3C) study who were enrolled in 1999-2000 (2000's population). Dementia was assessed using an algorithmic approach to apply an objective diagnostic process, stable over time; participants were considered as having dementia if they had a score ≥1. Multistates illness-death models were used to compute mortality with and without dementia, and to provide total Life Expectancy (LE), Dementia-Free Life Expectancy (DemenLe), Life Expectancy with dementia (DemenLe), as well as duration of life with dementia. Mortality without dementia has decreased between the two populations among men: (HRs: 0.63 (0.49-0.81)) and women (HR=0.67 (0.54-0.80)), whereas mortality with dementia has decreased for women only (HR=0.59 (0.41-0.87)). Total LE and DemenLe have increased between the 90% and the 2000's population (total LE: 17.2 years; DemenLe +2.2 years). DemenLe remained relatively stable between populations (DemenLe +0.3 years). For duration of life with dementia, a non-significant trend toward an increase of survival has been evidenced (duration+1.3 years). These increases were higher for women and lower educated individuals. The improvement of DemenLe is promising. However, as duration of life with dementia tends to increase for women, efforts to delay dementia onset should be reinforced.

S/P indicates work done while a student/postdoc
COMMUNITY SOCIAL CAPITAL AND THE IMPROVEMENT OF FUNCTIONAL ABILITY AMONG OLDER PEOPLE IN JAPAN Airi Amemiya*, Airi Amemiya, Naoki Kondo, Katsunori Kondo, (National Research Institute for Child Health and Development)

Background: The aim of this study was to investigate the contextual effects of community social capital on the improvement of functional ability among older people in Japan. Methods: We performed a multilevel survival analysis on 1936 men and 2207 women nested within 320 communities included in Japan Gerontological Evaluation Study in 2010. We used the objective data of the functional ability trajectories based on national long-term care insurance systems. We used multilevel Weibull survival models including a community-level random intercept. We stratified the analyses by gender. We used a validated measure of community social capital that captured three components: the levels of civic participation, social cohesion, and reciprocity. Results: In a community with high social cohesion, older men with the low perception of community social cohesion were less likely to improve their functional ability than older men with the high perception of community social cohesion (p for interaction = 0.007). Among women, community social cohesion was inversely associated with the improvement of functional ability regardless of the individual perception of community social cohesion. In a community with high civic participation, women who did not participate in any group in the community were less likely to improve their functional ability than women who participate in some groups (p for interaction = 0.008), whereas such cross-level interaction was not found among older men. Community reciprocity was not associated with the improvement in functional ability in men and women.

Conclusion: The effect of community social capital on the improvement of functional ability might differ between individuals depending on their psychosocial components in the same community. There might be older people who do not benefit from and excluded from community social capital.

COGNITIVE CHANGE AND CANCER INCIDENCE IN THE HEALTH AND RETIREMENT STUDY Ekland Abdiwahab*, Ekland Abdiwahab, Maor Ptak, Osnat Goldstein, Valeria C. Kobylytsch, Elizabeth Rose Mayeda, M. Maria Glymour, (UC San Francisco)

COGNITIVE CHANGE AND CANCER INCIDENCE IN THE HEALTH AND RETIREMENT STUDY Ekland Abdiwahab* Ekland Abdiwahab, Monica Odden, Ekland, Abdiwahab, Monica Odden, Ekland Abdiwahab, Monica Odden (School of Public Health, University of California, Berkeley, CA, USA)

Background: The aim of this study was to investigate the contextual effects of community social capital on the improvement of functional ability among older people in Japan. Methods: We performed a multilevel survival analysis on 1936 men and 2207 women nested within 320 communities included in Japan Gerontological Evaluation Study in 2010. We used the objective data of the functional ability trajectories based on national long-term care insurance systems. We used multilevel Weibull survival models including a community-level random intercept. We stratified the analyses by gender. We used a validated measure of community social capital that captured three components: the levels of civic participation, social cohesion, and reciprocity. Results: In a community with high social cohesion, older men with the low perception of community social cohesion were less likely to improve their functional ability than older men with the high perception of community social cohesion (p for interaction = 0.007). Among women, community social cohesion was inversely associated with the improvement of functional ability regardless of the individual perception of community social cohesion. In a community with high civic participation, women who did not participate in any group in the community were less likely to improve their functional ability than women who participate in some groups (p for interaction = 0.008), whereas such cross-level interaction was not found among older men. Community reciprocity was not associated with the improvement in functional ability in men and women.

Conclusion: The effect of community social capital on the improvement of functional ability might differ between individuals depending on their psychosocial components in the same community. There might be older people who do not benefit from and excluded from community social capital.

INCIDENCE, RISK FACTORS, AND SEQUELAE OF POST-KIDNEY TRANSPLANT DELIRIUM Mara McAdams DeMarco*, Mara McAdams DeMarco, Christine Hatges, Fatima Warsame, Alvin Thomas, Charles Brown IV, Karin Netfeld, Michelle Carlson, Dorry Segev, (JHU)

Delirium is an acute decline and fluctuation in cognitive function following a stressor like surgery. Frail kidney transplant (KT) recipients may be particularly vulnerable to the stressor of surgery resulting in delirium and subsequent adverse outcomes. The goal of this study was to identify the incidence, risk factors, and sequelae of post-KT delirium. First, we identified delirium claims (ICD-9:780.09) among KT recipients using national registry data linked to Medicare claims. Next, we studied 893 KT recipients (2009-2017) enrolled in a prospective cohort study. At admission, frailty and cognitive function were measured. We used a validated chart abstraction algorithm to identify delirium. Delirium risk factors were identified using logistic regression and the sequelae of delirium using adjusted logistic regression (length of stay [LOS] ≥2 weeks and discharge location—home versus institution such as skilled nursing facility or rehabilitation facility) and Cox proportional hazards models (graft loss and mortality). Nationally, 31 of 4360 (0.7%) recipients had a claim for delirium. In the cohort, delirium incidence increased with age (18-49:2.0%; 50-64:4.6%; 65-74:5.9%; and ≥75:13.8%) and frailty (0.0% vs. 3.9%), 95% CI for final recipients aged ≥75 experienced delirium. Frailty was independently associated with delirium (OR=2.09; 95% CI:1.02-4.13) but pre-mortem global cognitive function was not. Recipients with delirium were at a 5.42-fold (95%CI:7.16-10.66) increased odds of co-morbidity delirium. The cohort experienced delirium (OR=0.49; 95%CI:1.85-6.36) increased odds of institutional discharge, 2.73-fold (95% CI:1.14-6.53) increased risk of death-censored graft loss and 3.12-fold (95% CI:1.76-5.54) increased risk of mortality after adjustment. Post-KT delirium is not captured in claims but can be identified in the medical record, it is associated with subsequent adverse outcomes. Older and frail recipients are uniquely vulnerable to delirium. Transplant centers should implement interventions to reduce delirium risk.

SEX DIFFERENCES IN THE ASSOCIATION BETWEEN PENTRAIN 3 (PTX3) AND COGNITIVE DECLINE: THE CARDIOVASCULAR HEALTH STUDY Lindsay M. Miller*, Lindsay M. Miller, Nancy S. Jenny, Andrea M. Rawlings, Alice M. Arnold, Annette L. Fitzpatrick, Osei L. Lopez, Michelle C. Oddis, (School of Biological and Population Health Sciences, Oregon State University, Corvallis, OR, USA)

Abstract Background: The importance of systemic inflammation, measured by C-reactive protein, in cognitive decline has been demonstrated; however, the role of vascular inflammation is less understood. We investigated the association between pentraxin 3 (PTX3), a novel marker of vascular inflammation and changes in cognitive function. Methods: We followed adults 65 and older, free of cardiovascular disease (CVD) for up to 9 years (n = 1,5 47) in the Cardiovascular Health Study. We used adjusted linear mixed effects models to evaluate the relationship between PTX3 and cognitive function, measured using the Modified Mini Mental State Exam (3MSE). We adjusted for demographic, behavioral, and clinical characteristics. Mediation by CVD events and effect modification by sex and apolipoprotein E4 allele (APOE) was also examined. Results: Among the participants, 63% were women, and the mean age was 72. Over an average of 4.5 years of follow-up, the mean annual decline in 3MSE was 0.14 points. The association between PTX3 and change in 3MSE differed between women and men (p = 0.024). In the adjusted model, each standard deviation higher in ln(PTX3) was associated with a 0.20 decrease in 3MSE score per year in women over follow-up (95% CI: -0.37, -0.03; p = 0.02). No decline in men (0.07; 95% CI: -0.40, 0.22). Adjustment for mediating CVD events had a minor effect on the associations. No effect modification by APOE was found. Conclusions: In this population-based prospective cohort study of older adults, we found that vascular inflammation was significantly associated with cognitive decline in women, identifying subgroups affected by higher levels of vascular inflammation could give rise to more informed clinical interventions.
THE ASSOCIATIONS BETWEEN HEARING LOSS AND TINNITUS AND QUALITY OF LIFE AT AGE 60 IN THE NEWCASTLE THOUSAND FAMILIES STUDY Mark Pearce*, Mark Pearce, Belma Isikakova, Kay Mann, Morven Brown, Adrian Rees, (Newcastle University)

Hearing loss is one of the most common conditions facing older people in modern society and can have far-reaching consequences for individuals, especially if combined with tinnitus. In this study, we measured hearing function in 6-63 year-old members of the Thousand Families Birth cohort and assessed associations between hearing function and quality of life, with further assessments of the impacts of tinnitus and hearing aid use. The Newcastle Thousand Families Study is a birth cohort from the north of England, established when the cohort members were born in May and June 1947. Hearing data were based on self-reported and clinical measurements (333 study members had clinical data). Quality of life and psychological well-being were measured by the CASP-19 and General Health-28 questionnaires (psychological well-being). Linear regression was used to examine associations between hearing loss and quality of life (both overall, and for sub-domains). A range of socio-demographic covariates were included as potential confounders with interaction analysis used to test the potential effect modifying effects of tinnitus and hearing aid use. Significant positive associations found between self-reported hearing loss and psychological well-being (p<0.05); high-frequency clinical hearing loss and GHQ-28 scores (p<0.001) and tinnitus and depressive symptoms (p<0.05).

No interaction effects were seen for hearing aid use or tinnitus. Hearing loss, including tinnitus, may result in poor psychological health in older age and this should be considered in its clinical management. High frequency hearing loss (common in age-related hearing loss) may reduce speech understanding and result in social isolation. Tinnitus may lead to increased anxiety and emotional distress. The nature of hearing aid users was low. This meant the interaction analysis was likely underpowered, but suggests that more needs to be done to ensure an increase in appropriate hearing aid use.

S/P indicates work done while a student/postdoc

EDUCATION MODIFIES THE RELATIONSHIP BETWEEN HEIGHT AND COGNITIVE FUNCTION IN A POPULATION-BASED STUDY OF OLDER ADULTS IN RURAL SOUTH AFRICA Lindsay Kobayashi*, Lindsay Kobayashi, Lisa Berkman, Ryan Wagner, Kathleen Kuhm, Stephen Tillman, SV Subramaniam, (Georgetown University)

Adult height is an indicator of early-life health and nutrition, which may have long-reach consequences for later-life health. We aimed to estimate the relationship between adult height and later-life cognitive function among older rural South Africans, and if education modified this relationship. Data were from baseline interviews with 5039 adults aged 40-100 in the population-based “Health and Aging in Africa: A Longitudinal Study of an INDEPTH Community in South Africa” (HAALSI) in 2015. Linear regression was used to estimate the relationship between height, quintile of cognitive z-score (memory, time orientation, and matteness), adjusted for age, sex, country of birth, household wealth, marital status, number of close social contacts, self-rated health, and limitations to activities of daily living, and a multiplicative interaction between height and education. Mean (SD) height was 162.7 (8.9) cm. Nearly half the sample had no formal education (46%; 2307/5039). Mean age- and sex-adjusted cognitive z-scores varied from -0.68 (95% CI: -0.76 to -0.61) in those with no education in the shortest height quintile (most disadvantaged) to 0.62 (95% CI: 0.52 to 0.71) in those with at least eight years of education in the tallest height quintile (most advantaged). In older adults with no formal education, there was a linear height disparity in cognitive z-scores (adjusted β = 0.01; 95% CI: 0.08 to 0.13 per height quintile), but there was no height disparity in cognitive z-scores in those with any education. Short stature is associated with poor cognitive function and may be a risk factor for cognitive impairment among older adults living in rural South Africa. However, the risk associated with short stature was negated for older adults who had any formal education. Findings also have implications for younger generations in South Africa, as one in five children suffer from stunted growth and problems remain around equal access to quality education in the country.
UTILITY OF THE BEHAVIORAL ASSESSMENT AND RESEARCH SYSTEMS (BARS) IN MEASURING ATTENTION AMONG CHILDREN RESIDING NEAR COAL ASH STORAGE SITES Chisom Odoh, Lonnie Sears, Barbara Polivka, City Brock, Kristina Zierold, (University of Louisville)

Purpose: Attention is indicative of disorders such as ADHD. The Behavioral Assessment and Research Systems (BARS) can be used to measure sustained attention in children exposed to toxic pollutants, such as coal ash. Coal ash, a waste product generated from the combustion of coal, has been identified as a potential health hazard, because it contains toxic metals. Children residing near coal-burning power plants may experience more attention behaviors. The purpose of this study was to assess differences between BARS scales that measure attention among children exposed to coal ash and children not exposed to coal ash. Methods: A community-based study assessing neurobehavior in children aged 6-14 years old, who may be exposed to coal ash is ongoing. BARS is a series of computer-based tests used to assess neurobehavioral performance among children. BARS tests such as the continuous performance test (CPT), selective attention test (SAT), and the simple digit span (SDS) are commonly administered measures of attention relevant in identifying ADHD. Exposure to coal ash was measured in the homes of children using air samplers and lift tape samplers. Results: 294 of children were diagnosed with ADHD and 76% of children were exposed to coal ash. BARS scores were lower in children exposed to coal ash for the CPT and the SAT. On the CPT, exposed children had an average latency time of 461 milliseconds while non-exposed children had a latency time of 459 milliseconds. Results from SAT also showed slower times for children exposed to coal ash. Conclusions: Children not exposed to coal ash responded faster than exposed children. Children with faster response times are more likely to have better attention than children with slower response time. Pollutants such as coal ash, may affect the behavior of children and need to be further understood.

LEISURE-TIME PHYSICAL ACTIVITY, BUT NOT OCCUPATIONAL PHYSICAL ACTIVITY, IS ASSOCIATED WITH LOWER INSULIN RESISTANCE: A CROSS-SECTIONAL STUDY OF KOREAN ADULTS Yong-joo Kim, Jong-joon Kim, Masanobu Kamachi, Ichiro Kawachi, (Department of Social and Behavioral Sciences, Harvard T.H. Chan School of Public Health)

Emerging evidence points to "physical activity paradox" in which occupational physical activity (PA) is detrimental to cardiovascular health. The present study examined the associations of occupational PA and leisure-time PA with insulin resistance among Korean adults. We used cross-sectional data from the 2015 Korean National Health and Nutrition Examination Survey, including 3,515 participants aged 19-65 years. The Korean version of the Global Physical Activity Questionnaire was used to assess occupational PA, leisure-time PA, and transportation-related PA. Insulin resistance was measured by HOMA-IR (fasting glucose x fasting insulin) which was log-transformed. Statistical models included the three PA types independently and simultaneously, adjusting for age, sex, education, income, occupational class, shift work, working hours, medical conditions, smoking, and alcohol drinking. Overall, the proportion of participants who reported to have at least two times of week was 52% for leisure-time PA and 13% for occupational PA. While leisure-time PA (≥1 min/week vs. none) was associated with lower HOMA-IR (β=-0.01, 95% CI: -0.11 to 0.00), the association was not significant for occupational PA (β=0.01, 95% CI: 0.00 to 0.06). However, among those with a history of cancer/stroke/chronic heart disease, occupational PA (≥1 min/week vs. none) was associated with higher HOMA-IR (β=0.04, 95% CI: 0.10, 0.59). The same pattern was observed when using a linear term for each PA type. While leisure-time PA was associated with lower HOMA-IR (for every additional 60 min/week: β=0.01, 95% CI: -0.01 to 0.00), the association for occupational PA was not significant. However, among those with a history of cancer/stroke/chronic heart disease, occupational PA was associated with higher HOMA-IR (β=0.02, 95% CI: 0.09, 0.13). Our findings suggest that occupational PA may be harmful to glycemic control among those with chronic conditions. Prospective studies are necessary to confirm this association.

SIP indicates work done while a student/postdoc.
TRENDS IN INCIDENCE OF COLORECTAL CANCER WITH OBSTRUCTIVE SLEEP APNEA IN TAIWAN: A 14-YEAR LONG TERM DESCRIPTIVE STUDY Chang-Jung Shen*, Chien-An Sun, (School of Public Health, National Defense Medical Center)

Background: Colorectal cancer (CRC) is the first leading cancer in Taiwan. Obstructive sleep apnea (OSA) has been recognized as a potential risk factor in developing cancer. However, secular trend studies of CRC with OSA are limited. This descriptive study examined the incidence and prevalence of CRC with OSA in a large-scale, population-based Chinese cohort. Methods: From 2000 to 2013, about 4180 new cases with OSA were identified in Taiwan's National Health Insurance Research Database (NHIRD). Chi-square test was used for evaluating incidence rates in different sex, age groups and periods. For long term trends, we assessed the change in the incidence rates per 14 years by linear trend analysis. Results: The incidence of OSA rose from 1.82 in 2000 to 5.61 in 2013 among men per 10,000 individuals, and from 0.63 to 1.86 among women. Prevalence of OSA more than tripled from 2.45% in 2000 to 7.47% in 2013. Overall, incidence of CRC per 1000 individuals in 2013 was 24.10 significantly higher than 8.16 in 2000, and increased 27% per year in men and 8.7% per year in women from 2000 to 2013. On the other hand, the incidence of CRC per 100 individuals among OSA patients increased for both men and women in each 10-year age grouping (30-39, 40-49, 50-59, and >60 years) from 0.52 to 2.96 (P trend<0.001). Conclusion: In the past 14 years, the incidence and prevalence of CRC with OSA is steadily rising. Thus, the study indicates a positive correlation between OSA and CRC is needed.

TRENDS IN THE INCIDENCE AND MORTALITY RATES OF PROSTATE CANCER FOLLOWING CHANGES IN THE PROSTATE-SPECIFIC ANTIGEN SCREENING GUIDELINES Jeffrey M Slezak*, Reading, Jeffrey M Slezak, Steven J Jacobsen, (Kaiser Permanente Southern California)

Introduction: In August 2008 and May 2012, the United States Preventative Service Task Force issued a recommendation against prostate-specific antigen (PSA)-based screening for the early detection of prostate cancer. Conflicting data on prostate cancer incidence and mortality trends have since been presented. Therefore, we sought to explore the most recent trends within a large integrated healthcare delivery system. Methods: Male members of the Kaiser Permanente Southern California (KPSC) health plan, newly-diagnosed with prostate cancer between January 1st, 2005 and October 31st, 2016 were identified as incident prostate cancer cases (n=28,950). Prostate cancer deaths were identified in the same timeframe using death certificate data (n=3,979). Incidence and mortality rates were calculated as the number of cases per 100,000 person-years of the KPSC population each calendar year, with the total rate directly age-adjusted to the 2010 US male population. Poisson regression models were used to test trends. Results: The overall age-adjusted incidence rates per 100,000 person-years of prostate cancer declined from 2005-2016 (362.4 to 230.9 cases), with slight rate increases from 2005-2007 (362.4 to 419.2 cases), 2008-2009 (382.4 to 388.4 cases) and 2014-2015 (242.3 to 253.5 cases). Incidence rates per 100,000 person-years of localized prostate cancer also declined from 2007-2016 (350.2 to 173.7 cases), however, distant-stage prostate cancer cases increased from 2011-2016 (14.7 to 242 cases). Whereas, prostate cancer mortality rates declined 8% per year from 2005-2012 (IRR=0.98, CI=(0.97, 1.00)) they then increased 4% per year from 2012-2016 (IRR=1.04, CI=(1.01-1.08)). Conclusion: These data suggest that decreasing potential treatment harms, using a one-size fits all approach to PSA screening, has had a negative effect in terms of mortality. Moreover, these data suggest that a personalized approach to screening, based on known risk factors, may prove more effective.
ASSOCIATIONS OF HERPESVIRUS SEROREACTIVITY WITH AIDS-RELATED NON-HODGKIN LYMPHOMA Minkyo Song* Minkyo Song, Noemi Bender, James J. Goddard, Cheryl A. Winkler, Nicole Brunner, Tim Waterboer, Charles S. Rabkin, (National Cancer Institute)

Latent and/or reactivated infection with human herpesviruses (HHVs), particularly Epstein-Barr virus (EBV) and HHV8, is a suspected cause of non-Hodgkin lymphoma (NHL). We therefore measured antibodies for all 8 HHVs in blood samples from 2 prospective cohorts of HIV infection, a condition with high NHL risk even in the HIV treatment era. Patients with incident (n=28) and prevalent (n=58) AIDS-related NHL were matched by age, sex, and CD4 count to 67 HIV-positive AIDS-free controls. Seroreactivity to a total of 17 viral proteins was measured by fluorescent bead-based multiplex serology using a non-parametric model (ORs) and 95% confidence intervals (95% CIs) were adjusted for age, sex, CD4 count, race/ethnicity and study by logistic regression. Based on quantitative cutoffs for 15 masked duplicates, estimated coefficients of variation (CVs) were ≤10% for all antibodies except HHV6-IE1A (CV 24%, ICC 0.5), HHV6-IE1B (14%, 0.4), HHV8-LANA (16%, 0.7), and HHV8-K81 (10%, 0.6). Seroreactivity to herpessimplex virus 2 (HSV2) was significantly lower in both incident (4%) and prevalent (4%) cases than lymphoma-free controls (6%), with OR 0.48 (95% CI 0.23-0.99) for cases overall. Cases had non-significantly lower prevalence of antibodies to HHV6, EBV-Zebra, and -EAD (ORs 0.42-0.73), similar prevalence of antibodies to HSV1, Varicella Zoster virus (VZV) gE, EBV-LANA and -VCAp18, (ORs 0.98-1.17); and non-significantly higher prevalence of antibodies to EBV-EBNA1, cytomegalovirus (CMV) pp65, and two EBV proteins, EBNA and VCAp18, were present in all or almost all samples. Our data may reflect confounding or disease effect Alternatively, exposure to HSV2 or a similarly transmitted infection may be ineretively associated with development of AIDS-related NHL. Further studies are warranted to replicate and possibly extend this unexpected finding.

POSTMENOPAUSAL ANDROGEN METABOLISM AND RISK OF ENDOMETRIAL CANCER IN THE WHI-OH COHORT Karen A. Michels* Karen A. Michels, Cannel L. Anderson, Louise A. Britton, Chi Chen, Kathy Pan, Ruth M. Pfeiffer, Nicolas Wernstrom, Xia Xu, Brittan Trabert, (Division of Cancer Epidemiology and Genetics, National Cancer Institute, NIH)

Although an hormonal etiology for most endometrial cancer is accepted, changes in hormone metabolic levels associated with this cancer are poorly understood. Existing studies report on only a few hormones, often measured with outdated assays. Methods: We used data from a nested-case control study in the prospective Women’s Health Initiative Observational Study, which enrolled women aged 50-79 between 1993-1998 (33 cases and 354 non-cases not using hormone therapy at enrollment). Using high performance liquid chromatography- tandem mass spectrometry, we measured concentrations of twelve androgens in sera taken at recruitment, before cancer diagnosis. We previously measured unconjugated estrone and estradiol. We used conditional logistic regression to estimate odds ratios (OR) and 95% confidence intervals (CI) for endometrial cancer with further adjustment for potential confounders. We stratified models by body mass index (BMI) to explore effect modification, as increases in adipose tissue may lead to greater aromatization of parent androgens. Results: We identified elevated endometrial cancer risk with high concentrations of androstenedione (A4). (OR 2.36, CI 1.34-4.16; 5th versus 1st quintile), testosterone (T) (OR 1.91, CI 1.12-3.24), and dehydroepiandrosterone (DHEA) (OR 1.85, CI 1.06-3.25). These associations were attenuated after adjustment for estradiol (A4: OR 2.04, CI 1.12-3.69; T: OR 1.55, CI 0.89-2.66; and DHEA: OR 1.67, CI 0.94-2.96). Increasing estrone relative to A4 and increasing estradiol relative to both A4 and T were associated with increased risk. Glucuronidated androstenedione metabolites were not associated with endometrial cancer. High concentrations of A4, T, and DHEA were associated with risk among lean (BMI ≤25 kg/m²), but not obese women (BMI ≥30). Conclusions: Our notin associations with parent androgens suggests these hormones may primarily influence endometrial cancer through downstream effects on estrogens.

ASSOCIATIONS OF HERPESVIRUS SEROREACTIVITY WITH AIDS-RELATED NON-HODGKIN LYMPHOMA Minkyo Song* Minkyo Song, Noemi Bender, James J. Goddard, Cheryl A. Winkler, Nicole Brunner, Tim Waterboer, Charles S. Rabkin, (National Cancer Institute)

Lanet and/or reactivated infection with human herpesviruses (HHVs), particularly Epstein-Barr virus (EBV) and HHV8, is a suspected cause of non-Hodgkin lymphoma (NHL). We therefore measured antibodies for all 8 HHVs in blood samples from 2 prospective cohorts of HIV infection, a condition with high NHL risk even in the HIV treatment era. Patients with incident (n=28) and prevalent (n=58) AIDS-related NHL were matched by age, sex, and CD4 count to 67 HIV-positive AIDS-free controls. Seroreactivity to a total of 17 viral proteins was measured by fluorescent bead-based multiplex serology using a non-parametric model (ORs) and 95% confidence intervals (95% CIs) were adjusted for age, sex, CD4 count, race/ethnicity and study by logistic regression. Based on quantitative cutoffs for 15 masked duplicates, estimated coefficients of variation (CVs) were ≤10% for all antibodies except HHV6-IE1A (CV 24%, ICC 0.5), HHV6-IE1B (14%, 0.4), HHV8-LANA (16%, 0.7), and HHV8-K81 (10%, 0.6). Seroreactivity to herpessimplex virus 2 (HSV2) was significantly lower in both incident (4%) and prevalent (4%) cases than lymphoma-free controls (6%), with OR 0.48 (95% CI 0.23-0.99) for cases overall. Cases had non-significantly lower prevalence of antibodies to HHV6, EBV-Zebra, and -EAD (ORs 0.42-0.73), similar prevalence of antibodies to HSV1, Varicella Zoster virus (VZV) gE, EBV-LANA and -VCAp18, (ORs 0.98-1.17); and non-significantly higher prevalence of antibodies to EBV-EBNA1, cytomegalovirus (CMV) pp65, and two EBV proteins, EBNA and VCAp18, were present in all or almost all samples. Our data may reflect confounding or disease effect Alternatively, exposure to HSV2 or a similarly transmitted infection may be ineretively associated with development of AIDS-related NHL. Further studies are warranted to replicate and possibly extend this unexpected finding.
PARENTAL AGE AND RISK OF NON-HODGKIN’S LYMPHOMA IN A QUEBEC BIRTH COHORT Marie-Claude Rousseau, Marie-Elise Parent, (Institut National de la Recherche Scientifique) It has been hypothesized that advanced parental age could increase lymphoma risk of the offspring, but results have been inconsistent across studies. We aimed to assess the association between parental age and risk of non-Hodgkin’s lymphoma (NHL) in a cohort of persons born between 1970 and 1974 in the province of Quebec, Canada. The Quebec Birth Cohort on Immunity and Health was established by linkage of provincial administrative sociodemographic and health databases, and includes 400,611 persons born in Quebec from 1970 to 1974. Data were obtained from the birth registry, healthcare registration files, medical services claims, and hospitalization databases until 2014. Maternal and paternal age at child birth were extracted from the birth registry and categorized into 5-year age groups. Subjects were considered as having NHL if they had ≥2 physician claims or hospitalizations for NHL within 2 months. Logistic regression was used to estimate ORs and 95% CIs, adjusted for sex, birth weight for gestational age, number of older siblings, single/multiple birth, paternal place of birth, rural/urban place of residence, and income. Individuals with complete information on parental age were considered in analyses (n=389,227; 95.4%). Median maternal and paternal age at child birth were 26 and 28 years old, respectively. A total of 1246 NHL cases were identified. For maternal age, the adjusted ORs ranged from 0.84 (95% CI: 0.54-1.29) for ≤40 years old to 1.11 (95% CI: 0.90-1.42) for 35-39 years old vs. 25-29 years old. For paternal age, the ORs varied between 0.80 (95% CI: 0.59-1.09) for 40-44 years old and 1.11 (95% CI: 0.92-1.35) for ≥50 years old. Results remained unchanged upon mutual adjustment for maternal and paternal age, and there was no multiplicative interaction between these factors. No association was observed between either maternal or paternal age at birth and occurrence of NHL in their offspring in a Quebec birth cohort.

DIFFERENCES IN QUALITY OF LIFE BETWEEN SURGICAL AND RADIOTHERAPY NON-SMALL CELL LUNG CANCER PATIENTS USING THE SEER MEDICAL HEALTH OUTCOMES SURVEY (SEER-MHOS) Rebecca Schwartz, Rebecca Schwartz, Naomi Alpert, Raje Flores, Kenneth Rosenzweig, Emmanouil Tzartou, (Department of Occupational Medicine, Epidemiology and Prevention, Zucker School of Medicine at Hofstra/Northwell) Background: Surgical resection has been considered the standard of care for early stage non-small cell lung cancer (NSCLC); however, approximately 25% of stage 1 NSCLC patients do not undergo surgery due to preexisting comorbidities, older age, or refusal. Stereotactic Body Radiation Therapy (SBRT) has been proposed in order to provide a minimally invasive alternative treatment. Objective: To examine differences in quality of life (QoL) between SBRT and surgery in early stage NSCLC patients. Methods: SEER-MHOS (1998-2014) was used to examine early stage lung cancer patients who underwent surgery only or radiotherapy only to assess changes in Physical QoL score (PCS) and Mental Health QoL score (MCS) from baseline (prior to cancer diagnosis and treatment) to follow-up after treatment. QoL was measured using the 36-item Short Form Health Survey (SF-36) until 2016, when it was replaced by the Veterans RAND 12-Item Health Survey (VR-12). Repeated measures ANOVAs were used to assess differences in QoL change between the groups. Results: Data from 184 patients (28 radiotherapy, 156 surgery) was included. The time between baseline and follow up ranged from 0.8-23 years (M=19.6, SD=3.4). Surgical patients had higher baseline PCS (p=0.006) and MCS (p=0.0056) than radiotherapy patients. There was a significant decline in PCS score from baseline to follow up (surgery: -4.81; 95% CI: -6.31,-3.30; p<0.0001; radiotherapy: -5.6; 95% CI: -9.96,-1.24). Similarly, MCS scores declined for both groups although the change was not significant for radiotherapy patients (surgery: -2.96; 95% CI: -4.35,-1.37; radiotherapy: -1.86; 95% CI: -3.54,1.60). There was no significant difference in the change over time between the 2 treatment options for PCS or MCS. Conclusion: Although baseline QoL is higher in surgical patients, both treatments confer a comparable, slight decrease in QoL indicating that post-treatment QoL concerns should be considered in treatment decision making.

THE ROLE OF CELLULAR IMMUNE RESPONSES IN CERVICAL CARCINOGENESIS: A SYSTEMATIC REVIEW AND PRIMARY TISSUE ANALYSIS Tamirat L. Atewo, Tamitri Libwin, Nicolas Westensten, Sarah Irvin, Niels Grabe, Vikrant Sahasrabuddhe, Rebecca Chornock, (Division of Cancer Epidemiology and Genetics, National Cancer Institute, Rockville, MD) Immune response to cervical human papillomavirus (HPV) infection helps determine whether a given infection persists and ultimately progresses to cervical pre-cancer and invasive cancer, but cellular immune response pathways involved in the progression from HPV infection to invasive cancer are not well understood. We performed a systematic review and meta-analysis of defining cellular immune cells in cervical tissue at all stages of carcinogenesis, including normal uninfected epithelium, HPV infected epithelium, precancer, and cancer. The meta-analysis showed increased cytotoxic T cell (CD8), T helper cell (CD4), Langerhans cell (S100), and macrophage (CD68) infiltration with each stage in the carcinogenesis process, with stronger infiltration in stromal cells for CD8 and CD4 and stronger infiltration in epithelial cells for CD68 and S100. Regulatory T cells (FoxP3) increased only in stroma. However, the high heterogeneity of the studies and findings emphasize the need for more systematic studies of cellular immune infiltrates in cervical carcinogenesis. Therefore, in the Study to Understand Cervical Cancer Early Endpoints and Determinants (SUCCEED), we stained slides from 50 subjects with invasive cervical cancer, 75 with cervical intraepithelial neoplasia grade 3 (CIN3) lesions, 50 with CIN2 lesions, 50 with normal lesions (all HPV-positive) and 28 with HPV-negative normal lesions for p6 and DB to evaluate T cell infiltration in cervical carcinogenesis. Automated analysis to quantify these markers is currently underway and will be reported at the meeting. Additional markers are also being stained and quantified (CD4, CD8, S100, CD68, and FoxP3). Evaluating cellular immune infiltrates at all stages of cervical carcinogenesis in a large epidemiological study combined with the use of automated image analysis will provide a clearer picture of the immune response to cervical HPV infection and persistence.

SEGMENTING LEARNING WITH CONVOLUTIONAL NEURAL NETWORK TO EXTRACT FEATURES AND BUILD THE CLASSIFIER: AN APPLICATION TO ENDOSCOPE IMAGE CLASSIFICATION FOR TREATMENT PLANNING OF CERVICAL PRE-CANCEROUS LESIONS Chia-En Chang, Chia-En Chang, Sheng-Hsuan Lin, Hong-Chen Hsu, Henry Horang, Shing-Liu, (Institute of Statistics, National Chiao Tung University, Hsinchu, Taiwan) With the rise of artificial intelligence, many types of research applied deep learning technique in different fields such as e-commerce, finance, engineering, science, healthcare etc. In the medical field, scientists developed a system of computer-sited diagnosis with the deep neural network (DNN-CAD) in image analysis to assist medical staff in the diagnosis of disease. However, while DNN-CAD can obtain higher accuracy than other algorithms, it cannot be explained why such a diagnosis is given. In this study, we hope to utilize DNN as a supplementary method to learn specific features and calculate the probability which may be seen in the image. Finally, we use these extracted features as predictable factors to build logical regression. The model achieved an accuracy of 84.28% (+/- 3.15%) and AUC of 62.33% (+/-0.71%) with the same data. Although it cannot be explained why such a diagnosis is given, this study also implemented the model of with partial learning step by step is better than the CNN model which trained all without any tutor but also can be explained by medical back ground knowledge. Furthermore, this classifier takes into account the probability that squamous cells may be seen in the transformation zone (T-zone), as the chance of seeing squamous cells after being examined by cervical screening. In this way, we can consider assist diagnosis, or even determine the method of Loop electrosurgical excision procedure (LEEP) without more examine.

S/P indicates work done while a student/postdoc
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17β-HYDROXYSTEROID DEHYDROGENASE 1 AND 2 AS POTENTIAL MARKERS FOR TAMOXIFEN RESISTANCE MANIFESTED BY BREAST CANCER RECURRENCE Lindsay Collin* Lindsay Collin, Beate P. Cramm-Fenton, Thomas P. Ahrens, Kristian Christensen, Kristian Lauridsen, Stephen Hamilton-Dutoit, Anders Kjær-Nielsen, Henrik Toft Sørensen, Timothy L. Lish, (Department of Epidemiology, Rolstein School of Public Health, Emory University, Atlanta, GA)

Background: Nearly 1.7 million women are diagnosed with breast cancer annually worldwide, 65% with estrogen receptor α (ERα) positive disease so that eligible for adjuvant endocrine therapy. Despite significant advancements in treatment, nearly 30% of women diagnosed with breast cancer will experience a recurrence. Identifying biomarkers that predict treatment failure is of immense importance. 17β-Hydroxysteroid Dehydrogenase 1 and 2 (17β-HSD1 and 2) regulate estradiol and estrogen receptor activity in breast cancer cells. The relationship between cytoplasmic expression of 17β-HSD1 with breast cancer recurrence is of great interest. The aim of our study is to assess the prognostic value of intertumoral 17β-HSD1 and 2 expression and breast cancer recurrence.

Methods: This study leverages resources from a population-based case control study, nested in a population of 11,251 females residing in the Jutland Peninsula of Denmark. Participants were aged 35-69, diagnosed with stage I-II breast cancer between 1985 and 2001, and were registered within the Danish Breast Cancer Group. Cases of recurrence included 541 participants with ERα-positive disease treated with tamoxifen for at least 1 year (ERα+/TAM+) and 310 cases with ERα-negative disease never treated with tamoxifen (ERα-/TAM-). Cases were matched to controls on ER/TAM status, date of surgery, menopausal status, stage and county. Cytoplasmic expression of 17β-HSD1 and 2 were assessed using immunohistochemistry on tissue microarrays. We computed conditional odds ratios (OR) and 95% confidence intervals associating quartiles of 17β-HSD1 and 2 expression and breast cancer recurrence. Results: Preliminary results for the association between cytoplasmic expression of 17β-HSD1 with breast cancer recurrence indicate an OR of 1.45 (95% CI 0.82-2.56) although this includes only a subset of the population with available staining. Conclusion: We expect the complete study will provide insight into treatment resistance among women treated with tamoxifen.

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ESTIMATING THE CANCER BURDEN DUE TO LIFESTYLE FACTORS AMONG ADULTS IN CANADA Darren R. Brunet, Darren Brunet, Christine M. Friedenreich, Yiheng Runa, Abbey E. Porter, Xin Gevers, Stephen D. Walter, on behalf of the ComPARe Study Team, (University of Calgary)

Background: Despite established associations between modifiable risk factors and cancer, sufficient reductions in the prevalence of these risk factors have not been achieved in Canada. Resistance to change and cancer prevention strategies based on outdated information (e.g., outdated risk factors and poor study designs) contribute to the slow progress in Canada. Objective: The Canadian Population Attributable Risk of Cancer (ComPARe) project estimated the proportion of current cancer incidence attributable to modifiable risk factors in Canada. Methods: We identified lifestyle-cancer risk factors from the literature and obtained risk estimates from collaborative panels and meta-analyses. Age-specific incidence data from the Canadian Cancer Registry were combined with prevalence data from national population-based surveys. We estimated the cancer burden attributable to tobacco smoking, alcohol, excess body weight, physical inactivity, sedentary behavior, hormone use and unhealthy eating habits (i.e., insufficient fruit, vegetable, fiber, vitamin D and calcium intake), and excess red and processed meat intake. Results: Estimates of population attributable risk were 31.0% and 26.2% for active and passive tobacco smoking (14 and 4 cancer sites, respectively), 4.4% for alcohol intake (8 sites), 10.8% for excess body weight (14 sites), 10.3% for physical inactivity (15 sites), 5.4% for sedentary behavior (4 sites), 9.9% and 5.9% for insufficient fruit and vegetable intake (7 and 8 sites, respectively) and 3.9% for red and processed meat intake (4 sites each). In 2013, 82.8%, 61.8%, and 30.2% of incident lung, colorectal, and breast cancers, respectively, were attributable to these lifestyle factors. Conclusion: A considerable proportion of the cancer burden in Canada is attributable to modifiable risk factors. These results will inform and prioritize interventions targeting the risk factors that can achieve the greatest reduction in the cancer burden in Canada.

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PATIENT REPORTED OUTCOMES AMONG MOLECULAR SUBSETS OF METASTATIC COLORECTAL CANCER PATIENTS Shankesh dhiman*, Shailesh Advani, Qifang Shi, Michael Overman, Xin Shelley Wang, Scott Kopetz, (Georgetown University Lombardi Comprehensive Cancer Center, Division of Gastrointestinal Medical Oncology, MD Anderson Cancer Center)

Background: Distal and proximal colorectal cancer (CRC) patients have distinct incidence trends and embryonic and pathophysiological origins, however whether these sub-sites have distinct etiologies is unclear. Methods: We used pooled data from 407,270 participants in three US-based studies, with an overall median follow-up of 13.4 years. We analyzed the association between dietary intakes of total, processed and nitrite, nitrate, nitrate, and nitrite, and meat-related compounds (HCA s, nitrate, nitrate, and nitrite). Results: Of the 407,270 participants with ERα positive disease treated with tamoxifen for at least 1 year (ERα+/TAM+) and 300 cases with ERα,- disease never treated with tamoxifen (ERα-/TAM-), cases were matched to controls on ER/TAM status, date of surgery, menopausal status, stage and county. Cytoplasmic expression of 17β-HSD1 and 2 were assessed using immunohistochemistry on tissue microarrays. We computed conditional odds ratios (OR) and 95% confidence intervals associating quartiles of 17β-HSD1 and 2 expression and breast cancer recurrence. Results: Preliminary results for the association between cytoplasmic expression of 17β-HSD1 with breast cancer recurrence indicate an OR of 1.45 (95% CI 0.82-2.56) although this includes only a subset of the population with available staining. Conclusion: We expect the complete study will provide insight into treatment resistance among women treated with tamoxifen.
INVERSE ASSOCIATION OF ACUTE LYMPHOCYTIC LEUKEMIA INCIDENCE AND COUNTY ELEVATION AMONG PRESCHOOL CHILDREN IN THE UNITED STATES Frank Groves* Frank Groves, (University of Louisville)

It has been postulated that the iron-replete state may be favorable to leukemogenesis, and, conversely, that the iron-depleted state may be unfavorable to leukemogenesis, possibly due to inhibition of lymphopoiesis by elevated erythropoietin, at oases among persons residing at high altitude. To test the hypothesis that high erythropoietin inhibits the development of acute lymphoblastic leukemia among preschool children, the association between leukemia incidence and county elevation was studied using data from eight of the nine SEER areas during 1973-2014. Counties (N=198) were stratified into tertiles according to elevation (999 feet) as given in the Area Health Resource File from the Health Resources and Services Administration. Leukemia incidence among white children between one and four years of age was inversely associated with elevation, declining from 77.2 per million (95% CI [72.6, 82.0]) in lower-altitude counties and 77.2 per million (95% CI [72.8, 81.8]) in medium-altitude counties to 67.7 per million (95% CI [63.6, 71.9]) in higher-altitude counties. This finding lends support to the erythropoietin-suppression hypothesis.
RELATIONSHIPS OF CIRCULATING INSULIN-LIKE GROWTH FACTOR-I AND BINDING PROTEINS 1-7 WITH TERMINAL DUCT LOBULAR INVOLUTION OF THE BREAST AMONG WOMEN UNDERGOING IMAGE-GUIDED DIAGNOSTIC BREAST BIOPSY IN THE BREAST STAMP PROJECT Manik Hadar1, Mamta Hadi1, Hannah Oh1, Ruth M. Peffer2, Roni T. Fikl3, Sharon Fan2, Maciej Mieloty1, Michael Pollock1, Berit Geller1, Pamela Vaeck1, Donald Weaver1, John Stepe1, Jeff Wang1, Bo Fan1, Amit Pasha Mahmoudzadeh1, Serghei Malkov1, Sally Herschorn1, Stephen M. Hewitt1, Louise A. Brinton1, Mark E. Sherman1, Gretchen L. Gierach1, (National Cancer Institute, National Institutes of Health, Bethesda, MD, USA)

Background: Lower degrees of age-related involution of the breast, as reflected in a greater number of terminal duct lobular units (TDLUs), is a strong breast cancer risk factor. Insulin-like growth factor (IGF)-I and its binding proteins (IGFBPs), which limit IGF-I bioavailability, may also play an important role in breast cancer etiology. Prior studies have found positive associations between circulating IGF-I, the IGF-I:IGFBP-3 ratio, and TDLU number, particularly among postmenopausal women. To build upon these findings, we evaluated associations of six other IGFBPs with the number of TDLUs observed in breast biopsy specimens. Methods: Serum IGF-I and IGFBPs-1-7 were measured using enzyme-linked immunosorbent assay in 191 pre- and 103 post-menopausal women, ages 40-65, undergoing image-guided diagnostic breast biopsy. Normal TDLUs per unit of biopsy tissue area were enumerated by a study pathologist. Factor analysis with rotation was used to evaluate covariation among IGF-measures. Relationships between IGF-1 and TDLU measures were assessed with Spearman’s partial rank correlation (r) adjusting for age. Results: Factor analysis of IGF-measures revealed two independent factors: Factor 1 was positively correlated with IGF-I and IGFBP-3 and inversely correlated with IGFBP-1, and IGFBP-2; factor 2 was positively correlated with IGFBP-4, IGFBP-5, and IGFBP-7 (factor loading p<0.05 for each IGFBP analyte). Among pre-menopausal women, neither factor was significantly associated with TDLU number. Among post-menopausal women, only factor 2 was inversely correlated with TDLU number (r=-0.10, p=0.04). Conclusions: These results suggest complex relationships between serum IGF levels and measures of TDLU involution among women undergoing a diagnostic breast biopsy. Ongoing efforts to study relationships between serum IGFs, their binding proteins, and TDLU involution may be valuable in understanding the role of the IGF-system in breast cancer etiology.

SURVIVAL IN HEAD AND NECK CANCER STRATIFIED BY HPV STATUS IN SEER Rebecca Ehrenkranz1, Rebecca Ehrenkranz2, Robert Negoita3, Claire Lam1, (National Institutes of Health/ National Cancer Institute, Division of Cancer Control and Population Sciences, Surveillance Research Program)

Background: Evidence indicates HPV infection plays a causal role in certain head and neck cancers. Our analysis describes SEER HPV data, and reports population-based relative survival outcomes. This is the first time HPV-specific survival estimates for these cancers were calculated per Surveillance, Epidemiology, and End Results (SEER) data. Methods: We used SEERstat software to select head and neck cancers by anatomic location between 2001-2014. HPV status was collected via Collaborative Stage Site Specific Factor 10, and recorded as positive, negative, or unknown. Relative survival estimates were calculated via the Kaplan-Meier method and stratified by HPV status, sex, and race. Results: Completeness of HPV data rose from 1071 (20.4%) cases with known HPV status in 2010 to 3137 (51.6%) cases with known status in 2014. Of those with known status, percent HPV positive rose from 610 (59.8%) in 2010 to 2101 (67.0%) in 2014. Survival analysis showed ~20% lower 3-year overall survival in HPV-negative patients (62.2% 3-year OS) than those with unknown HPV status (62.8% 3-year OS) relative to HPV positive patients (83.2% 3-year OS). The 3-year OS percent change between HPV-unknown and HPV-negative patients ranged from 0.2% - 3.8% stratified by race. Comparatively, 3-year OS percent change between HPV-positive and HPV-unknown patients ranged from 4.9-25.0% stratified by race. HPV-positive whites had the lowest observed 3-year survival (84.6%), while HPV-negative and HPV-unknown blacks had the lowest 3-year OS (51.1 and 51.2%). Conclusion: SEER collection of HPV data improved over time, collecting more cases overall while reducing the proportion of unknown cases. Survival in HPV-unknown patients closely resembled survival in HPV-negative patients. Relative survival in SEER mirrored case-specific survival rates found in the literature. Racial survival disparities remained even after stratifying by HPV status.

CLINICALLY OCCULT PROSTATE CANCER (PCA) CASES MAY DISTORT THE EFFECT OF TESTOSTERONE REPLACEMENT THERAPY ON RISK OF PCA Xiaogang Zhou1, Xia Zhang2, (Texas A&M University)

Background: Although PCA screening is conducted before testosterone replacement therapy (TRT), clinically occult PCA cases may exist. Objective: To evaluate whether the possible inclusion of occult PCA cases distorts the effect of TRT on the risk of PCA. Design, Setting, and Participants: We followed 776 hypogonadal males aged 33-74 (TRT=100, non-TRT=376) from a urology center in Germany from 2004-2016, with a mean follow-up period of 7 years. Methods: We assumed occult cases might take 1- 2y (latency period) to become clinically detectable after receiving TRT. We selected several possible latency periods (12/18/24 mo) and compared the effects of TRT on the risk of PCA during the full follow-up period, within latency periods, and during the full follow-up period with the exclusion of cases occurring within latency periods. We applied propensity score matching (PSM) to balance demographic characteristics and baseline health condition between TRT and non-TRT groups. Results: Overall, 26 PCA cases occurred in the non-TRT group vs 9 cases in the TRT group. Within 18 mo of follow-up, 9 cases occurred in the TRT group vs 0 cases in the non-TRT group during the full follow-up period with the exclusion of cases occurring within 18 mo, 36 cases occurred in the non-TRT group vs 0 cases in the TRT group. The adjusted table showed a seemingly adverse effect of TRT on PCA development within 18 mo (p=0.030) and beneficial effect during the full follow-up period after excluding cases occurring within a latency period of 18 mo (p=0.009). Similar patterns were observed for 12 or 24 mo as the latency period. Conclusion: TRT may make occult PCA cases detectable within a latency period of treatment and present a beneficial effect in the long run. Improved sensitive screening techniques are needed to identify early-stage PCA and prevent the possible contributing effect of TRT on PCA progression among occult PCA cases.
THE ASSOCIATION OF OBJECTIVELY MEASURED SLEEP QUALITY WITH RETINAL MICROVASCULARITY IN POLICE OFFICERS Claudia C. Ma*, Claudia C. Ma, Ji K. Gu, Michael E. Andrew, John M. Violanti, Desta Fekadu, Cathy Tinney-Zara, Luanda E. Charles, (Health Effects Laboratory Division, National Institute for Occupational Safety and Health, Centers for Disease Control and Prevention)

Objective: Literature examining associations of sleep quality with changes in the retina is limited. We examined cross-sectional associations of several parameters of sleep quality with central retinal artery equivalent (CRAE), a measure of retinal arteriolar width and central retinal vein equivalent (CRVE), a measure of venular width in 210 police officers. Methods: Participants were from the Buffalo Cardiovascular Health Study (2011-2016). The sleep parameters including activity during sleep, sleep efficiency, sleep latency, duration of longest wake episode, and sleep-to-wake ratio were derived from actigraphy data. CRAE and CRVE were derived from retinal photography data. Age, sex, race/ethnicity, smoking status, alcohol intake, physical activity, blood glucose, low-density lipoprotein (LDL), LDL reducing medication, high-density lipoprotein, triglyceride, and hyper tension status were selected as potential confounders. Linear regression models were used to assess associations. Results: Sleep-to-wake ratio was negatively and significantly associated with CRAE after adjustment (β=-28.41, p=0.014). Duration of longest wake episode was positively and significantly associated with CRVE (β=0.27, p=0.024). Prior to adjustment, duration of longest wake episode was positively and significantly associated with CRAE (β=-0.27, p=0.026). After adjustment, the association was slightly attenuated (β=0.03, p=0.07). Sleep-to-wake ratio was negatively associated with CRVE (β=-35.29, p=0.001) and remained significant after adjustment (β=-28.41, p=0.001). Conclusion: The results indicate that a greater activity during sleep, lower sleep efficiency, or longer sleep latency was associated with smaller CRAE (i.e., arteriolar narrowing) and larger CRVE (i.e., venular widening). Future epidemiological studies with a prospective design and larger sample sizes are warranted to confirm our findings.

AN INVERSE ASSOCIATION OF PROTEINURIA WITH MORTALITY IN INCIDENT HEMODIALYSIS PATIENTS Masanobu Hishida*, Masanobu Hishida, Taro Shio, Daigo Iimura, Kunihide Matsushita, (Johns Hopkins Bloomberg School of Public Health)

Proteinuria is a potent predictor of mortality. However, in patients with formerly reduced kidney function, a few studies showed a J-shaped association between proteinuria and mortality. No studies have explored this association in incident dialysis patients. We examined data from 1382 Japanese incident dialysis patients (mean age 67 years) from 17 institutions. Baseline data were collected just prior to or during the hospitalization for dialysis initiation. The associations of midstream proteinuria (0+, 1+, 2+, or 3+ with albuminuria and cardiovascular disease (CVD) mortality were quantified by Cox models. Most patients (n=1343 (96.5%)) had 2+ proteinuria (48.3%) had no proteinuria. Patients with no proteinuria were likely to be older (75 vs 67 years) and have a history of coronary disease (56% vs. 36%), compared to the others. During a mean follow-up of 3.3 years, there were 352 deaths (129 due to CVD). Patients with no proteinuria had a worse prognosis than those with 2+ proteinuria independently of potential confounders. Our study highlights the prognostic value of midstream data and suggests that absence of proteinuria as a potential indicator of the highest post-dialysis mortality risk.

METABOLIC MEDIATORS OF THE RELATIONSHIP BETWEEN ADIPOSE AND CARDIAC STRUCTURE AND FUNCTION IN UK ADOLESCENTS Alice R. Carter* Alice R. Carter, Diana L. Santis Ferreira, Amy L. Taylor, Debbie A. Lawlor, George Davey Smith, Nishi Chaturvedi, Alun D. Hughes, Laura D. Howe, (MRC Integrative Epidemiology Unit, Population Health Sciences, University of Bristol, UK)

Introduction: Strong evidence shows that adiposity increases cardiovascular disease (CVD) risk, explained in part by blood pressure, glucose, triglycerides, and cholesterol. Metabolomics offers the potential to identify novel intermediate pathways. Methods: Body mass index (BMI) was measured at age 11 in the Avon Longitudinal Study of Parents and Children. Measures of cardiac structure (precursors of CVD at age 17) were left atrial size indexed to height (LAI) left ventricular mass indexed to height (LVMI), effective wall thickness (RWT) and left ventricular internal diameter (LVIDD). Metabolic traits (mostly lipid and lipoprotein related) were quantified via high-throughput 1H-magnetic resonance spectroscopy (MRS) at age 15. Complete data were available for all exposures, mediators and outcomes (N=772). Multiple imputation was used to deal with missing data in covariates. Multivariable linear regression was used to estimate associations of BMI with measures of cardiac structure. Mediation was assessed via controlled direct and natural indirect effects, firstly, considering 156 metabolic measures individually, and secondly considering all metabolites jointly (pathway components, N=17). Bootstrapping was used to calculate robust standard errors. Results: A one-unit higher BMI was associated with 0.74 (0.54,0.94) higher LVMI in males 0.68 (0.52,0.84) in females. Individually, each metabolite explained little of this association. Jointly, the PCs of the metabolites explained 8% of the association in males and 0.8% in females. Similar re-sults were seen for LAI and LVVIDD. There was weak evidence of an association of BMI on RWT. Conclusion: In this adolescent population, individual metabolites measured by MRS contribute a small amount to the pathway from adiposity to cardiac structure. Considering them jointly indicates they play a role in the pathway, particularly in males. Further work is warranted to assess causality.

THE ROLE OF CARDIOVASCULAR DISEASE RISK FACTOR SURVEILLANCE IN WOMEN'S HEALTHCARE SETTINGS: INCORPORATING PREVENTATIVE CARE INTO REPRODUCTIVE HEALTH SERVICES Jessica M. Madrigal* Jessica M. Madrigal, Ashlesha Patel, Camilla Johnson, (University of Illinois at Chicago, School of Public Health, Division of Epidemiology and Biostatistics)

Background: Preventive care is undervalued by minority women of reproductive age, despite recommendations. Adolescent care settings offer a chance for cardiovascular disease (CVD) risk factor screening in addition to standard reproductive health and contraceptive services. Our aim was to examine the prevalence of CVD risk factors among women presenting for reproductive health services in an urban public healthcare system. Methods: Chart review was done for 740 women who presented for a first trimester abortion or to obtain contraceptive methods over three months. We abstracted information on demographics, body mass index (BMI), systolic and diastolic blood pressure, and smoking. BMI ≥ 25 or 30 kg/m2 was categorized as overweight or obese, respectively, and hypertension was defined as blood pressure ≥ 130/80 mmHg. Prevalence estimates were calculated and log-binomial regression was used to identify factors associated with CVD risk. Results: On average, women were 26 (SD=6) years old, 85% African American, and 52% were eligible for food stamps. Overall, 29% were categorized as overweight, 42% as obese, 10% had elevated blood pressure, and 21% were in the hypertensive range. 18% reported current smoking. 44% of women had one CVD risk factor, and 35% had two or three. Half of the women desired children in the next one to five years. Prevalence of risk factors varied by age, number of births, and insurance status. Women aged 25-34 (PR=3.2, 95% CI 1.1 to 9.1) or older than 35 (PR=3.5, 95% CI 1.2 to 10.4) had increased prevalence of two or more risk factors when compared to women under 18. Conclusions: The reproductive health care setting provides an opportunity to monitor, counsel, and refer at-risk women for further screening and care. This encounter may be the only opportunity women have for health screening. Furthermore, CVD risk factors limit contraceptive options, and weight, smoking, and blood pressure counseling may result in healthier pregnancies for those that desire future children.
THE RELATIONSHIP BETWEEN LIFESTYLE FACTORS AND THE RESOLUTION OF ADOLESCENT METABOLIC SYNDROME Yi-Wen Lai* Yi-Wen Lai, Chun-Ying Lee, Shuron Tsai, Wei-Ting Lin, Pei-Wen Wu, Yu-Ting Chiu, Hsiao-Hsing Huatig, Chien-Hung Lee, (Department of Public Health College of Health Science Kaohsiung Medical University)

Kidney metabolic syndrome (MetS) is a predictor of high carotid intima-media thickness, type 2 diabetes mellitus and cardiovascular disease in adults. Previous studies have reported that the resolution from MetS between youth and adult life could reduce the risk of diabetes and cardiovascular disease in adults. The occurrence of MetS has been linked to lifestyle parameters, however, how lifestyle factors in childhood affect the resolution of adolescent MetS is not well understood. We used a 3-year follow-up study to investigate the effect of the change in lifestyle factors on the resolution of MetS and its components. Participants were 661 adolescents aged 12 to 14 years who were randomly selected from 14 junior high schools in Taiwan using a multistage stratified cluster sampling strategy. Comprehensive demographic factors, dietary, physical, anthropometric, and clinical parameters were collected. The modified criteria of NCEP/ATP-III for adolescents was used to determine MetS. Compared to baseline MetS condition, adolescents who reduced number of MetS components after 3-year follow-up were defined as the resolution of MetS component. Logistic regression models were used to evaluate the related effects after adjusted for covariates. We found that adolescents with high physical activity (≥977 MET-minutes/day) had a 2.1-fold higher likelihood of MetS resolution than those with low physical activity (≤977 MET-minutes/day). Reading time, screen time and the intake of sugar-sweetened beverages were not associated with the resolution of MetS. Our findings emphasize the role of physical activity on the resolution of adolescent MetS.
INFLAMMATORY MARKERS AND FUTURE RISK OF PERIPHERAL
ARTERY DISEASE

Ning Ding* Ning Ding, Shoshana H. Ballew, Corey Andrew Kalbaugh, Ron C. Hoogeveen, Josef Coresh, Elizabeth Selvin, Christie M. Ballantyne, Kunihiro Matsushita, (Johns Hopkins University)

Introduction: Inflammation is associated with increased risk of coronary heart disease and stroke, but few prospective studies have evaluated its association with incident peripheral artery disease (PAD) in the general population. Hypotheses: Inflammatory markers are associated with increased risk of incident PAD and its severe form, critical limb ischemia (CLI). Methods: In 12,258 ARIC participants free of PAD at baseline (1990-92), we quantified the associations of two representative inflammatory markers, high-sensitivity C-reactive protein (hsCRP) and white blood cell count (WBC) with incident PAD (hospitalizations with PAD diagnosis [ICD-9: 440.2-440.4] or leg revascularization [e.g., 38.38]) and CLI (severe PAD cases with ulcer, gangrene, or leg amputation) using Cox proportional hazards models. hsCRP was log-transformed. Results: Over a median follow-up of 22 years, there were 448 cases of PAD and 161 cases of CLI. Log-hsCRP was significantly associated with incident PAD (unadjusted HR 1.73 [95% CI 1.58-1.89] per 1 SD). The association was attenuated but remained significant after adjusting for potential confounders such as diabetes and smoking (1.46 [1.31, 1.63]). WBC demonstrated similar results with unadjusted HR (for 1 SD) 1.15 [1.12-1.18] and adjusted HR 1.08 [1.04, 1.12]. Largely similar results were observed for CLI and across demographic and clinical subgroups. Conclusions: hsCRP and WBC are independently associated with incident PAD in the general population. Our results confirm the importance of inflammation in the development of PAD and potential usefulness of these inflammatory markers available in daily practice for identifying individuals at high risk of PAD.
INDIVIDUAL SOCIODEMOGRAPHIC FACTORS MODIFY RELATIONS
BETWEEN MEASURES OF COMMUNITY CONTEXT AND CHANGE IN 
HbAlc LEVELS IN INDIVIDUALS WITH TYPE 2 DIABETES Annemarie 
G. Hirsch, Annemarie C. Hirsch, Cara Nordberg, Melissa Poulsen, Brian S. 
Schwartz, (Gingsing, Department of Epidemiology and Health Services Research) 

Background: Associations of community contexts with health have been found to vary by individual-level characteristics. We recently reported that community factors were associated with change in glycated hemoglobin (HbAlc) in patients receiving care for type 2 diabetes. We now evaluated whether individual factors modified the observed associations. Methods: Using medical record data, we identified patients with type 2 diabetes who had an HbAlc ≥ 7.5% and a follow-up HbAlc within 90-370 days. We used 4 community factors that we previously found to be associated with HbAlc change: community socioeconomic deprivation (CSED), food availability, fitness assets, and utilitarian physical activity favorability. We used mixed effects models and tested whether individual-level characteristics modified these associations by including cross-product terms between community factors and age (<65, 65+ years), history of Medical Assistance (yes/no, surrogate for low family socioeconomic status [SES]), and race/ethnicity (white/non-white), controlling for sex, treatment, body mass index, time since diagnosis, and baseline HbAlc. Analysis was stratified by community type (township, borough, census tract in city). Results: We identified 15,208 patients with 69,818 elevated HbAlc measures. In townships and cities, better physical fitness assets were associated with a greater reduction in HbAlc only in subjects with low family SES (vs. not low, interaction p<0.04). In boroughs, utilitarian physical activity favorability was associated with a greater reduction in HbAlc only among those of non-white race/ethnicity (vs. white, interaction p<0.05). Conclusion: The relations between two measures of physical activity context and HbAlc change differed by family SES and race/ethnicity. Understanding how individual-level factors magnify or mitigate the effects of community context on HbAlc change can inform targeting secondary prevention strategies.

THE EFFECTS OF PERIODONTAL CARE INTERVENTION ON 
PERIODONTAL STATUS AND SELF-CARE BEHAVIORS IN PATIENTS 
WITH TYPE 2 DIABETES MELLITUS (T2DM): A PILOT RANDOMIZED 
CONTROLLED TRIAL. STUDE Yi-Ying Hsiao, Yi-Ying Hsiao, Yuan-Jong Hsu, 
Hsiao-Ling Huang, (Department of Public Health, College of Health Sciences, 
Kaohsiung Medical University, Taiwan) 

Background: The association between diabetes and periodontitis is bidirectional: patients with T2DM are more susceptible to periodontitis, and the presence of periodontitis affects glycemic control. Most intervention studies for DM patients have employed the systematic care model. However, oral health and periodontal care have been generally omitted. Objective: Our aim is to evaluate the effects of periodontal care intervention on periodontal status and self-care behaviors in patients with T2DM. Methods: A randomized experimental design was used; patients with T2DM were recruited and randomly assigned to the experimental group (EG) or control group (CG). There were 19 and 14 patients included in the EG and CG, respectively. A periodontal care intervention used for EG, in which the participants underwent the conventional periodontal therapy (subgingival scaling and root planing) combined with 30 minutes of oral health education and instruction once a week for 4 weeks by a certified dental hygienist. The CG received conventional periodontal therapy and the brochure. Pre- and post-test data were collected including periodontal-related knowledge and behaviors, periodontal pocket depth (PPD), plaque index (PI), gingival index (GI), bleeding on probing (BOP) and clinical attachment loss (CAL). Comparisons of periodontal parameters between EG and CG were analyzed by the t-test. Proportion test analyzed the change of self-care behaviors between pre- and post-test. Result: There was a significant difference of change in level of knowledge between the EG and CG. After intervention, two groups differed significantly in terms of changes in PPD, GI, PI, and BOP (all P<0.05). Moreover, the EG had a significantly higher degree of improvement. Conclusion: The results suggest periodontal care intervention was effective on periodontal status and self-care behaviors in patients with T2DM.
Background: Polychlorinated biphenyls (PCBs) are synthetic organochlorine compounds previously used in industrial processes. Although banned, these chemicals continue to persist in the environment and are associated with adverse health outcomes in children. Using data from a cross-sectional pregnancy cohort, we investigated the association between prenatal exposure to PCBs and body fatness in 9-year-old girls in the United Kingdom. Methods: The concentrations of various PCB congeners (PCB-118, PCB-138, PCB-153, PCB-170, and PCB-180) were measured in maternal serum samples collected during pregnancy (N=202). Body fatness was measured using body mass index (BMI), and dual-energy x-ray absorptiometry (DXA) for body fat mass, trunk fat, and overall percent body fat. Using multivariable linear regression, we explored associations between PCB congener concentrations and maternal gestational serum and body fatness outcomes with adjustment for maternal pre-pregnancy BMI, maternal education, breastfeeding status, and birthweight. Results: Among 339 mother-daughter dyads, the median (range) (IQR) for PCB congeners was between 15.0 pg/g (11.0-20.8) for PCB-118 and 64.6 pg/g (48.6-86.3) for PCB-153. Means (standard deviations) for percent body fat was 28.1 g (8.5) and for BMI was 18.4 kg/m² (4.2). A unit (pg/g) increase in PCB-170 concentration was associated with a 0.15 kg/m² (9.9%) confidence interval: 0.02-0.28) higher BMI. No other assessed PCB congeners were associated with body fatness outcomes. Conclusions: Although biologically plausible based on the literature, in this study, prenatal exposure to PCB congeners was not associated with adjusted measures of body fatness in 9-year-old girls.
POLYCHLORINATED BIPHENYLS AMONG REPRODUCTIVE-AGED BLACK WOMEN Amelia K K Weselelink* Amelia K K Weselelink, Traci N Bethea, Michael McClean, Paige Williams, Run Hatte, Andrea Sjol, Theodore Baskey, Donna B Baird, Lutizen A Wise, (Boston University School of Public Health)

Polychlorinated biphenyls (PCBs) are a class of lipophilic endocrine-disrupting chemicals with wide industrial production and usage from the 1930s through 1977 in the U.S. Due to their environmental and biological persistence, PCBs remain commonly detected in wildlife and humans. We examined predictors of serum PCB concentrations in a prospective cohort study of premenopausal black women aged 25-34 years from the Detroit area (2010-2012). Eligible women did not have a prior diagnosis of breast, autoimmune disease, or cancer. We collected demographic, behavioral, dietary, and medical data via self-administered questionnaires, telephone interviews, and in-person clinic visits. We collected non-fasting blood samples from a random subset of 477 participants at enrollment, in which we measured 24 PCB congeners at the Centers for Disease Control and Prevention. We lipid-adjusted PCB concentrations and set values below the limit of detection (LOD) to LOD/Log2(3) (linear regression was used to calculate percent differences and 9.5% CI for selected predictors with individual PCBs, sum of total PCBs, and sum of PCBs by degree of chlorination. PCB concentrations were inversely associated with age and fish intake. The strength of associations varied by degree of chlorination. For example, BMI <25 kg/m² corresponded to 15.1% lower sum of tri- and tetrachlorinated PCBs (95% CI 4.9-24.1), 34.6% lower sum of pentachlorinated PCBs (95% CI 25.8-42.3), and 49.5% lower sum of heptachlorinated PCBs (95% CI 42.6-55.6). Likewise, associations for age, education, and fish intake were stronger for more highly chlorinated PCBs. Associations with parity and lactation duration, however, were stronger for less chlorinated PCBs. Results are consistent with studies of PCB body burdens, few of which include large numbers of black women.

AIR POLLUTION AND PRETERM BIRTH: DO AIR POLLUTION CHANGES OVER TIME INFLUENCE RISK IN CONSECUTIVE PREGNANCIES AMONG LOW-RISK WOMEN Pauline Mendola* Pauline Mendola, Carie Noble, Andrew Williams, Daming Liu, Seth Sherman, Indrulatha Senci, Katherine Grant, (NIH/NICHD)

Air pollution has generally decreased over time in the U.S. while having a prior preterm birth (PTB) increases subsequent pregnancy PTB risk. To investigate whether air pollution exposures would have differential effects on PTB risk in two consecutive pregnancies, we estimated exposures based on modified Community Multiscale Air Quality Model linked to the NICHD Consecutive Pregnancy Study. Electronic medical records for consecutive delivery admissions were available for 50,000 women with singleton births in 20 U.S.-based hospitals between 2003-20. We categorized exposures based on potencies as high (>75), moderate (25-75) and low (<25). Modified Poisson regression with generalized estimating equations estimated the PTB risk in a second pregnancy associated with persistent high and moderate exposure, and increasing or decreasing exposure, compared to persistent low exposure. Analyses were adjusted for prior PTB, interpregnancy interval and other demographic and clinical characteristics. Pollution levels generally decreased over time, reducing the number of women in higher categories for the second pregnancy. Second pregnancy PTB risk was increased when exposure stage for sulfates (32%), nitrogen oxides (17%), nitrogen dioxide (34%), and particle <10 microns (29%) versus consistently low exposure. No effect was observed for particle <2.5 microns. Estimating effects by PTB history, we found that when pollutant levels increased over time compared to staying low, PTB risk tended to increase to a lesser extent for repeated PTB (14-19%) than for women without a prior PTB (51-79%). These findings suggest that area-level changes in air pollution exposure appear to have important consequences in repeated pregnancies. Women with and without a prior PTB were impacted by increasing levels of air pollution exposure over time but results were stronger among those without a prior PTB.


While risks of accidental deaths from tropical storms (e.g., drowning, carbon monoxide poisoning) have been well-documented, much less is known about risks for more common causes of mortality (e.g., cardiovascular, respiratory). Here, we conducted the first multi-year, multi-state epidemiological study to estimate the relative risks (RRs) of community-wide all-cause, cardiovascular, respiratory, and accidental mortality associated with tropical storm exposure in the United States (US). To measure storm exposure, we used five hazard-related metrics—distance to storm track, cumulative rainfall maximum sustained wind speed, flooding and tornadoes. For each metric, we modeled the association between community-level storm exposure and daily death counts in 78 large eastern US communities, 1988–2009, using a matched analysis of storm-event days versus similar unexposed days. We assessed risks for a window from two days before to seven days after the storm’s closest approach. Over the study period, 92 Atlantic Basin tropical storms were considered based on US landfall or near-approach, with 70 communities exposed to at least one storm. Under wind exposure metrics, we found substantively elevated risk for all mortality outcomes considered, with highest risk typically on the day the storm was closest. Based on wind exposure, overall RRs of mortality during the full storm exposure window were 1.90 (95% CI: 1.58-2.29), 1.61 (61.64-22.80), 1.50 (0.97-2.26), and 2.04 (0.13-50.30) for all-cause, accidental, cardiovascular, and respiratory mortality, respectively. These estimated associations are dominated by extremely high risks during the few most severe storms (e.g., Andrew [1992], Katrina [2005]), a hypothesis we continue to explore. Our results suggest that very severe tropical storm exposures can have important mortality impacts beyond direct accidental deaths, including potentially important risks for cardiovascular and respiratory mortality.

PREGNANT AND EARLY LIFE EXPOSURES TO AIR POLLUTION AND CHILDHOOD DEVELOPMENT Sandie Ha* Sandie Ha, Edwina Yeung, Erin Bell, Tabasum Iqbal, Alkhor Ghanbazari, Griffith Bell, Pauline Mendola, (Department of Public Health, School of Social Sciences, Humanities and Arts, University of California, Merced, CA)

Particulate matter <2.5µm (PM2.5) and ozone (O3) have been linked to poor fetal outcomes but few studies simultaneously explored prenatal and early life exposures in relation to childhood development. Participants included 3,754 singleton and 2,071 twins from the Upstate KIDS Study, a pediatric cohort in upstate New York (2008-2010). Census tract level PM2.5 and O3 estimated by the Environmental Protection Agency Downscale models were linked to each child’s addresses during pregnancy and early life incorporating residential history, and locations of maternal work and daycare. Parents reported on their children’s development at ages 4, 8, 12, 18, 24, 30, and 36 months in 5 domains using the Ages and Stages Questionnaire. Generalized mixed models were used to obtain the RRs and 95% CIs for the risk of failing any developmental domain per μg/m³ increase in PM2.5 and ppb increase in O3. Models were adjusted for maternal demographics, lifestyle, birth characteristics, gestational complications, season, and exposures during other windows. Among twins, exposures to PM2.5 during trimester 2 (RR: 1.06 [1.01,1.11]) and the first two years (RR1: 1.57 [1.33,1.84]; RR2: 1.67 [1.40,2.01]) were associated with the risk of failing any developmental domain. Whole-pregnancy and first-year PM2.5 exposures also increased the risk of failing fine motor (RR1: 1.01 [0.83,1.24] and communication (RR2: 1.24 [1.04,1.49]) domains, respectively. Third trimester O3 exposure increased the risk of failing the overall cognitive domain (OR: 1.03 [1.01,1.05]), but exposure during the first three years was associated with a slightly lower risk of failing the communication, fine motor, and personal-social domains. Similar findings were observed for singletons but they were weaker and not significant. We found evidence suggesting that PM2.5 exposures during pregnancy and early life may increase the risk of delayed childhood development, especially among twins. The associations with O3 appear inconsistent.
USING MULTIPLE SPATIAL MEASURES TO EXAMINE PATHWAYS BETWEEN RESIDENTIAL GREEN SPACE AND BIRTH OUTCOMES IN PORTLAND, OREGON

Leanne Cusack* Leanne Cusack, Mike Papenfus (ORISE fellow at the Environmental Protection Agency)

Background: Measures of green space used in epidemiological studies (e.g., Satellite Normalized Difference Vegetation Index (NDVI) or land cover) capture multiple exposures and pathways potentially relevant to health (e.g., air pollution reduction, physical activity, psychological influences, etc.). Here we examine how different exposure measures of green space are related to each other and the specific pathways in which they may be associated with birth outcomes in a population-based birth cohort Portland, Oregon. Methods: We used Vital Statistics data to create a birth cohort in Portland, Oregon from 2000 to 2011 (n=244,309). Residential green space was assigned using multiple measures including % tree cover from the EPA EnviroAtlas, number of street trees obtained from the Portland Street Tree Inventory and mean annual LandSat 5 30m NDVI at various buffer distances. Logistic and linear mixed models were used to determine associations with preterm birth, small for gestational age (SGA) and term birth weight, controlling for individual and neighborhood factors. Results: We observed varying degrees of correlation between the different green space measures. These ranged from 0.04 for tree count in 50m and NDVI to 0.70 for NDVI and tree cover. Unadjusted results demonstrated protective effects of NDVI for all buffer sizes (50m, 250m, 500m and 1000m) on birth weight; however, in fully adjusted models these effects disappeared. For example, an IQR increase (0.1) in NDVI with a buffer of 50m was associated with a 20.7 gram (95% CI: 19.2, 22.3) increase in term birth weight in unadjusted models and a 0.3 gram (95% CI: -1.2, 2.0) increase in fully adjusted models. Maternal and paternal race, ethnicity and education had the largest impact on reducing associations.
Background: Whether stroke model with single nucleotide polymorphisms (SNPs) with big effect size identified in Genome-wide association studies (GWAS) is to improve predictability and stroke prediction model with genetic variants has higher predictability for young-stroke than old stroke remains unknown. Methods: In this study, we used a case-cohort study from the Korean Cancer Prevention Study-II (KCPS-II) (N = 156,701). We genotyped 74 SNPs identified in GWAS on the KCPS-II subcohort members and incident stroke cases. We calculated a genetic risk score (GRS) by summing the number of risk alleles over all SNPs. Prediction models with or without GRS were evaluated in terms of the area under the receiver operating characteristic curve (AUROC). Results: Sixteen out of 74 SNPs identified in GWAS in this study showed significant association with stroke, with an odds ratio greater than 2.0 in Koreans. For participants aged <40 years, AUROCs (95% CI) for modifiable traditional risk factors (Model 1), GRS only (Model 2), and Model 1 plus GRS (Model 3) were 0.58, 0.65 and 0.67 for incident stroke, respectively. Compared to Model 1, Model 2 improved AUROC by 7%, while Model 3 improved it by 9%. A favorable traditional risk was associated with a significantly less stroke risk within each genetic risk category. Conclusions: Traditional and genetic risk scores were independently associated with susceptibility to stroke. Among young participants, genetic variants may be useful for predicting stroke risk. Moreover, a favorable traditional risk was associated with stroke regardless of the genetic risk level. This research was supported by Basic Science Research Program through the National Research Foundation of Korea (NRF) funded by the Ministry of Education (NRF-2016R1A6A3A11933465) and a grant of the Korean Health Technology R&D Project, Ministry of Health & Welfare, Republic of Korea (HI14C2666). Keywords: prediction, genetic variants, stroke, case-cohort study.

TRANS-ETHNIC GWAS META-ANALYSIS IDENTIFIES OVER 180 GENETIC LOCI FOR SERUM URATE Adrienne Tin* Adrienne Tin, Jonathan Marten, (Johns Hopkins Bloomberg School of Public Health)

Background. High serum urate levels are a cause of gout, an excruciating disease with suboptimal treatment affecting ~4% of the adult population in many developed countries. Ancestry-specific genome-wide association studies (GWAS) of serum urate in European, African, and Asian ancestries have identified a total of >30 loci. Together the index SNPs at these loci explain <10% of the phenotypic variance, suggesting that additional loci remain to be identified. No trans-ethnic association studies of serum urate have been performed to date. Method. We performed ethnicity-specific and trans-ethnic meta-analyses of GWAS among 457,690 individuals (European ancestry: 288,649; East Asian: 125,725; African American: 33,671; South Asian: 9,037; Hispanic American: 608) from 74 studies using fixed-effect inverse variance weighting in METAL. To further investigate ancestry as a source of heterogeneity of allelic effects, we conducted trans-ethnic genome-wide meta-regression using MR-MEGA by generating axes of genetic variation based on pairwise allele frequency differences between studies and estimate the effects of these axes for each variant. Results. Ethnic-specific meta-analyses identified 124, 46, and 14 genome-wide significant 1-Mb genomic intervals in European ancestry, East Asian, and African-American individuals, respectively. Trans-ethnic meta-analysis identified 184 intervals that contained 21 variant associated with serum urate at p<40 1-Mb genomic intervals with no previous association with serum urate. Further fine mapping and integration with bioinformatics will generate novel insights into serum urate metabolism and potential treatment targets for lowering urate levels and prevention of gout.
THE ASSOCIATION BETWEEN GUT MICROBIOTA AND ANTHROPOMETRIC MEASUREMENTS IN BANGLADESH

Gwendolyn Osborne*; Gwenlondy Osborne, Fen Wu, Liying Yang, Farzana Jasmin, Muhammad G Kibria, Firisque Parvez, Ishrat Shafee, Gobin Sarwar, Akhmad Ahmed, Mahbub Eunus, Tarapati Islam, Vasa Sholovitch, Hyun Hui, Hsin Li, Joseph H Grdziel, Zhifeng Pei, Habitul Absam, Yu Chen, (Department of Population Health and Environmental Medicine, New York University School of Medicine, New York, New York, USA)

Background: Many studies have observed an association between gut microbiota and obesity measured by BMI. However, few studies have investigated the gut microbiota in relation to other anthropometric measures. A few studies have been done in low-income, lean populations. Objective: To investigate the relationship between the gut microbiota and anthropometric measurements among 248 participants from the Health Effects of Arsenic Longitudinal Study (HEALS) in Bangladesh. Our cohort represents a unique population that allows for the investigation of the gut microbiota and anthropometric measurements in lean individuals.

Methods: We measured height, weight and arm, thigh, hip and waist circumferences, and collected fecal samples. Microbial DNA was extracted from the stool samples and sequenced by 16S rRNA gene sequencing. We examined the associations between relative abundance of individual bacterial taxa from phylum to genus levels and the anthropometric measurements. Results: Higher BILM mid-upper arm circumference, waist circumference, and waist-to-height ratio were associated with a lower diversity of fecal bacteria after adjusting for sex, age, smoking, and education. The relative abundance of the genus Oscillospira and the family S24-7 were inversely related to all the measurements after correction for multiple testing (FDR p-value < 0.05). The relative abundance of the genus Acidaminococcaceae and the family Ruminococcaceae were also associated with several measurements. The positive associations of the genus Acidaminoccus with BMI, as well as waist and hip circumferences, were stronger in women than in men (p-values for interaction < 0.01).

Conclusions: Our data in a lean Bangladeshi population are consistent with the evidence of an association between Oscillospira and leanness, measured using multiple anthropometric measures. We also identified several other bacterial taxa that were related to various anthropometric measurements.

INTRODUCTION TO PUBERTY

High blood cholesterol is a major risk factor of cardiovascular diseases. The prevalence of hypercholesterolemia was raised from 11.2% to 20.4% in the past decades. Recently, several genome-wide association studies (GWAS) have identified single nucleotide polymorphism (SNPs) associated with the blood cholesterol levels in Europeans and Americans, few studies have conducted in Asian. Objectives: Our aims are to identify novel genetic variants which are associated with high blood cholesterol and to investigate the interactions between genetic variants and environments in Han Taiwanese. Methods: A total of 436 men and 518 women were genotyped using the Affymetrix Asia Genome-Wide Array Plate, which comprised 61,565 SNP markers from the Taiwan biobank. After quality control, we looked for the associations between SNPs and high blood cholesterol levels. Results: We found that rs75934221 and rs2073068 showed the statistical significance after adjusting for confounding factors (P = 3.76E-06 and 5.29E-06), which located on NNX3 and PLEKCG genes. Moreover, the smoking subjects with the rs75934221 AA genotype had 6.35-fold risk of high blood cholesterol levels than nonsmoking subjects with the GG genotype. The smoking subjects with the rs2073068 GG genotype had 4.46-fold risk of high blood cholesterol levels than normal weight subjects with the AA genotype. Conclusions: We identified NNX3 and PLEKCG genes as novel genes of high blood cholesterol levels in Taiwanes adults. Further replication studies in large sample sizes are needed.

EFFECTIVENESS OF STRATEGIES FOR IMPLEMENTING CHILDHOOD VACCINATION PROGRAMS IN FRAGILE COUNTRIES

Faiza Rab; Faiza Rab, Zhe Li, (Doctoral student)

Background: Despite emphasis on childhood vaccination programs as being the most effective intervention in reducing childhood mortality, millions of children remain unvaccinated globally. Infragile contexts, focus on childhood vaccination programs and the impact of the political instability, human rights violations, economic and social insecurity have resulted in many countries being in 'fragile state,' with crumbling health infrastructure and poor health care delivery. Objectives: Our aim was to identify strategies to improve childhood vaccination uptake in fragile countries and compare community-based programs for their effectiveness. Methods: Childhood, immunization, and 'fragile' states were key concepts identified for systematic literature search, limited to English language, conducted between January and March 2017 by two independent reviewers. Screening results were categorized at 3 levels and kappa statistics calculated at each level. Data extraction included year of the study, location, setting, study design, characteristics, type of vaccination assessed in the study, the intervention or campaign, control, vaccination outcomes and study limitations, measures of effect (OR, RR) describing increase in coverage or decrease in drop-out and missed vaccination. Random effects model was used to evaluate effectiveness of vaccination programs. Results: Twenty-seven studies published between 1996 and 2016 were identified as effective community-level strategies for childhood vaccination in fragile countries. Kappa for the three levels of screening ranged from substantial to good (0.75, 0.61, 0.58). The identified strategies included: recall and reminder through SMS texts, phone calls, reminder stickers and cards; health education programs; microplanning strategies; monetary incentives. Data was collected from 43,018 participants. SMS text reminders was found to be the most effective intervention (RR 1.32, CI 1.14 to 1.52).

AGE-PERIOD-COHORT EFFECT IN MARIJUANA USE IN THREE SOUTH AMERICAN COUNTRIES

Alvaro Castillo-Carrilga*; Alvaro Castillo-Carrilga, Araceli River-Aguirre, Katherine M. Reyes, Magdalena Cordel, (Violence Prevention Research Program, University of California, Davis)

Introduction: In a context of recent drug policy changes, and increasing rates of marijuana use in some Latin American (LA) countries, the decomposition of population-level trends can help to explain the sources of variation over time. While studies have examined age-period-cohort (APC) effects in marijuana use across the three countries. To the contrary of U.S. and Argentina that are considering the legalization of medical and recreational marijuana. Methods: We used methodologically comparable, nationally representative, repeated cross-sectional general population surveys on marijuana use from 1994 to 2016 (n=18,281 in Uruguay, n=42,492 in Argentina, n=202,885 in Chile). The surveys were conducted at 2-year intervals depending of the country. All surveys used a three-stage random sample design, included people aged 15-65, and used a face-to-face interview. APC effects were estimated using cross-classified logistic hierarchical models. Results: By period, Chile and Uruguay experienced an increasing trend in past year marijuana use, while in Argentina past year use remained stable over time. By age, the highest probabilities of use in Chile and Uruguay were in the younger groups (age 15-25), while in Argentina the highest probabilities were at ages 30 to 40. By cohort, the oldest (1945 to 1950) and the youngest (1985 to 1995) cohorts had the highest probabilities of use in Argentina, while in Chile the probability of use increased until 1975, to decrease thereafter. There was no clear cohort effect in Uruguay. Conclusions: We observed different APC effects in marijuana use across the three countries. To the contrary of US and some European countries, after accounting for cohort and age effects we saw a consistent increase in marijuana use over time in Chile and Uruguay.
THE CHRONIC KIDNEY DISEASE PROGNOSIS CONSORTIUM (CKD-PC): A GLOBAL, COLLABORATIVE, INDIVIDUAL PATIENT DATA META-ANALYSIS
Shoshana H. Ballew, Morgan Grams, Kunihiro Matsushita, Mark Woodward, Ron T. Gansevoort, Andrew S. Levey, Josef Coresh, (Johns Hopkins Bloomberg School of Public Health, Baltimore, MD and CKD Prognosis Consortium)

Background: The Chronic Kidney Disease Prognosis Consortium (CKD-PC) was established in 2009 and has grown to be the largest CKD consortium in the world. CKD-PC has contributed to multiple clinical practice guidelines over the past decade, while respecting cohort autonomy and allowing some of the largest datasets to share only aggregate results. Methods: CKD-PC procedures include: rotating membership on a Steering Committee; a single data coordinating center (DCC) responsible for statistical programs and management of papers; continuous open cohort enrollment; opt-in for each cohort for each paper; rotating lead and co-authorship with ~15 authors per paper and all contributing collaborators listed in PubMed. Piece-wise linear spline models allow a detailed examination of the dose-response association between estimated glomerular filtration rate and albuminuria and outcomes (mortality, cardiovascular diseases, end-stage renal disease [ESRD], acute kidney injury, and progression of CKD) and can be pooled across cohorts using the variance-covariance matrix of the regression coefficients. Results: CKD-PC now includes 80+ cohorts representing general, high cardiovascular risk, and CKD populations from 40+ countries including 13+ million participants. CKD-PC has published 20 meta-analyses since 2010 and contributed to numerous international guidelines and regulatory body policies. For example, CKD-PC observational analyses combined with re-analysis of clinical trials and mathematical simulations demonstrated that a 30-40% decline in kidney function could be an acceptable surrogate for ESRD in clinical trials. Implications: CKD-PC procedures enable flexible collaborative meta-analyses, inclusion of cohorts that cannot share raw data due to legal/administrative constraints, and efficient response to guideline workgroups and regulators' needs.

S/P indicates work done while a student/postdoc
RACIAL AND ETHNIC DISPARITIES IN STAGE AT PRESENTATION OF EWING SARCOMA: RESULTS FROM THE FLORIDA CANCER DATA SYSTEM Mohammad Aalaeed, Mohammad Aalaeed, T unity Korn-Sengal (King Soard Medical City)

BACKGROUND: Ewing Sarcoma (ES) is a rare, malignant small round cell tumor affecting children and young adults. In the United States (US), ES is the second most common malignant bone tumor among children/adolescents after osteosarcoma. Previous reports on ES epidemiology were mainly directed toward incidence rates, patient characteristics, and overall survival. There is limited research on disparities in tumor stage at presentation. This study examines socioeconomic and clinical disparities in ES and ES stage at presentation.

METHODS: Patients with ES diagnosis were identified using 1981-2013 Florida Cancer Data System (FCDS) and linked with 2000 US census. Patients' socioeconomic and clinical characteristics were extracted. Exploratory data analysis and Chi-square test were used to analyze the differences across patient socioeconomic and clinical characteristics and stage at presentation (localized, regional, distant) and ES site (bone/joints, soft tissue), respectively. SAS v9.4 were used for data management and statistical analysis. RESULTS: There were 6,755 incident cases of ES including children (56.9%) and adults (43.1%). Majority of patients were white (60.9%), female (56.2%) and non-Hispanic (84.1%) and e 81 years (56.2%). Bone/joints ES (88.2%) were diagnosed more often than soft tissue ES (11.9%). With respect to stage at presentation, there were more distant (36.2%) than regional (34.6%) and localized (29.2%). No significant differences between stage at presentation and age, sex, race, ethnicity, respectively. With respect to ES site, there were statistically significant differences in age and stage presentation.

CONCLUSION: To our knowledge, this study is the first study to explore differences in ES stage at presentation. Despite the substantial difference in incidence rates among racial/ethnic groups, no statistically significant difference was noticed when it comes to stage of presentation. Further studies with large sample size across different US regions are needed.

POVERTY AND INVASIVE GROUP A STREPTOCOCCUS INFECTIONS IN MINNESOTA 1996-2016: ANALYZING SOCIAL DISPARITY WITH THE USE OF GEOCODING AND AREA-BASED POVERTY MEASURES Ishrat Kamal-Ahmed, Dr. Richard Danila, Dr. Michael Osterholm, Dr. Craig Hedberg, Dr. James Hodges, Dr. Matthew Weisse (University of Minnesota) It has been difficult to determine the association, if any, between invasive Group A Streptococcus (GAS) disease and poverty due to lack of individual or poverty status. We used Census derived area-based poverty information as a proxy for individual poverty status as outlined by the Harvard School of Public Health Disparities Geocoding Project method. Data were collected by the Minnesota Department of Health Emerging Infectious Disease Program. More than 3,600 GAS cases from 1996 to 2016 were geocoded to their corresponding census tract poverty levels and analyzed. Results demonstrated there would be 18% (population attributable fraction) of GAS if the exposure to poverty were reduced to zero. The highest incidence rate ratio (IRR) of 2.26 (95% CI [2.02, 2.52]) was observed between the least impoverished (poverty level <20%) and the highest (poverty level >20%). The relative index of inequality (RII) of 2.45 (95% CI [2.14, 2.77]) indicated that people in the most impoverished group were twice as likely to have GAS than those in the least impoverished group. Similar methods can be applied where individual information on social determinants of health such as race, ethnicity, literacy, employment status, etc. is missing from the data. This may help accurately quantify any social disparity, and subsequently design proactive health measures, for both chronic and infectious diseases.

IMPACT OF ORGANIZED COLORECTAL CANCER SCREENING PROGRAMS ON SOCIOECONOMIC AND HEALTH-SERVICE RELATED SCREENING INEQUITIES: A STUDY OF THREE PROVINCIAL PROGRAMS IN CANADA Alexandre Blais, Alexandre Blais, Lise Gauvin, Getaanji D. Datta, (University of Montreal, CHUM Research Centre) Background: Preventive colorectal cancer screening participation remains low in Canada, and large social disparities in screening exist. Several Canadian provinces have implemented organized screening programs to promote screening uptake. Objectives: To evaluate the effectiveness of systematic and patient-reliant organized colorectal cancer screening programs at 1) increasing overall recent (<2 years) stool-based screening, and 2) reducing screening inequities by income access to a endorsed medical device (MD), education, and rural residence. Methods: Using a sample of Canadian Community Health Survey respondents (cycles 2003-2014), aged 50-75 years with no family history of colorectal cancer, we evaluated two systematic programs, in provinces of Saskatchewan (SK) and Nova Scotia (NS), where all age-eligible residents receive screening kits via mail, and one patient-reliant program in Prince Edward Island (PEI), where respondents receive screening kits via mail following their request. The difference-in-differences framework was applied using adjusted Poisson regression models with pooled, weighted populations of New Brunswick and Newfoundland as controls. Results: All programs increased recent screening overall (compared to controls, prevalence differences (PD) were 4.7% [95% CI 1.7%, 7.6%] in SK and NS, pooled, and 11.9% [95% CI 1.5%, 7.5%] in PEI). PEI's program increased the gap in screening according to MD access (PD=19.9% [95% CI 5.7%, 34.2%]), while the other inequities remained unchanged. Educational disparities increased after the implementation of SK's program screening (PD=9.1% [95% CI 14.4%, 16.7%]), while other inequities remained. NS's program had no impact on any of the assessed inequities. Interpretation: Organized programs appear to increase screening overall, but do not reduce identified screening inequities. Future work on the acceptability, feasibility, and effectiveness of complimentary targeted interventions is needed.

SOCIOECONOMIC DISPARITIES IN WEIGHT, HEIGHT AND BODY MASS INDEX IN CHILDHOOD/ADOLESCENCE FROM 1953-2015: FINDINGS FROM FOUR BRITISH BIRTH COHORT STUDIES David Barr, Dr. David Barr, William Johnson, Leah C. Diatta Kafi, Rebecca Hardy, (University of College London) Socioeconomic disparities in childhood body mass index (BMI) have been repeatedly documented in high-income countries, yet it is unclear how they have changed across time, how disparities in the components of BMI have changed (weight and height), or whether disparities differ in magnitude across the outcome distributions. We investigated disparities in childhood/adolescent weight, height, and BMI using data from four national British birth cohort studies initiated in 1946, 1958, 1970, and 2001 (NC=53,673). Associations between childhood socioeconomic position (SEP) — estimated social class in 6 categories — and anthropometric outcomes at age 7, 10/11, and 14/16 years were examined using gender-adjusted linear regression. Multilevel models were used to examine if disparities widened or narrowed from childhood to adolescence, quantile regression was used to estimate whether the magnitude of associations differed across the outcome distributions. Lower SEP was associated with lower childhood/adolescent weight in earlier born cohorts, yet higher with weight in the 2001 cohort. Lower SEP was associated with shorter height in all cohorts, yet the absolute magnitude of this difference narrowed across generations. There was little evidence for childhood BMI disparity in the 1946-1970 cohorts, yet disparities were present in the 2001 cohort, and in all cohorts at 14/16 years (P<0.05 age x SEP interactions). BMI and weight disparities were present at the median, yet systematically larger at higher quantiles - e.g., a 0.049 kg/m2 disparity (95% CI 0.63-1.33) at the median in the 2001 cohort at 11 years (lowest to highest SEP), yet 2.54 kg/m2 (95% CI 1.83-3.22) at the 90th percentile. Findings suggest that weight disparities reversed yet height disparities narrowed from 1953-2015, leading to BMI disparities in more recently-born British children/adolescents. Reducing socioeconomic disparities may benefit population health by both shifting the median and right-skew of the BMI distribution.
LIMITED HEALTH LITERACY AND ADVERSE OUTCOMES AMONG KIDNEY TRANSPLANT CANDIDATES

Mara McAdams-DeMarco* Fatima Warsame, Christine Haugen, Jacqueline Gironzick-Wang, Ning Desai, Rashieda Hall, Rekha Kattathumpuli, Deidra Crews, Tanjala Purnell, Dorry Segev, Mara McAdams-DeMarco (Department of Surgery, Johns Hopkins School of Medicine)

Background: Limited health literacy adversely affects health outcomes in patients with chronic disease. We aimed to examine the association between health literacy, listing, and waitlist mortality among KT candidates. Methods: In a prospective cohort study of 1,544 adult KT candidates, health literacy was assessed at the time of KT evaluation (5/2014-8/2017). We ascertained responses to the Brief Health Literacy Screen (scores range from 0-12 with lower scores indicating worse health literacy) and waited listing, and waitlist mortality among KT candidates. Results: Candidates with limited health literacy had a 31% (aHR=0.69, 95%CI:0.56-0.85) increased risk for waitlist mortality. Candidate KT candidates with limited health literacy were less likely to be listed for KT and those who were listed are at increased waitlist mortality risk. ESRD patients with limited health literacy may represent a significant subgroup of KT candidates that require additional support and resources in their pursuit of KT.

RACIAL/ETHNIC VARIATIONS IN PERSONAL AND HOME USE IN PREGNANT WOMEN

Marissa C. Gre, John Bosco Umeguje, Ande A. Bellavia, David Cantonwine, Ellen W. Seely, Thomas F. McKnight, Tamira James-Todd, (Harvard T.H. Chan School of Public Health)

Background: Pregnancy exposure to endocrine-disrupting chemicals (EDCs) varies across racial/ethnic groups, which could increase the risk of certain pregnancy complications and adverse reproductive health outcomes in disadvantaged populations. Identification of modifiable sources of EDCs that are unequally distributed by race/ethnicity is required to design effective public health interventions. Therefore, we evaluated differences in product use associated with EDC exposure in a diverse pregnancy cohort. Methods: We included a total of 437 women in the LIFEVICES pregnancy cohort study (Boston, MA) who completed a self-reported questionnaire in the 1st and/or 2nd trimester (median 99 and 26 weeks gestation, respectively). Race/ethnicity was categorized as White, Black, Asian, Hispanic, Other. The use of 19 products (13 personal care, 6 home) within 48 hours of the prenatal visit was reported. We calculated the proportion of each product use, as well as the total number of products used by racial/ethnic group. We also evaluated change in product use between the two time periods. Results: Compared to Asian and Black women, White and Hispanic women reported a significantly higher use of total products in the 1st trimester (Asians 6%, 95% CI:5.5, 7.4; Blacks: 7, 95% CI:6, 9.8; whites 8, 95% CI:7, 9.8; Hispanics 9, 95% CI:8, 12.9). Differences were mainly driven by higher use of personal care products and remained similar in the 2nd trimester. A significant reduction over time in total, personal, and home products used was observed only among Hispanic women (-1.4, 95% CI:-1.9, -0.9; -0.8, 95% CI:-1.3, 0.3; -0.6, 95% CI:-1.1, 0.2), respectively. Conclusions: In a pregnancy cohort, we observed significant racial/ethnic differences in use of personal care and home products known to be sources of EDCs. Future studies should investigate how these usage patterns could contribute to racial/ethnic disparities in reproductive outcomes known to be associated with EDCs.

COMPARING THE ROLES OF HOUSEHOLD AND AREA POVERTY IN THE LONGITUDINAL YOUTH FITNESS-SCHOOL ABSENTEEISM ASSOCIATION ACROSS GENDER

Emily M. D’Agostino, Sophia E. Day, Kevin J. Konty, Michael Larkin, Subir Saha, Katarzyna Warsame, Christine Haugen, Jacqueline Garonzik-Wang, Niraj Desai, Rasheeda Hall, Rekha Kattathumpuli, and Tanjala Purnell, Dorry Segev, Mara McAdams-DeMarco (Department of Surgery, Johns Hopkins School of Medicine)

Background: Despite the introduction of survival-enhancing therapies in the clinical management of heart failure (HF), the association between socioeconomic status (SES) and mortality remains uncertain. This has created an unmet need in subgroups of HF populations. The aim of this study was to determine if the elevated risk of mortality in HF is significantly mediated by SES. Methods: The study was a population-based survey using the National Health and Nutrition Examination Survey (NHANES) data from 1999-2010. Respondent’s coverage by health insurance, education level and reported attainment family income was used as domains of socioeconomic status. A series of models were developed using Cox proportional hazards models, in which were distributed by race/ethnicity, this was significantly mediated by socioeconomic status. Results: Compared to Asian and Black women, white and Hispanic women reported a significantly higher use of total products in the 1st trimester (Asians 6%, 95% CI:5.5, 7.4; Blacks: 7, 95% CI:6, 9.8; whites 8, 95% CI:7, 9.8; Hispanics 9, 95% CI:8, 12.9). Differences were mainly driven by higher use of personal care products and remained similar in the 2nd trimester. A significant reduction over time in total, personal, and home products used was observed only among Hispanic women (-1.4, 95% CI:-1.9, -0.9; -0.8, 95% CI:-1.3, 0.3; -0.6, 95% CI:-1.1, 0.2), respectively. Conclusions: In a pregnancy cohort, we observed significant racial/ethnic differences in use of personal care and home products known to be sources of EDCs. Future studies should investigate how these usage patterns could contribute to racial/ethnic disparities in reproductive outcomes known to be associated with EDCs.

S/P indicates work done while a student/postdoc
ESTIMATING THE EFFECTS OF MIGRATION FROM MEXICO TO THE US ON SELF-RATED HEALTH AND MORTALITY: A COMPARISON OF MEXICAN-BORN US RESIDENTS AND NON-MIGRANT MEXICANS

Most evidence on the health effects of migration to the US compares migrants residing in the US with US-born individuals. The relevant counterfactual for migrants, however, corresponds better with non-migrants who remained in the country of origin. Regardless, such comparisons may be biased if childhood socioeconomic status (SES) influences migration and also predicts later life health. We merged harmonized data for Mexicans living in Mexico who never migrated to the US and participated in the Mexican Health and Aging Study (N=8,857) with data for Mexican-born migrants living in the US participating in the Health and Retirement Study (n=494). First, we examined predictors of migration, and second, we examined the prevalence of fair/poor self-rated health at baseline (2001/2000) and mortality through 2012, comparing migrants to non-migrants. Logistic regression (for self-rated health) and Cox proportional hazards models (for mortality) were adjusted for age, sex, and parental education. Mean age at baseline was 62 years (SD=9) in both groups. 55% of migrants and 57% of non-migrants were female. Migration to the US was predicted by higher maternal (OR=3.57 for ≥ primary versus < primary; 95% CI: 2.76, 5.70) and paternal (OR=2.08; 95% CI: 1.44, 2.99) education. In age and sex adjusted models, compared to non-migrants, fair/poor self-rated health was less common among migrants to the US (OR=0.79, 95% CI: 0.63, 1.00). Adjusting for parental education (OR=0.94; 95% CI: 0.72, 1.22) attenuated this advantage. Migrants had lower mortality compared to non-migrants in age and sex adjusted models (HR=0.47; 95% CI: 0.39, 0.55). Results: Overall, blacks were at higher risk of SPCs than whites, with the greatest increase in risk observed among colon FPC (76%) and rectal FPC (95%) patients. High levels of winter VDR were protective for most SPCs with a 10% to 22% decrease in risk, depending on the pairing. Additional analysis indicated some pairings had greater benefit for whites than blacks. Increasing levels of CES deprivation were associated with a steep increase in risk among blacks with prostate FPC for colon SPC. Conclusions: Racial disparities in the incidence of SPCs are present and seem to be associated with areas with lower winter VDR and in some cases, SES. Additional research is needed to better understand risk factors and identify individuals at higher risk of SPCs.

GEOPOLITICAL DISPARITY IN ACCESS TO DECEASED-DONOR LIVER TRANSPLANTATION
Mary Grace Bowring, Mary Grace Bowring, Allan Massie, Sheng Zhou, Sommer Gentry, Dorry Segev, (Johns Hopkins University School of Medicine)

Over 12,000 patients with end-stage liver disease join the liver transplant (LT) waitlist each year. For most patients, LT is the only viable treatment and approximately 1500 die annually awaiting LT. By law, access to organ transplantation should be independent of place of residency, yet geographic disparities persist and are likely driven by regional variation in organ supply and demand. Prior analyses of this disparity have focused on health status of transplanted patients, and do not account for patients who remain on the waitlist or who die without receiving LT. Additionally, recent policy (Share35), which increased organ sharing, might have improved or worsened geographic disparities. We sought to quantify and identify changes in geographic disparity in LT following Share35. We used national registry data from 6/2010-6/2016 to identify a cohort of 93,610 adult liver transplant candidates and retrospectively estimate LT rates using multilevel Poisson regression with random intercept for Donation Service Area (DSA; 58 geographic areas used to define organ sharing) pre- and post-Share35. We adjusted for candidate Model for End-stage Liver Disease (MELD) score, a validated risk score that quantifies severity of liver disease and is used for allocation. From the model, we derived the DSA-level median incidence rate ratio (MIRR) of LT rates, a summary measure of DSA-level heterogeneity in access to LT. Confidence intervals around MIRR were estimated using bootstrap methods. Pre-Share35, DSA-level LT rates ranged from 0.24 to 7.25 events per person-year. MIRR was 2.25 (95% CI: 2.21-2.29). In other words, two candidates with the same MELD in two different DSAs were expected to have a 2.25-fold difference in LT rate driven by geographic location alone. After the policy change there was no evidence of change in MIRR (post-Share35 MIRR= 2.28 (2.25-2.34, p=0.7). Geographic location remains a major determinant of access to LT, and targeted policy is warranted.

DISPARITIES, MULTIPLE PRIMARIES AND VITAMIN D
Amy E. Abutruzi, Amy E. Abutruzi, Kiaraw Davis, Parnell Ohman Strickland, David August (Rutgers University - Edward J. Bloustein School of Policy and Public Planning)

Background: Disparities have been well documented in both colorectal and prostate cancer occurrence but have not been extensively examined in multiple primary cancers. The extent to which race is associated with vitamin D radiation (VDR) or socioeconomic (SES) deprivation, adjusted for prior radiotherapy, is unknown. Methods: White and black males aged 50 years with first primary cancer (FPC) of the colon, rectal or prostate and no distant metastasis were drawn from SEER and followed for subsequent primary cancer (SPC) development. Logistic regression and competing-risk Cox proportional hazards models were used to estimate the additional risk associated with individual and county-level factors. Results: Overall, blacks were at higher risk of SPCs than whites, with the greatest increase in risk observed among colon FPC (76%) and rectal FPC (95%) patients. High levels of winter VDR were protective for most SPCs with a 10% to 22% decrease in risk, depending on the pairing. Additional analysis indicated some pairings had greater benefit for whites than blacks. Increasing levels of CES deprivation were associated with a steep increase in risk among blacks with prostate FPC for colon SPC. Conclusions: Racial disparities in the incidence of SPCs are present and seem to be associated with areas with lower winter VDR and in some cases, SES. Additional research is needed to better understand risk factors and identify individuals at higher risk of SPCs.
TRENDS IN EYECARE ACCESS AND AFFORDABILITY: THE NATIONAL HEALTH INTERVIEW SURVEY (NHIS) 2008-2016 Varshini Varadani, Kevin Frick, David Friedman, Bonnie Lin Swenor, (Wilmer Eye Institute)

Purpose To examine trends in accessing and affording eyecare in the United States. Methods We analyzed NHIS data from 2008-2016 in adults ≥18 years. Outcome measures included visits to an eye doctor and inability to afford eyeglasses in the past year. Vision impairment (VI) was defined as difficulty seeing despite wearing glasses. Survey logistic regression, adjusted for potential confounders was used to examine associations between survey year and eyecare outcomes. Results In fully adjusted models, Americans were less likely to access eyecare from 2009-2014, as compared to 2008, although this estimate was significant only in 2013 (OR=0.94, p=0.018) and 2014 (OR=0.92, p=0.007); this pattern reversed in 2015 (OR=1.04, p=0.27) and 2016 (OR=1.06, p=0.09) with increased access noted, although not significant. When compared to 2008, Americans were more likely to report difficulty affording glasses from 2009-2012, although this estimate was significant only in 2010 (OR=1.14, p=0.029). By 2014 this pattern reversed and Americans were less likely to report difficulty affording glasses (2014 OR=0.88, 2015 OR=0.77; 2016 OR=0.69, p<0.001 for both). After adjusting for all covariates including survey year, those with VI were more likely to access care (OR=1.58) but had greater difficulty affording glasses (OR=1.42) compared to those without VI. (p<0.05 for both). As compared to non-Hispanic whites, blacks, Asians, and Hispanics were less likely to access care and Black women were also more likely to access care (OR=1.47) and report difficulty affording glasses (OR=1.65), compared to men (p<0.001 for both). When controlling for all variables mentioned above, the pattern of decreased difficulty affording glasses was observed from 2014-2016, which may reflect economic recovery after the Great Recession and/or healthcare changes due to the Affordable Care Act. However, marginalized populations continue to face difficulties with accessing/affording eyecare.

INSURANCE STATUS AS AN EFFECT MODIFIER ON ASSOCIATIONS BETWEEN PRESCRIPTION DRUG MONITORING PROGRAMS AND TRENDS IN PRESCRIPTION OPIOID-RELATED POISONINGS Nathan Pauly, Nathan Pauly, Magdalena Cerda, Chris Delcher, Silvia S. Martinez, Brandon Marshall, Jeff Talbert, Corey Davis, (University of Kentucky)

Background: The United States is in the midst of an opioid epidemic. Prescription drug monitoring programs (PDMPs), states-level databases that collect information on Controlled Substance prescribing, have been suggested as a tool to mitigate the crisis. This study examines the effects of specific administrative features of PDMPs on prescription opioid-related poisoning (RxORP) rates over a 14-year period. Methods: The State Implant Databases from the Healthcare Cost and Utilization Project were used to identify hospital admissions related to RxORP in 17 states from 2001-2014. Generalized estimating equation Poisson regression models were used to examine associations between state adoption of specific PDMP features and changes in county-level RxORP rates over time. Models were stratified by payer type to assess whether insurance status acts as an effect modifier on these associations. Results: From 2001-2014 the RxORP rate increased 144% from 80 to 217 per 100,000 discharges in the 17 state sample. Associations between PDMP features and RxORP rates differed by insurance type. In the Medicaid population, counties without PDMP coverage experienced significant increases in the RxORP rate (aRR 1.02 [95% CI: 1.00 - 1.05] per year), while counties covered did not experience a significant change over time (aRR 0.99 [95% CI: 0.98 - 1.02] per year). Similar patterns were observed in the uninsured population. In the Medicare population, there was no significant difference in counties with and without PDMPs—both experienced significant increases in RxORP rates. In the privately-insured and Medicaid population, counties with PDMPs requiring unsolicited reporting experienced decreasing RxORP rates over time (aRR 0.98 [95% CI: 0.95 - 0.99] and aRR 0.97 [95% CI: 0.95 - 0.99] per year respectively). Conclusion: Results suggest that PDMPs exert a stronger effect on RxORP rates in the Medicare and uninsured populations relative to the Medicare and privately insured populations.

A THREE-TIERED APPROACH TO CHOOSING A CAUSAL INFERENCE METHOD FOR ESTIMATING THE EFFECT OF A PRIMARY CARE REFORM IN ONTARIO, CANADA Nadia Sotriou, Nadia Sotriou, Isabelle Vodell, Tibor Schuster, (McGill University)

Objectives Causal inference methods present an opportunity to improve the analysis of data from observational studies including health policy evaluation studies. This study uses the causal inference framework to evaluate a primary care reform in Ontario, Canada and proposes a three-tiered approach to choosing the appropriate causal method based on the degree of unmeasured confounding. Methods A new primary care reform, Family Health Teams (FHTs), was rolled out in Ontario between 2005 and 2010. The average causal effect (ACE) of patient enrolment in FHTs on health system use will be estimated using health administrative data. Required causal conditions (consistency, positivity, exchangeability) will be assessed. A directed acyclic graph will be mapped with subject experts to identify the set of potential confounder and collider variables. The set of confounder variables not measurable through the administrative data will be determined. Depending on the degree of unmeasured confounding, the following three-tiered analytical approach is proposed to estimate the ACE: 1) If no to few confounders are unmeasured, a marginal structural model will be used with a sensitivity analysis testing simulated data to determine the extent of bias; 2) If few to moderate confounders are unmeasured in the administrative data but available for a subset of the population through an alternate data source, then propensity-score calibration will be used; 3) If a large number of confounders are unmeasured, instrumental variable (IV) analysis, using distance from home to the FHT as the IV, will be used if IV assumptions are met, to approximate the ACE. Conclusion This study illustrates a simple step-by-step approach to applying causal inference methods in policy evaluation. As these methods are still underutilized, developing recommendations or guidelines to choosing the most appropriate methods may help health services researchers adopt these methods into their tools and strengthen their evaluation.
ACHEVING THE FIRST 90 FOR CHILDREN: AN ECOLOGICAL ANALYSIS OF DETERMINANTS OF NATIONAL EARLY INFANT HIV DIAGNOSIS IN 30 LOW AND MIDDLE-INCOME COUNTRIES. Daniel A. Adeyinka1, Daniel A. Adeyinka, Balaoyewo Okafor, Mercy Mba, Esther F. Adeyinka, Olumide O. J. Emmanuel Agebo, Osunsehemia Isiannu, Chamberlain Ozigbo, (University of Saskatchewan, Canada)

Background: Late infant testing continues to hamper progress towards eliminating AIDS-related deaths in the low and middle-income countries (LMIC). The relative contributions of governance and income inequality to early infant diagnosis (EID) coverage, and the effect of maternal and child health systems in accelerating national EID coverage, are currently unclear. The objective of the study is to identify the critical social and structural indicators for EID coverage across the global priority LMIC for fast-tracking HIV elimination. Methods: We estimate ecological regression models with data from 33 LMIC on EID from the UNAIDS, governance index and corruption control from Transparency International, and economy, behavioral factors and health service system indicators from World Bank and WHO database. Non-parametric regression models were performed. We compared covariates that were associated with EID at p-value<0.20 from univariate analyses. In multivariate regression, adult literacy and poverty index were fitted into separate models to avoid multicollinearity (coefficient). A-priori p<0.05 was considered statistically significant. Results: EID coverage was 33% (Range 1%, Pakistan and South Sudan; 95%, South Africa). Countries with significantly higher EID coverage have controlled corruption (P=0.0595; Confidence Interval (CI) 0.4, 0.6; p=0.001), increased adult literacy rates (P=0.001; CI 0.5, 0.5; p<0.001), lower corruption index (P=0.001; CI 0.5, 0.5; p<0.001), and improved government spending on health (P=0.001; CI 0.4, 0.4; p<0.001). Conclusions: Countries with better corruption control, adult literacy, government expenditure on health, income inequality and decrease in HIV-related stigma experience higher EID coverage. Our findings indicate that improving EID coverage will require not only investment in strengthening health control programmes, but also population health strategies that accelerate EID coverage.

ESTIMATING BIAS IN HOSPITALIZATION RATES DUE TO MISSING HOSPITALIZATION DATA Thilun Davy-Mendez1, Thilun Davy-Mendez, Sonia Napawask, and Olana Zalikharova, David A. Wolfe, Cherie Fauri, Joseph J. Eason, (University of North Carolina at Chapel Hill)

Clinical cohort studies often collect medical records from a single hospital system and may be biased due to missing hospitalizations at other centers. We used the University of North Carolina (UNC) UNC Clinical Cohort, which includes data on non-UNC hospitalizations, to estimate bias in hospitalization rates, calendar time trends, and risk factors due to missing data. Patients were followed from 01/1996 or HIV care initiation at UNC until first death, 12/2006, or loss to follow-up (18 months with no clinical visit). Patients who received care, but were censored at the end of the study, were included using log-binomial regression with GEE. We calculated crude hospitalization rates per 100 person-years (PY), overall and by CD4 at admission (CD4<200, CD4>200). Poisson regression with GEE estimated time trends and year-adjusted IRRs. We compared rates and IRRs obtained when including all hospitalizations vs. only UNC, 4,327 patients contributed 30,000 PY and 10,107 hospitalizations (73% at UNC). Compared to non-UNC hospitalizations, those at UNC were less likely to be in 2010-2016 (20 vs. 38%), with CD4<200 (51 vs. 66%), and with undetectable HIV RNA (47 vs. 56%) (all P<0.01). Including both UNC and non-UNC admissions, crude hospitalization rate per 100 PY (95% CI) over the study period was 33.7 (33.0-34.3) overall, 13.5 (12.9-14.0) for hospitalizations with CD4<200, and 16.8 (16.4-17.3) with CD4>200. When excluding non-UNC hospitalizations, those dropped to 24.6 (24.1-25.2), 11.0 (10.7-11.4), and 11.7 (11.3-12.1), respectively. Rates with CD4<200 decreased over time when examining only UNC admissions but remained constant when including non-UNC ones. Other time trends and associations with demographic factors did not change. In this clinical cohort, hospitalization rates were substantially lower when data on external admissions was missing, especially for those with CD4<200, affecting association with calendar time.


Assessments of geographic distribution of HIV burden have traditionally used Surveillance data based on individuals' residence at diagnosis. As persons living with HIV (PLWH) move, we calculated the number of PLWH alive by year-end 2015 for 50 states, the D.C., the District of Columbia and 6 U.S. dependent areas based on the most recent addresses reported to surveillance and compared it with the distribution based on jurisdiction of residence at diagnosis. A total 994,252 persons had HIV diagnosed, and were alive by year-end 2015. Populations remained stable (net change of <5%) in 32 jurisdictions. The largest absolute difference and percent increases were in Georgia (3.0%) and Mississippi (4.2%) respectively, and the largest decreases in California (-2.6%) and US Virgin Islands (-1.9%) respectively. Breaking absolute difference by in- and out-migration, Florida and North Dakota had the largest absolute and percent in-migration (Florida: 12,749, North Dakota 7,469), whereas California and North Dakota had the largest out-migration, 12,749 and 41.4% respectively. Overall, among persons who moved since HIV diagnosis, the largest proportions were male (38.8%), had HIV attributed to heterosexual contact (48.4%), were single (38.4%), and were 20-24 (34.7%). By sex, 73.5% of men had HIV attributed to male-to-male sexual contact, whereas among women 71.0% had HIV attributed to heterosexual contact. The distribution of characteristics such as age, sex, race/ethnicity and transmission category among persons who moved were similar to the distribution of the total population of persons living with diagnosed HIV. Using jurisdiction-level HIV Surveillance data based on most recent known address to determine the geographic distribution of HIV may be a more accurate and beneficial in informing prevention and care services and allocating funds.

SIP indicates work done while a student/postdoc
GENDER DIFFERENCES IN ANTIRETROVIRAL TREATMENT (ART) AND FRACTURE RISK AMONG PATIENTS WITH HUMAN IMMUNODEFICIENCY VIRUS (HIV)

Laura Bozzi*, Laura Bozzi, O'Mareen Spence, Susan dosReis, (University of Maryland School of Pharmacy)

Adults with Human Immunodeficiency Virus (HIV) experience premature aging, developing chronic medical conditions at a younger age. This is true among HIV patients who experience bone loss after initiating antiretroviral treatment (ART), placing these individuals at risk for fractures. Tenofovir disoproxil fumarate (TDF), an ART, has previously been associated with fracture risk. It is largely unknown whether TDF is selectively prescribed to men versus women given the known risks of bone health. Our objective is to examine gender differences in TDF use and to investigate whether risk factors attributable to fracture explain variability in TDF use by gender. The study is a cross-sectional analysis of the 2010-2012 Medical Expenditure Panel Survey data. We identified adults age 25+ years diagnosed with HIV and received any ART. We classified ART as TDF versus other ART. Risk factors for fracture are older age (≥55 years), race, rheumatoid arthritis, current smoking, and body mass index ≥25. We used bivariate analysis to compare gender and fracture risk factors and multivariable logistic regression to examine the association between gender and ART, adjusting for fracture risk factors. We weighted the estimates to account for complex survey design. The overall weighted sample size of HIV patients with any antiretroviral use was 757,539. The majority of HIV patients were men (85.4%) and received TDF (78.4%). Fifty-two percent of women were African-American compared to 19% of men (p=0.02) and 17% of women were age 55+ years compared to 31% of men (p<0.0001). After adjusting for fracture risk factors, women were 72% less likely to receive TDF compared to men (p=0.03). The significantly lower use of TDF among women with HIV may be a result of channeling bias, since women already are at increased risk of bone loss with age. A prospective cohort study is warranted to explore the gender disparities in the long-term risk of TDF on bone health among adults aging with HIV.

S/P indicates work done while a student/postdoc
VIRAL HEPATITIS AMONG IMMIGRANTS: A VALIDATION STUDY OF HEALTH ADMINISTRATIVE DIAGNOSIS AND BILLING CODES ACROSS CANADA Abdool S Yaseen III, Abdool S Yaseen, Jordan Feld, Laura MacDonald, Jeff Kwong, Natalie Crowcroft, Navdeep Jattu, (University of Toronto)

Background: Surveillance efforts often rely on administrative data for determining disease distribution and prevalence. However, if not properly validated among sufficiently representative groups, such efforts could be misleading. Moreover, geographically distinct medical and cultural practices in the collection and documentation of administrative data may result in varying results. Aim: To determine the appropriateness of using health administrative diagnosis and billing codes to identify individuals living with viral hepatitis B and/or C (HBV/HCV). Methods: We used linked laboratory and health administrative data in Ontario, Canada between 1997-2013 to estimate the diagnostic performance of health administrative diagnosis and billing codes at identifying individuals living with HBV/HCV. Diagnostic measures (i.e. sensitivity, specificity, and positive predictive value) along with their 95% binomial confidence intervals were produced from confusion matrices. The codes were externally validated using linked lab and health administrative data from British Columbia. Results: In total, there were 2,541,005 individuals included in our study cohort, 1,533,754 that were tested for HBV only, 209,671 that were tested for HCV only, and 797,880 that were tested for both HBV and HCV across the study period. There were 57,699 and 40,234 individuals with at least one HCV and HBV infection, respectively. High specificity (85-95% for HBV; 86-99% for HCV) and positive predictive values (84-91% for HBV; 87-98%) were observed for both HBV and HCV, and similarly low sensitivity values (2-20% for HBV; 7-50% for HCV). Conclusion: Present, health administrative diagnosis and billing codes can reliably detect the presence of HBV/HCV infections among individuals presenting to the Ontario health care system. Additional studies are needed to assess the potential for using medical communities to improve the diagnostic performance of the available diagnosis and billing codes.

OUTBREAK INVESTIGATION OF MEASLES IN FARASH TOWN, ISLAMABAD, APRIL 2017 Dr. Nadia Noreen*, Nadia Noreen, Malea MA, Dr. Asghar Rizvi, (FELTP, Pakistan)

Abstract: Background: On April 14, 2017, two measles cases were reported by local health practitioners from Farah Town, a team of FELTP fellows were deployed to investigate the outbreak. Objectives: To request the district health authorities an outbreak investigation was conducted to assess magnitude, identify risk factors and recommend control measures. Methods: An outbreak investigation was carried out from April 15 to May 05, 2017. Active case finding was conducted through a house-to-house survey. A case was defined as a patient with maculopapular rash with fever and presence of any of the lymphoid tissues like conjunctivitis or cough in a resident of Farah Town from March 25, 2017 to April 30, 2017. Contingency-based age and sex stratified controls were selected. Vaccine coverage survey was conducted in a cluster of 245 houses. Frequencies were calculated, attack rates observed for both HBV and HCV, and similarly low sensitivity values (2-20% for HBV; 7-50% for HCV). Conclusion: Present, health administrative diagnosis and billing codes can reliably detect the presence of HBV/HCV infections among individuals presenting to the Ontario health care system. Additional studies are needed to assess the potential for using medical communities to improve the diagnostic performance of the available diagnosis and billing codes.

MODELLING THE IMPACT OF TRACHOMA MDA ON GU CHLAMYDIA USING TRANSMISSION MODELS S. Rae Wannier, Travis C. Porco, PhD, MPH, Lee Worden, PhD, Tom Littman, PhD MD, (University of California San Francisco)

Annual Trachoma Mass Drug Administration (MDA) with azithromycin impacts the burden of genital urinary (GU) chlamydia. Communities that are unable to afford Trachoma are at risk for poverty with poor access to sanitation, screening and antibiotics to treat the infection. Conditions that may allow for MDA to maintain a high chain of transmission. The dosing of azithromycin for the Trachoma MDA is consistent with dosing given clinically to treat GU chlamydia (GUC) disease, and recent evidence has suggested it reduces the population prevalence. We modelled the impact of Trachoma MDA upon the prevalence of GUC. Methods: We analyzed an extended compartmental SIS model accounting for the natural history of GU, risk structure, and gender. The model includes slowly developing partial immunity. MDA was modelled as an impulsively forced treatment with varying coverage and efficacy. Results: Our model showed that three years of MDA at current levels reduced the prevalence of GUC in all populations by at least 15%. Between annual MDA, the prevalence partially rebounded to pre-treatment levels. With Coverage x Efficacy ≥ 0.80, the time between MDA treatments was insufficient to maintain transmission, allowing for GUC to be suppressed below 1 in 10,000 after 5 rounds of starting prevalence less than 9.2%. When serial non-compliance is increased from 20% to 80%, this target is achieved for starting prevalences below 4.7%, down from 9.2%. Targeting azithromycin treatment only to high-risk individuals reduces the starting prevalences for which target is reached to 1.8%. Discussion: Our model suggests that MDA could reduce the prevalence of GUC to less than 1 in 10,000 within 5 years. This reinforces the suggestion of potential additional health benefits of trachoma MDA and points to potential value of screening and treatment in rural areas, and suggests testable hypotheses regarding prevalence in endemic areas under treatment.
EVALUATING TRENDS IN FOODBORNE OUTBREAKS AND OUTBREAK-ASSOCIATED ILLNESSES FOR VARIOUS PATHOGEN-FOOD CATEGORY PAIRS FROM 1998-2015 Beau B. Bruce, Beau B. Bruce, LaFonza C. Richardson, Michail C. Bazaco. (Centers for Disease Control)

The Interagency Food Safety Analytics Collaboration (IFSC), established by the Centers for Disease Control and Prevention, the Food and Drug Administration, and the U.S. Department of Agriculture's Food Safety and Inspection Service, works to improve U.S. foodborne illness source attribution estimates. Evaluating trends in sources of foodborne illness is useful for developing food safety policies, but quantifying changes over time in the relative importance of those sources is challenging. IFSC's goal was to develop a model to estimate changes in count data (outbreaks and outbreak-associated illnesses) over time for specific pathogen-food category pairs. We developed a Bayesian negative binomial regression model using thin plate splines to estimate the number of foodborne outbreaks and confirmed outbreak-associated illnesses caused by Salmonella, Escherichia coli O157, Listeria monocytogenes, and Campylobacter from 1998-2015 attributed to 17 food categories of the IFSC Food Categorization Scheme. Overall, our model is versatile and portable to various levels of food categorization granularity or other time series analyses of foodborne outbreak data. Thin plate splines adequately follow changes over time while remaining resistant to outliers. The Bayesian approach allows hypothesis-testing between relevant time periods. We found several significant changes in outbreaks and outbreak-associated illnesses over time, including a decrease in 2013-2015, compared to 2010-2012, in the number of Salmonella outbreaks associated with eggs (median: 1.2 fewer outbreaks/year; 95% CI: 0.2-2.0) and E. coli O157 outbreaks associated with land animals (median: 3.7 fewer outbreaks/year; 95% CI: 0.1-6.6). In conclusion, our model can be used to estimate changes in the number of foodborne outbreaks and outbreak-associated illnesses over time for food category-pathogen pairs. It may be applicable in evaluating trends in other types of foodborne illness or time series data.

ANTIMICROBIAL RESISTANCE OF VIBRIO PARAHEMOLYTICUS IN SHANGHAI FROM 2014 TO 2017 Yinghua Zhang, Yingzhong Zhang, Dongli Xu Hongying Yan, Jing Wang, Yue Chen. (Minhang District Centre for Disease Control and Prevention, Shanghai, China)

The study aimed to explore the spectrum and tendency on antimicrobial resistance of Vibrio parahaemolyticus from patients with acute diarrheal diseases. Every 10th patient who was admitted to intestinal clinics for acute diarrheal disease in Minhang District, Shanghai was enrolled in the study during the period from January 2014 to December 2017. The strains of Vibrio parahaemolyticus were isolated from 1376 patients aged 13 to 93 years. Disk Diffusion test (Kirby-Bauer antibiotic testing) was conducted for testing susceptibility of 11 antibiotics including chloramphenicol (CXM), ceftazidime (CXM); ceftriaxone (FOX), ciprofloxacin (CIP), novobiocin (NOB), levofloxacin (LEV), tetracycline (TE), gentamicin (CN), sulfadiazine (SD) and azithromycin (AZI). Analysis of variance (ANOVA) was used to compare the inhibition zone diameters of antibiotics in different years, and the mean values of inhibition zone diameters each year were taken as line chart. Most patients were 20 to 60 years of age. The rates of resistance to CXM and FOX were 19.4% and 1.6% respectively. The sensitivity rates were 89.2%, 41.1% and 86.8%. The susceptibility rates for Vibrio parahaemolyticus to CIP, NOR, LEV, NA, TE, CN, and SD were 94.9%, 99.0%, 99.9%, 97.7%, 98.8%, 98.0%, 99.1% and 98.2% respectively. For those susceptible strains, the inhibition zone diameters of CXM, LEV and NA decreased over the study years. The antimicrobial resistance is predicted to gradually increase in the next 3 to 10 years.

HOMOPHILY IN OBSERVATIONAL STUDIES OF VACCINE EFFECTIVENESS Paul Zivic, Paul Zivic, James Moody, Allison Akello, (University of North Carolina at Chapel Hill)

We propose a novel network-based method to account for the tendency of individuals to contact individuals with similar characteristics, also known as the property of homophily in networks. We implemented this method in a simulation study of vaccine effectiveness (VE). Classical methods, which directly compare outcomes between vaccinated and unvaccinated individuals, are potentially biased in non-homophilous settings. It is necessary to assess the utility of the standard diagnostic strategy for Zika using clinical symptoms. This study will compare reporter virus particle (RVP) neutralization assay for positive Zika infection to symptomatic clinical diagnosis of Zika virus. Methods Serum samples collected from patients in Bentarruquilla, Colombia will be tested with two RVP neutralization assays, one for Zika virus and one for Dengue-II. Inhibitory concentrations (IC) for each assay will be determined at IC50, IC90, and IC100. RVP positive Zika results are indicated by a positive control. Results will be compared to patient symptoms and flavivirus history, and time since infection. Results Optimal RVP assay conditions will be determined using positive controls. It is expected that clinical diagnosis using patient symptoms will not consistently match with serological confirmation, and thus a sensitivity and specificity analysis will be conducted to determine the accuracy of clinical symptomatic diagnosis. History of arbovirus infection, length of time between symptom and sample collection, and number of symptoms will be compared between patients with and without serologically confirmation. Discussion This project will help determine the utility of symptomatic diagnosis of Zika virus in Colombia and help inform physicians in areas with multiple endemic flaviviruses on the best practices to confirm diagnosis of suspected Zika virus infection.

COMPARISON OF SEROLOGICAL AND SYMPTOMATIC DIAGNOSIS OF ZIKA VIRUS INFECTION USING THE RVP NEUTRALIZATION ASSAY ON SAMPLES FROM BARRANQUILLA, COLOMBIA DURING THE 2015 ZIKA VIRUS OUTBREAK Brooke Talbot, Brooke Talbot, Grace Mantus, Rebecca, Allan Chang, (The George Washington University)

Background: The outbreak of Zika virus infection in South America in 2015 prompted a global response to Zika infection detection. In South American countries where other mosquito-borne viruses are already endemic, it is necessary to accurately distinguish Zika cases to ensure better patient outcomes. In resource-limited settings, it is necessary to assess the utility of the standard diagnostic strategy for Zika using clinical symptoms. This study will compare reporter virus particle (RVP) neutralization assay for positive Zika infection to symptomatic clinical diagnosis of Zika virus. Methods Serum samples collected from patients in Bentarruquilla, Colombia will be tested with two RVP neutralization assays, one for Zika virus and one for Dengue-II. Inhibitory concentrations (IC) for each assay will be determined at IC50, IC90, and IC100. RVP positive Zika results are indicated by a Zika IC at two-fold greater than the corresponding Dengue IC. Results: This project will determine the utility of symptomatic diagnosis of Zika virus in Colombia and help inform physicians in areas with multiple endemic flaviviruses on the best practices to confirm diagnosis of suspected Zika virus infection.
MULTIPLE EXPOSURES, REINFECTION, AND RISK OF PROGRESSION TO ACTIVE TUBERCULOSIS

Sarah Ackley*, Sarah Ackley, Robyn S. Lee, Erin Zwier, Marcel A. Behr, Caitlin S. Pepperell, (UCSF)

Tuberculosis (TB) remains one of the leading preventable causes of death worldwide. A more complete understanding of the dynamics of contagion could be used to improve control strategies. A recent study of a TB outbreak in a largely Inuit village found that among recently infected individuals, exposure to additional active cases was associated with a significantly increased probability of developing active disease within a year. Two models might account for this. In the reinfection model, multiple exposures have an independent risk of becoming an infection, and infections independently contribute to active disease. In the threshold model, small numbers of exposures confer a low risk of active disease, and this risk increases in a stepwise fashion past a threshold number of exposures. We used binomial risk models to evaluate whether either or both of these competing explanations were consistent with observed data. To determine the dynamic impact of reinfection during the early phase of infection, we performed a simulation from a modified Reed-Frost model of TB dynamics following spread from an initial number of cases. We parameterized this model with the maximum likelihood estimates from the reinfection and threshold models in addition to the observed distribution of exposures among recent infections. While both models are consistent with the observed increase in disease risk with increasing exposures, the threshold model confers a better fit to this data (p=0.04). Our simulations indicate that multiple exposures during this critical time period can lead to dramatic increases in outbreak size. In addition to preventing primary infection, strategies to prevent repeated exposures may reduce TB burden in high-prevalence settings.

WHERE DO U.S. ADULTS REPORT RECEIVING THE ANNUAL INFLUENZA VACCINE?

Patrick Maloney*, Patrick Maloney, Susanne Straif-Bourgeois, (Louisiana State University Health Sciences Center)

Background: Despite significant morbidity and mortality, the rates of annual influenza vaccination remain far below desired levels. Few studies have explored the locations where individuals are seeking vaccination, despite the fact that locations that offer the influenza vaccine have expanded and diversified. This study examined the influence of demographics, health care coverage, and high risk conditions on vaccination location. Methods: Data from the 1999-2015 Behavioral Risk Factor Surveillance System (BRFSS) were used to establish relative trends over time of the locations where influenza vaccination was reportedly received by U.S. adults. Data from the 2015 BRFSS were used to assess the relationship between demographic factors, health care coverage, and high risk conditions and vaccination location. Multivariable logistic regression was used to examine this relationship. All analyses were stratified by age group. Results: Overall, the percentage of U.S. adults receiving the influenza vaccine at traditional locations has decreased from 70% in 1999 to 57% in 2015. Conversely, the percentage of U.S. adults receiving vaccinations at non-traditional locations has increased from 30% in 1999 to 43% in 2015. Multivariable analysis revealed that vaccination at non-traditional locations was linked with higher income and education levels, being employed, being non-minority (white), having greater access to care, having insurance, living in more urban areas, and not having at least one high risk condition. Conclusions: Although vaccination at non-traditional locations has become more frequently used and more readily available, a significant disparity exists between those who get vaccinated at traditional locations and those who use non-traditional locations. These results indicate that the traditional setting remains essential for reaching certain populations. Efforts should be made by non-traditional locations to reach underserved populations.
LOW BACK PAIN AMONG STUDENTS IN RELATION TO THE WEIGHT OF SCHOOL BAG Abdullah Al-Taiar* Abdullah Al-Taiar, Fatemah Akbar, Munseera Al-Abdullah, Dina Mohammad, Jumana Al-Baghli, Farah Bulbul, Bana Qadoura, (Faculty of Medicine, Kuwait University)

Objective: The association between the weight of school bag and Low Back Pain (LBP) amongst students remains under intense debate worldwide. This study aimed to estimate the prevalence of LBP amongst public high school students in Kuwait and to investigate the association between LBP and the weight of school bag.

Methods: A cross-sectional study using multistage cluster sampling with probability proportional to size method was conducted on a total of 950 public high school students from all governorates. Data on LBP were collected through face-to-face interviews using a standardized questionnaire. The students' height and weight and the weight of their school bags were measured using appropriate weight and height scales. Logistic regression was used to investigate the association between the weight of school bags and LBP while adjusting for potential confounders. Results: The estimated lifetime, 6-month and 1-month prevalence of LBP were 70.3% (95% CI: 67.3-73.2%), 49.1% (95% CI: 45.8-52.2%), and 30.8% (95% CI: 27.8-33.8%) respectively, with significantly higher prevalence in females compared to males (p<0.001). The absolute weight of school bag was not significantly associated with LBP neither in univariate nor multivariate analysis. The relative weight of school bag (as a percentage of the body weight) was significantly associated with LBP in univariate analysis but not in multivariate analysis. The students' perception towards their bag weight, however, was found to be significantly associated with LBP throughout the analysis (p<0.001). Conclusion: LBP amongst high school students in Kuwait seems to be very common with a prevalence resembling that of high-income countries. Our data suggest that the students' perception on the weight of school bag is far more important than the actual weight. Current recommendations about the weight of school bags, which are not supported by evidence, should be revised to take into account the students' perception on the weight of school bag.

S/P indicates work done while a student/postdoc

INCOME INEQUALITY AND FIREARM HOMICIDE: A NATIONAL STUDY Ali Rowhani-Rahbar* Ali Rowhani-Rahbar, Alex Quistberg, Anjum Hajat, Frederick Rivara, (University of Washington)

There is growing consensus that income inequality, which has been rising since the 1970s in the US, is broadly associated with poor health outcomes. The latest empirical evaluation of the association between income inequality and firearm homicide dates back to 20 years ago. Using two pre-specified lag times of at least 15 and 5 years, we examined the association of income inequality measured by the Gini index (range: 0 [complete equality] to 1 [complete inequality]) separately in 1990 and 2000, with firearm homicide rates during 2005-2015 among individuals aged 14-30 years across all US counties. Gini and race/ethnicity-specific firearm homicide rates data were respectively obtained from the American Community Survey and Compressed Mortality Files compiled by the National Center for Health Statistics. Zero-inflated negative binomial models were estimated for the association between firearm homicide rates and estimated lifetime, 6-month, and 1-month prevalence of LBP amongst students in Kuwait. We found that income inequality significantly associated with firearm homicide in both 1990 (IRR=1.57; 95% CI:1.33-1.86) and 2000 (IRR=1.64; 95% CI:1.40-1.92) was associated with firearm homicide. Gini was consistently associated with firearm homicide in all models among African Americans even after incremental accounting for all aforementioned contextual factors. Findings suggest that policies to alleviate income inequality may impact firearm homicide rates for the most vulnerable subpopulations, and have the added benefit of potentially exerting a positive effect on other contextual factors related to income inequality.

S/P indicates work done while a student/postdoc

COMPARING METHODS FOR DETECTING SPATIOTEMPORAL CLUSTERS OF HOMICIDE AND FIREARM-RELATED ASSAULT Tingan Atwood-Jain* Tingan Atwood-Jain, Kennedy Muti, Stephen J. Mooney, Ali Rowhani-Rahbar, (University of Washington)

Gun violence in the US has been described as a "social contagion" because it exhibits similar characteristics to other infectious diseases, including spatiotemporal clustering. However, it is not clear how sensitive detection of gun violence clusters is to the scan statistic used to detect them. Using public safety data portal data from Philadelphia from 2006-2010, we compared spatiotemporal clusters detected using two distinct approaches: (1) Poisson scan statistic which uses population estimations to calculate the expected number of cases and (2) Space-time permutation scan statistic which estimates expected number of cases by the marginal distribution of observed cases. For the Poisson scan statistic, we obtained computer-generated population estimates at the census tract level from the Census Tact Planning Program. For both methods, we used monthly and census tract at temporal and spatial units, respectively. We adjusted for temporal trend and allowed clusters to overlap but no two clusters were allowed to share the same center. We used Monte Carlo simulations (1000 simulations) to identify statistically significant clusters. The Poisson scan detected 12 statistically significant clusters, whereas the space-time permutation scan detected 16 clusters. Cluster standardization incidence ratios (SIRs) detected using the Poisson scan ranged from 1.5 to 8.3. By contrast, SIRs detected using the space-time permutation scan ranged from 2.55 to 46.7. In general, the Poisson scan clusters were more spread out and had a larger radius than the space-time permutation scan clusters. While Poisson scan clusters did not vary over time, there was considerable diffusion of the space-time permutation scan clusters over time. Findings provide empirical support that the choice of scan statistic and definition of population at risk affect the detection of spatiotemporal clusters and through the diffusion patterns and spatial analysis.
TRAUMATIC BRAIN INJURY WITH POLYTRAUMA: HOW BODY REGIONS INJURED AND INJURY SEVERITY INFLUENCE MORTALITY

Rebecca Adeigbe, PhD* Rebecca Adeigbe, Jennifer Gurney, Melissa Kottke, Anthony Pusateri, Tuan Le, (USAISR)

Background: High energy explosives resulting in traumatic blast injuries and polytrauma was frequently observed in casualties from the Iraq and Afghanistan wars. We sought to identify an association between body region (BR) injury and the outcome effects of concomitant traumatic brain injury (TBI) in order to determine how injured BR influence mortality in US service members. Methods: Data were extracted from the Department of Defense Data Registry from 2002-2016. pTBI was defined as a having a TBI diagnosis and an Abbreviated Injury Scale (AIS) score ≥3 in one or more other BR. Descriptive statistics were used for demographic and injury characteristics. Logistic regression was used to determine how AIS severity for each of the body regions influenced odds of mortality. Results: A total of 10,282 patients with pTBI were analyzed. In addition to sustaining TBI, 31% of patients sustained injury to the face, 16.7% to the chest, 18.1% to the abdomen, 36.3% to extremities and 70.4% to soft tissue. While all patients were diagnosed with TBI, for the head and neck, 22.1% of patients had a severe or critical AIS score. Additionally, 2.6% had a severe or critical AIS score for the face, 56.5% for the chest, 27.5% for the abdomen, 47.4% for extremities and 2.3% for soft tissue. After controlling for covariates (e.g., injury mechanism), odds of mortality were greater for patients who had higher AIS scores for the head (OR:3.1; CI:2.7-3.6) and face (OR:1.5; CI:1.1-2.0). For patients who sustained injury to all body regions (n=18), odds of mortality were greater for those with higher extremity (OR:3.6; CI:1.6-8.2) and soft tissue (OR:3.0; CI:1.3-7.2) scores. Conclusion: Patients with TBI and chest trauma presented with the highest AIS scores, but this injury pattern was less lethal than TBI associated with extremity and soft tissue injuries. Given that isolated chest injuries are more lethal than isolated extremity injuries, these findings warrant further investigation.

RISK FACTORS FOR MORBIDITY AND MORTALITY FOLLOWING A FIREARM ASSAULT INJURY: A POPULATION-BASED RETROSPECTIVE COHORT STUDY

Veronica A. Pear* Veronica A. Pear, Aaron Shev, Nicole Kravitz-Wirtz, Christopher D. McCort, Garen J. Wintemute, (Violence Prevention Research Program, University of California Davis School of Medicine)

Firearm violence is a substantial cause of death and injury in the United States. A small number of studies suggest individuals who survive a firearm injury are at particularly high risk of subsequent firearm-related injury and death. However, little is known about the risk factors associated with re-injury or death in this population. The primary aim of this study is to identify these risk factors. We will evaluate the risks associated with demographic characteristics, time since index injury, location, hospital payment source, severity of injury, and co-occurrence of mental health or substance abuse diagnoses. We will also quantify the overall and transition-specific hazards of subsequent violent injuries or death among people with a firearm injury. The study population comprises all individuals in California who visited a hospital for a firearm assault injury between 2005-2013. Using data from California's Office of Statewide Planning and Health, we will link these individuals' emergency department (ED) visits, hospitalizations, and mortality records across the study period. To our knowledge, this will be the first population-based study to evaluate this question using both inpatient and ED data. We will use multi-state models to explicitly and simultaneously model transition from one injury to the next or from an injury to death, accounting for event history and other covariates. These models allow the hazards to change with each subsequent event and are able to account for competing risks. Individual frailty will also be included to incorporate variability in individuals’ underlying propensities for (re)injury by a firearm. Multi-state models are particularly well suited for prediction of recurrent events. By identifying characteristics of patients at especially high risk of violent re-injury or death, this study can inform clinical decision making and the targeting of preventive interventions and policies in California and nationwide.

S/P indicates work done while a student/postdoc
DISPARITIES IN HIV PREVENTION AND TREATMENT: OBSTACLE TO ACHIEVING ELIMINATION OF HIV IN NIGERIA Daniel A. Adeyinka

Background: Inequity is considered as a major contributor to the global HIV but empirical evidence is limited. Most studies often recommend reducing normative physiological risks, economic differences and gendered power dynamics that make women to be disproportionately affected by HIV. Few researchers have addressed this issue through a gender lens. Paradoxically, men are overrepresented in AIDS deaths. Also, more efforts are concentrated on adults while children are often left behind. This study measured the impact of age-gender disparity on HIV control in resource-limited setting by using Nigeria as a case study. Methods: We conducted trend analysis from 2010-2015 on HIV tipping point ratios (TPR) by using the National HIV programmatic data and spectrum estimates for the 36 states and Federal Capital Territory. A cut ratio of <1 was used to depict effective control of HIV infections by showing that the HIV incidence falls below rate of ART initiation. Differences in ratios across the years were assessed with Mann-Kendall test for trend. Mann Whitney U test was used to explore age and gender differences. The significant level was set at α=5%. Results: From 2010-2015, the national TPR has significantly declined from 2.2 to 1.1; [p=0.03]. In 2015, Nigeria significantly achieved safe TPR of 0.9 for adults but not for children (3.6); [p=0.0001]. Despite the yearly variations, the TPR for 2015 was marginally significantly lower for female than male, 0.9 and 1.5 respectively, (p=0.045). It was observed that 4(10.8%) of the states have reached a safe TPR for children, compared to 16(43.2%) observed for adults. More (43.2%) states have attained safe TPR for females compared to males (24.3%). Conclusion: As is the case in Nigeria, age-gender bias has led to an undesirably slow decline in new HIV infections among men and children. This signals an urgent need to ensure that strategies adequately capture HIV prevention and treatment for these population groups in particular men and children.
ADJUSTMENT DISORDER AND TYPE-SPECIFIC CANCER INCIDENCE: A DANISH COHORT STUDY
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Background: Although adjustment disorder is common, there is a dearth of research on its health consequences. Earlier studies, biological mechanisms, and stress-related behaviors suggest that cancer may be a potential sequela of adjustment disorder. This study examined the association between adjustment disorder and type-specific cancer incidence in a nationwide cohort. Methods: Data were obtained from the comprehensive nationwide medical and administrative registries of Denmark. We calculated the incidence of type-specific cancers from 1995 to 2013 in patients with a prior adjustment disorder diagnosis (n = 58,712), and compared it with the incidence in the general population by calculating standardized incidence ratios (SIRs) with accompanying 95% confidence intervals (CI). SIRs were adjusted using semi-Bayesian shrinkage. Results: The SIR for any type of cancer was 1.0 (95% CI: 0.99, 1.1). Adjustment disorder was associated with a 10% lower risk of immune-related cancers (SIR=0.9, 95% CI: 0.84, 0.97) and with a 20% higher rate of smoking- and alcohol-related cancers (SIR=1.2, 95% CI: 1.1, 1.3). We found no association for hematological malignancies (SIR=1.1, 95% CI: 0.89, 1.3). After semi-Bayesian adjustment, type-specific cancer SIRs indicated no association between adjustment disorder and cancer incidence. Conclusions: This study provides persuasive evidence for a null association between adjustment disorder and type-specific cancer incidence in a nationwide cohort.

THE RELATIONSHIP BETWEEN DEPRESSIVE SYMPTOMS AND ADVERSE OUTCOMES ALONG THE HIV TREATMENT CASCADE
Angela M. Bengston* Angela M. Bengston, Brian W. Pence, Bradley N. Gaynes, Kate-Rita Christopoulos, William Christopher Mathews, Michael Magenest (Dr.)

The effect of depressive symptoms on attrition in progression through the HIV care cascade is complex. We included participants from the Center for AIDS Network of Integrated Clinic Systems Cohort who were antiretroviral therapy (ART)-naive, had at least one viral load and appointment measure after ART initiation, and had a depressive symptom measure within 6 months of ART initiation. Depressive symptoms over time were measured using the Patient Health Questionnaire-9 (PHQ-9) and categorized using a validated cut-off (PHQ-9 > 10). We followed participants from ART initiation through the first of the following: loss to follow-up (> 12 months with no HIV appointment), death, administrative censoring (2011-2014), or 5 years of follow-up. We used log binomial models with generalized estimating equations to estimate associations between depressive symptoms at a given visit and the risk of having a detectable viral load (> 75 copies/mL) or subsequent missed HIV visit over time, controlling for time-fixed and time-varying confounders. We included 1,078 HIV-infected adults, who contributed 2,242 person-years (median follow-up time 703 days). At ART initiation 31% of participants reported depressive symptoms. Participants were primarily male (68%) and non-Hispanic (48%), and contracted HIV through male-to-male sexual contact (68%). Mental health issues and substance use at ART initiation were common. In multivariable analyses, depressive symptoms were associated with an increased risk of a detectable viral load on ART (RR 1.27, 95% CI 1.07, 1.52) over time. The association between depressive symptoms and missing the next HIV appointment (RR 1.19, 95% CI 1.05, 1.36) moved to the null after adjustment for legacy depressive symptoms, anxiety, and mental health diagnoses (RR 1.00, 95% CI 0.85, 1.18). Depressive symptoms at a given visit are a risk factor for unsuppressed viral load, while established mental health issues may play a larger role in HIV appointment adherence.

IMPUTATION OF TIME-VARYING COVARIATES IN A SURVIVAL ANALYSIS
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Objective: A survival analysis was conducted to investigate the association between low vitamin D level and suicide in a sample of 446,097 Veterans using Veteran Health Administration (VHA) data over a 10-year period. Both time-varying and static covariates were utilized in the model. Given variability of VHA health service utilization over time among this population, accounting for missing data was necessary. There were 17,996 Veterans (4.0%) with missing baseline values, which was the year prior to vitamin D laboratory results, and there were 13,150 (2.95%) Veterans with missing data at a time point other than baseline. Lefting the missing data to be unobserved would have resulted in excluding a large number of Veterans from the sample. As such, multiple imputation methods were explored to retain these data in the survival analysis model. Methods: To account for missing time points for the time-varying covariates, multiple imputation was utilized. There were a few Veterans who had follow-up years 6 and greater, those that had missing data at those time points were removed from the sample (n=1,292, 0.3%). FRCC Ml and FRCC MIANALYZE in SAS 9.4 were used to perform the multiple imputations and 5 imputations were utilized for all missing time points. We also conducted a complete case analysis which included only Veterans with complete data at all time points. Results: The model using multiple imputation had similar results to the complete case analysis. However, 28 (6.2%) additional Veterans who died by suicide and 11,852 Veterans overall could be retained in the model. Given that suicide is a rare outcome, it is ideal to keep as many Veterans with suicide in the model as possible. Conclusions: While the study conclusions remained the same in this example, retention of additional events increased power and decreased standard errors. Additionally, the inclusion of substantially more subjects can lead to more representative results.
EFFECTIVENESS OF A LINKAGE TO MENTAL HEALTH CARE PROGRAM AFTER HURRICANE SANDY
Samantha Schneider* Samantha Schneider, Rehana Rasul, Wil Lilian-Granich, Binh Lai, Kristin Bevillagotti, Emanuela Taioli, Rebecca Schwartz, (Department of Occupational Medicine, Epidemiology and Prevention, Northwell Health)

Introduction. Hurricane Sandy hit New York on October 29, 2012 and contributed to mental health difficulties (MHD). In the Rockaways, Project Restoration (PR) offered a program linking participants at risk for MHD into mental health care (L2C). Leaders in Gathering Hope (LIGHT) studied MHD in Long Island/Queens/Staten Island and did not have a L2C component. Aim: Determine the effects of L2C in reducing MHD after Sandy. Using LIGHT participants as a comparison. Methods: PR gave eligible participants the option to enroll in L2C. Participants completed baseline and follow-up questionnaires (PR:m=2, LIGHT: m=128). Primary outcomes were symptom scores of PTSD, anxiety, depression, and perceived stress (PSS). Baseline demographics, history of MHD, current treatment status, hurricane exposure, and months since Hurricane Sandy were also assessed. Multivariable linear mixed models determined whether mental health changes from baseline to follow-up differed between L2C and LIGHT. Results L2C and LIGHT participants had similar mean ages (48.2% vs. 49.6%) but were more likely to have a history of MHD (65.4% vs. 21.9%) and baseline current treatment (67.3% vs. 9.8%). Although the median time since Sandy was longer in L2C compared to LIGHT (30.6 months vs. 13.1 months), L2C participants reported more hurricane exposure items (6.5% vs. 3.5%). Baseline MHD outcomes were higher in L2C vs. LIGHT. Multivariable models showed that the L2C group was associated with a decrease in PTSD (β=-1.2, SE=1.67, P=.001), anxiety (β=1.24, SE=0.25, P=.001, depression (β=-0.70, SE=0.25, P=.026), and PSS (β=-1.75, SE=0.102, P=.002) scores from baseline to follow-up. In LIGHT, MHD outcomes were not significantly different between baseline and follow-up. Conclusion: Engagement in L2C was effective in reducing MHD in this population. These findings confirm the powerful impact community outreach has on reducing MHD after a disaster.

DEPRESSIVE SYMPTOMS AT HIV TESTING AND TWO-YEAR SURVIVAL AMONG HIV-POSITIVE PEOPLE WHO INJECT DRUGS IN VIETNAM
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Introduction. HIV-positive people who inject drugs (PWID) experience higher rates of mortality than other HIV-infected individuals. A potentially important determinant of survival is the high burden of depression among PWID. Our study examined the relationship of depressive symptoms at HIV testing with two-year all-cause mortality among newly-diagnosed HIV-positive PWID in Vietnam. Methods. We analyzed data from 336 HIV-positive PWID in a randomized controlled trial of a brief depression intervention in Thoi Nguyen, Vietnam from 2009-2013. Depressive symptoms at HIV testing (prior to receiving an HIV diagnosis) were measured using the Center for Epidemiologic Studies Depression Scale (CES-D). Mortality was ascertained at 6, 12, 18, and 24 months following HIV diagnosis. We compared mortality between participants with and without depressive symptoms at HIV testing by estimating risk differences (RDs) from crude and weighted Kaplan-Meier cumulative risk curves, using inverse probability weights to control for confounding. Results. At HIV testing, 1/4 of 336 PWID (42%) experienced severe depressive symptoms (CES-D score ≥22) and over the two years following HIV diagnosis, 82 of 336 PWID (24%) died. Those with depressive symptoms faced an 11.7% (95% CI: 3.1, 21.7%) higher risk of death at 24 months. Controlling for potential confounders led to a slight attenuation of this risk difference (RD=-9.7% [-1.2%, 20.6%]). This increase in risk of mortality for PWID with depressive symptoms was consistent throughout the two-year period: at 6, 12 and 18 months after HIV diagnosis, the weighted RD was 12.6% (5.5%, 19.7%), 13.4% (4.6%, 23.2%), and 11.0% (9.9%, 21.1%), respectively. Discussion. PWID with depressive symptoms at time of HIV testing faced a markedly higher risk of death over the next two years. HIV diagnosis provides an important opportunity to screen and treat depressive symptoms and could subsequently improve survival in this high risk population.
Epidemiological characteristics of inpatient alcoholics with sleep disorders and factors affecting the changing status of repetitive hospitalization: A nationwide population-based study in Taiwan

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Factors such as having trouble in sleeping or unsound slumber may affect patients with long-term sleep disorders in their behavior. Clinically, insomnia patients often drink to sleep and gradually increase the amount of alcohol once the soporific action decrease. Withdrawal symptoms lead to more serious insomnia after stop drinking. As there are no studies exploring the epidemiological characteristics of alcohol abusers with sleep disorders currently, this study analyzed the influencing factors of repetitive hospitalization in cases of alcoholics with sleep disorders by data from the National Health Insurance Research Database. SPSS 21.0 is used in the statistical analyze. A total of 313 patients from 2000 to 2013 (83.4% males and 16.6% females), age between 25-44 had the highest proportion of occurrence (65.5%), 10.9% in low income group, 39.9% in major injuries patients. Winter has the highest occurrence rate (29.7%) compare with other seasons. Most of the patients (34.5%) lived in the South of Taiwan. Furthermore, lower income, major injuries and living in island areas were the affecting factors of the changing status of repetitive hospitalization. Low-income patients had 85.37 times more than higher income populations while living in island areas had 1.35 times more than living in north of Taiwan mainland. Relevant interventions are suggested to make so as to reduce the repetitive hospitalization of alcohol abusers with sleep disorders.
DATA SCIENCE CONSIDERATIONS FOR THE DEVELOPMENT OF VISUALIZATION TOOLS FOR CONFOUNDING AND SELECTION-BIAS IN LONGITUDINAL DATA Erin Schnellinger* Erin Schnellinger, Linda Valeri, John W. Jackson, (University of Pennsylvania)

We have recently developed a suite of SAS macros to diagnose confounding and selection-bias from time-varying and joint exposure in clinical trials and observational studies. More specifically, the macros take the users’ raw data as input, compute relevant balance statistics, and produce trellis plots illustrating patterns of confounding (or selection-bias) and the degree to which covariate adjustment methods — such as inverse-probability weighting — are successful in controlling for confounding (or selection-bias). While the user simply inputs his or her raw data into the software, and inspect the resulting trellis plots, much data manipulation occurs behind the scenes: the software must take the researchers’ existing data, reformat it appropriately, and construct longitudinal covariate balance tables. The challenge of this project was to ensure that the software could perform these manipulations for a variety of data collection schemes, all while requiring minimal input from the user, and while reducing the amount of computation time and memory consumed by the macros. Here, we discuss how we approached these challenges from a data science perspective. Our solution involves complex data transformations via PROC IML and PROC SQL to create “tiled” data sets. The result is a set of macros which flexibly captures the users’ data, regardless of whether each variable is ranked or the number of times each variable is measured.

Additionally, the software contains tools for low-latency training data, and restructures the users’ data so that it can be easily read by standard SAS graphing procedures (e.g., PROC GPANEL). By adopting a data science perspective to program development, we have created software that can accommodate a variety of data and, therefore, a variety of research. Our project demonstrates the power of adopting data science perspectives to advance epidemiologic research.

IDENTIFICATION OF LIFETIME PROFILES OF SMOKING INTENSITIES AND ASSOCIATION WITH LUNG CANCER RISKS: RESULTS FROM THE ICARE CASE-CONTROL STUDY Emilie Levert* Emilie Levert, Aude Losq, David Luce, Pascal Gueguen, Isabelle Sticker, Karen Leffondre, (Univ. Bordeaux, ISPED, INSERM, Bordeaux Population Health Research Center, team Biostatistics, team EPICONE, UMR 1219, F-33000 Bordeaux, France)

Objectives: To identify the different lifetime profiles of smoking intensities in the ICARE population-based case-control study and to compare their association with lung cancer risks. Methods: Incident lung cancer cases were recruited in 2003-2007 in 10 French territorial departments, and controls were selected via incidence density sampling and frequency matched to cases on age, sex, and departments. The average number of cigarettes smoked per day was reported for each smoking episode, in a standardized questionnaire during face-to-face interview. The present analysis was restricted to male ever smokers. A joint latent class mixed model was used to identify lifetime profiles of smoking intensities and estimate their association with lung cancer risk. Results: 19,385 cases and 18,373 controls contributed to the analysis. Five latent classes were identified: Class 1 with a moderate constant smoking intensity over lifetime at about 6 cigarettes/day (48.8% of subjects); Class 2 with a high constant peak at about 25 cigarettes/day around 35 years before diagnosis (9.8%); Class 3 with a very high peak at 35 cigarettes/day around 20 years before diagnosis (12.7%); Class 4 with a very high recent intensity at 37 cigarettes/day in the last 10 years (10.5%); and Class 5 with a high constant intensity at 25 cigarettes/day in the last 30 years (19%). Class 5 had the strongest risk of lung cancer compared to Class 1 (OR=1.82 95% CI: 1.47-2.25). Classes 3 and 4 with the most recent very high intensities had a significantly increased risk of lung cancer compared to Class 1 which smoked less but for a longer time (OR=1.62 95% CI: 1.27-2.06, and OR=1.63 95% CI: 1.25-2.11, respectively). Class 2 with a high constant peak had a similar risk of lung cancer compared to Class 1 with a moderate intensity over lifetime (OR=1.08 95% CI: 0.78-1.40). Conclusions: Our results provide a description of smoking behaviors over lifetime, and illustrate how recent high smoking intensities contribute to the risk of lung cancer.

ESTIMATING BIAS DUE TO INFORMATIVE CENSORING IN MULTIDRUG-RESISTANT TUBERCULOSIS COHORT ANALYSES A SIMULATION STUDY Meredith Brooks* Meredith Brooks, Justin Mani Paradies, (Harvard Medical School)

When individuals in multidrug-resistant tuberculosis (MDR-TB) cohorts lack observed survival times subsequent to an initial treatment outcome, the underlying Cox proportional hazards model assumption of non-informative censoring may be violated. Naïve analysis of data characterized by informative censoring may result in biased treatment effect estimates. Alternate censoring techniques show potential to reduce these biases. However, without long-term survival data available, validating and comparing these methods is difficult. Here, we use simulated data to compare the performance of the Cox model under several techniques to handle these censored observations. We simulate data to emulate a cohort of MDR-TB patients from Lima, Peru. Informative censoring is introduced using a rejection sampling algorithm. Cox proportional hazards models are used to estimate associations between an aggregate treatment regimen and death across three methods for including censored observations: the conventional method assuming non-informative censoring, a selective exclusion of short-term survival informed by literature, and incorporation of a predicted long-term vital status. Models are computed across several scenarios to demonstrate which censoring technique produces the least biased estimates. The protective effect of the aggregate treatment regimen is consistently underestimated by the conventional naïve analysis, up to 7.6%. Models using alternative censoring techniques produce treatment effect estimates consistently stronger and more accurate than the conventional method, underestimating the treatment effect by less than 2.4% across all scenarios. Use of alternative censoring techniques that account for differential risks of survival beyond the initial treatment outcome may more accurately reflect long-term survival, leading to reduction in bias of treatment effect estimates in MDR-TB cohort analyses. Reducing this bias yields more accurate and larger treatment effect estimates.

ASSESSMENT OF REPORTED SEDENTARY BEHAVIOUR IN CHILDREN AND ADOLESCENTS: WHAT ARE THEIR RELIABILITY AND VALIDITY? Marcus Vinicius Nascimento-Ferreira* Marcus Vinicius Nascimento-Ferreira, Augusto César Ferreira de Morais, Tatiana Rendeiro-Urreaga, Paulo Vinicius Tavares Oliveira, Luis A. Motta, Heraclito B Carvalho (School of Medicine, University of Sao Paulo, Sao Paulo, Brazil)

Background: Although subjective instruments are the most common tool to measure sedentary behaviour (SB) levels, their reliability and validity remain unclear. Ours aims were to assess the reliability and validity of SB subjective instruments in children and adolescents, and to examine the association of the measurement framework in these properties. Methods: We carried out a systematic review. Published studies were retrieved from electronic databases. We pooled correlation coefficients ($r$) as an indicator of agreement estimates. Results: A total of 14 studies met the inclusion criteria with ages ranging from 3 to 17 years. Ten of these studies (71.4%) reported correlation coefficients. We found two main groups of sedentary activities: screen time (38.1%) and sedentary behaviors (61.9%). The pooled reliability and validity of the SB instruments were 0.59 (CI95%: 0.50 to 0.62) and 0.04 (CI95%: 0.03 to 0.06), respectively. In stratified analyses, the direct observation showed a moderate validity coefficient to measure screen time (0.58, CI95%: 0.53 to 0.63). In the meta-regression, the objective measure during more than 7 days showed significant association with the validity ($p= 0.027, p= 0.031$). Conclusions: While sedentary behaviour subjective instruments show moderate/strong reliability, their criterion validity in children and adolescents depends on the reference method. Moreover, an extended period under objective evaluation improves the validity.
IMPROVEMENTS IN THE US LIFESPAN FROM 1968 TO 2015 AS DISPLAYED IN ANIMATED RISK FUNCTIONS ACROSS TIME

Jacqueline Rudolph, Jacqueline Rudolph, Stephen Cole, (University of North Carolina at Chapel Hill)

Mortality is a fundamental marker of population health and time trends in mortality can reveal much about improvements in public health. National vital statistics have been traditionally reported using rates (marginal and age-standardized) or life expectancy, but these measures do not utilize the full potential of the data because they are derivatives of a more informative measure of incidence: the survival function. Here, we use the US National Center for Health Statistics mortality and population data to estimate risk curves for all-cause and competing cause-specific mortality across the lifespan, and we examine trends in those curves over calendar time using animated visual displays. For all-cause mortality, we estimated annual probabilities of death in each age category by pooled logistic regression. We then used the estimated probabilities in a Kaplan-Meier estimator to obtain risk curves. For cause-specific mortality, we instead used pooled multinomial logistic regression and the Aalen-Johansen estimator. Point-wise 95% confidence intervals were estimated by Greenwood’s formula. We obtained marginal curves as well as curves modeled with individual-level logistic regression and the Aalen-Johansen estimator. For cause-specific risk curves, we used the estimated probabilities from the above models to estimate the pooled logistic regression model and the Aalen-Johansen estimator.

APPLICATION TO THE EFFECT OF STATINS ON LIFE-EXPECTANCY

Andrew Murray, Eleanor Murray, Ellen C Caniglia, Saima Hilal, Myriam Hunink, Eric J. A. Swanson, (Harvard T.H. Chan School of Public Health)

Policy makers and health policy researchers are often interested in understanding long-term population effects of medical or public health interventions. One common metric for estimating these long-term effects is life expectancy. However, unless all individuals included in a study have died by end of observed follow-up estimating life expectancy requires transportability of estimates to future populations. Agent-based and individual-level simulation models are a popular tool for estimating life expectancy since these simulation models can incorporate complex systems models. However, simulation models can be biased when incorrectly parameterized in the presence of treatment-on-treatment bias. In the presence of treatment-on-treatment bias, estimation of the causal effect requires a randomized controlled trial (RCT) provide strong evidence for causality and are therefore considered to be the gold standard for determining causal effects. However, they also come with multiple disadvantages related to the randomized controlled trial's focus on generalizability of the results and limited comparison of effects from different treatments. Instead, observational data may provide opportunities for determining causal treatment effects without the disadvantages of RCT's. Deriving causal effects from observational data is however still considered difficult primarily due to the control of confounding. For years, multivariable regression models have been the only widely applied method to adjust for confounders. Nowadays researchers also start to apply other methods for confounder adjustment, such as propensity score (PS) and instrumental variable (IV) analysis. However, the increasing popularity of these more advanced methods for causal inference also leads to incorrect use of these methods. Preliminary results of a study show that these models could lead to different conclusions. The validity of the results are dependent on the data situation, as each method has its own assumptions. Based on further analyses we will provide an advice on how and when to use multivariable regression models, PS and IV analysis for estimating causal treatment effects on observational data.
VISUALIZATION TOOL OF VARIABLE SELECTION IN BIAS-VARIANCE TRADEOFF FOR INVERSE PROBABILITY WEIGHTS
Ya-Hui Yu, Yvonne Lu, Brian C. Bull, Kevin M. Brooks, Katherine P. Hines, Ashley I. Naimi (University of Pittsburgh)

Inverse probability weighting (IPW) has become a commonly used confounder adjustment technique. The need to adjust for a high-dimensional set of confounders is becoming increasingly common. Adjusting for all such confounders may reduce bias, but at the expense of increased variance which is usually the result of (near) positivity violations and unstable IPWs. To date, most diagnostic techniques used to evaluate the behavior of IPWs rely on functions of the propensity score (e.g., mean and maximum stabilized weight, or propensity score overlap), but (usually) not the point estimate of substantive interest. We propose an algorithm that allows for the visualization of the bias-variance tradeoff incurred by including or excluding confounding variables from the propensity score model. Bias is quantified as the difference between the estimate from the model excluding certain confounders and the estimate from the model adjusting for all identified confounders. We applied this visualization tool to an empirical study examining the association between incident pre-pregnancy obesity and stillbirth in a cohort of linked birth and death records in Pennsylvania 2003-13. We identified 35 confounders, with a resulting propensity score model dimension of 9.5. Adjusting for all 35 confounders led to a risk ratio of 1.37 (95% CI: 1.01, 1.80). After applying our algorithm, we identified one confounder (prior gestational weight gain) that increased 3-fold mean squared error compared to full model. Removing this confounder from the propensity score model resulted in a more precise risk ratio of 1.68 (95% CI: 1.43, 1.99). These results demonstrate the potential reduce in mean squared error that can result from removing confounders from a propensity score model and the strength of visualizing the bias-variance impact of selected confounders when implementing IPW methods.

METHODS/STATISTICS

HYPERTENSION AND NIGHT WORK: A NEED FOR G-METHODS
Jacqueline Ferguson*, Jessica Huang, Sadie Holloway, Mark Cullen, Ellen Eisen (School of Public Health, University of California, Berkeley)

Night shift work has been associated with increased rates of hypertension. However, estimates of this association from occupational studies may be downwardly biased due to the healthy worker survivor effect. The use of inverse probability weighting (IPW) adjusts for bias due to dropping participants who are less healthy. However, adjusting for a high-dimensional set of confounders can reduce bias, but at the expense of increased variance. To date, most diagnostic techniques used to evaluate the behavior of IPWs rely on functions of the propensity score (e.g., mean and maximum stabilized weight, or propensity score overlap), but (usually) not the point estimate of substantive interest. We propose an algorithm that allows for the visualization of the bias-variance tradeoff incurred by including or excluding confounding variables from the propensity score model. Bias is quantified as the difference between the estimate from the model excluding certain confounders and the estimate from the model adjusting for all identified confounders. We applied this visualization tool to an empirical study examining the association between incident hypertension and night work in a cohort of linked birth and death records in Pennsylvania 2003-13. We identified 35 confounders, with a resulting propensity score model dimension of 9.5. Adjusting for all 35 confounders led to a risk ratio of 1.37 (95% CI: 1.01, 1.80). After applying our algorithm, we identified one confounder (prior gestational weight gain) that increased 3-fold mean squared error compared to full model. Removing this confounder from the propensity score model resulted in a more precise risk ratio of 1.68 (95% CI: 1.43, 1.99). These results demonstrate the potential reduce in mean squared error that can result from removing confounders from a propensity score model and the strength of visualizing the bias-variance impact of selected confounders when implementing IPW methods.

Jung-Im Shin*, Jung-Im Shin, Alex Chang, Rachel Cole, Morgan Grattan, ( Johns Hopkins University)

Background and purpose: Accurate classification of individuals with respect to kidney function is vital to research. However, many administrative health care data do not have laboratory data on kidney function. Our objective was to evaluate the accuracy of diagnostic codes related to chronic kidney disease (CKD) stages. Methods: From January 2015 to January 2017, we analyzed 39,226 outpatient individuals in Geisinger Health System, a large rural health care system in Pennsylvania. We used the International Classification of Disease, 9th revision (ICD-9) codes of 585.1-2, 585.3, 585.4, and 585.5 to classify individuals with glomerular filtration rate (GFR) ≤60, 30-59, 15-29, or <15 ml/min/1.73m2, respectively. Individuals who do not have a 585.x were classified as those with GFR ≥60. This was compared with the closest GFR within 90 days prior to the date of ICD-9 code estimated by outpatient serum creatinine using Chronic Kidney Disease Epidemiology Collaboration equation. Results: There were 30,417 patients with a 585.x code. Average GFR for the 361,829 patients without a 585.x code was 93.6, for 585.1 (N=327), it was 76.7; for 585.2 (N=942), it was 68.7; for 585.3 (N=26,630), it was 48.4; for 585.4 (N=19,252), it was 25.2; and for 585.5 (N=573), it was 15.0. The two methods agreed in 92.9% of the individuals. The kappa statistics was 0.61 (95% CI: 0.60-0.64). Conclusions: ICD-9 codes may be a useful tool for classifying individuals according to their kidney function in administrative health care data when laboratory data is not available.

Rosie Cornish*, Rosie Cornish, Amy Taylor, George Davey Smith, Andy Boyd, John Macleod, Kate Tilley, (University of Bristol)

Estimates of exposure-outcome associations obtained from a complete case analysis may be biased if the outcome is missing not at random (MNAR). Further, a standard implementation of multiple imputation will produce biased estimates if an imputed variable is MNAR. Neither of these mechanisms can be identified completely using the observed data. Linkage to external datasets can provide more complete outcome data, or a proxy for the missing outcome; this can be used to identify a set of plausible missingness mechanisms. To investigate potential bias due to dropout, we used random effects logistic regression to estimate the association between a number of lifestyle and health-related factors obtained from linked datasets and participation in the Avon Longitudinal Study of Parents and Children, taking account of a wide range of baseline socio-demographic factors known to be associated with participation. Of the 13,972 individuals included in this analysis, 9,049 (65%) had complete baseline covariates, numbers with linked variables varied depending on coverage of the linked dataset. After taking account of baseline characteristics, smoking (OR for participation=0.62, 95% CI: 0.52-0.74), depression (OR=0.76, 95% CI: 0.54-0.80), lower educational attainment (OR=0.83, 95% CI: 0.70-0.99), and higher school achievement (OR=0.73, 95% CI: 0.63-0.85) were associated with lower study participation. A wide variety of outcomes may be associated with non-participation in longitudinal studies. This may result in bias in estimates of exposure-outcome associations. Knowledge of the factors that are related to dropout allows the researcher to determine an appropriate analysis strategy that will minimise bias and maximise efficiency. Linkage to external datasets allows the missingness mechanism to be investigated more fully.
GENERALIZABILITY OF SUBGROUP EFFECTS Marissa J. Seaman*, Marissa J. Seaman, Ian Schmid, Elizabeth A. Stuart, (Johns Hopkins University)

Generalizing treatment effect inferences from randomized trials to a target population is challenged when the distribution of effect modifiers differs across the study sample and target. Even after accounting for observed modifiers using generalizability methods such as weighting, direct standardization, or outcome modeling, a key assumption is that subgroup-specific effect estimates do transport from sample to population. Thus, concerns may still remain about potential unobserved effect modifiers within subgroups (e.g., if the effect for males differs across sample and population data based on an unobserved racial factor). To our knowledge, the extent of residual bias due to unobserved within-subgroup modifiers has not been examined. Using Monte Carlo simulation, we evaluated the performance of generalizability methods across settings with two and three-way interactions between treatment, observed subgroups, and a single unobserved factor. In a simulation of 750,000 individuals (the target population), we varied the presence of treatment effect heterogeneity by a single factor within subgroups. From the target, we drew a biased sample (n=2000) based on covariates and compared biases, absolute bias, variance, and mean square error (MSE) of the population treatment effect estimate after weighting or standardizing the sample to resemble the target population. As treatment effect heterogeneity increased within subgroups, the weighting and standardization approaches resulted in differing bias, absolute bias, and MSE. Our simulations show that generalizability methods are sensitive to the possibility of unmeasured effect modifiers within subgroups, however, the plausibility of such a factor after accounting for important subgroup effects should be considered. We recommend the use of sensitivity analyses developed for unobserved characteristics in generalizability methods to assess the impact of potential treatment effect heterogeneity within subgroups.

METHODS/STATISTICS

SIMULATIONS COMPARING PERFORMANCE OF MATCHING METHODS TO UN-MATCHED ORDINARY LEAST SQUARES REGRESSION UNDER CONSTANT EFFECTS Anusha Vable*, Anusha Vable, Mathew V. Kang, Maria Glymour, Joseph Rigdon, Sanjay Basu, (UCSF)

Matching methods are increasingly used to infer causal effects from observational data under the assumption that matching produces unbiased inferences in a broader range of settings than unmatched ordinary least squares regression. We sought to compare inferences from propensity score matching (PSM), coarsened exact matching (CEM), and unmatched ordinary least squares regression (OLS) to identify which methods, in which scenarios, produced unbiased effect estimates and inferences at the expected rate of 95% (type I error = 5%). We compared the methods within three simulated datasets with simple data structures including a dichotomous exposure, two continuous confounders, and a continuous outcome under constant null effects. We compared the methods in scenarios with and without discontinuities in the exposure (probability of exposure = 0.5 if x = 0.5, 0.95 if x > 0.5) and/or outcome (coefficient for x = 10 if x = 0, 100 if x = 1), and measured and unmeasured confounding. In most scenarios, estimates from PSM, CEM, and OLS approaches were unbiased on average when all confounders were measured; however, compared to OLS, PSM was comparatively inefficient, while CEM type I error rates were comparatively high. Only when there were discontinuities in both the exposure and the outcome did the matching methods consistently outperform OLS in terms of unbiased effect estimation and inferences. When both matching methods and OLS had similar point estimates, OLS estimates resulted in unbiased inferences more often than matching methods, while when point estimates were dissimilar, matching methods resulted in unbiased inferences more often than OLS.
GENERALIZING FINDINGS FROM RANDOMIZED PARTICIPANTS TO ALL ELIGIBLE INDIVIDUALS USING CLINICAL TRIALS NESTED WITHIN COHORTS Sarah E Robertson*, Sarah Robertson, Isla J Dusharah, Elizabeth A Stuart, Miguel A Hernan, (Brown University)

The need to generalize trial findings from randomized participants to all eligible individuals arises naturally in clinical trials nested within cohorts of individuals meeting the trial selection criteria, including those who refuse randomization. In such studies, methods that use baseline covariates from all eligible individuals but use the treatment and outcome information only from the randomized participants are appealing because they avoid confounding of the treatment effect among eligible individuals who refuse randomization. Leveraging connections with time-varying bias theory, we show that the data from clinical trials nested within cohorts can be used to identify the average treatment effect in the super-population of eligible individuals. We examine three classes of estimators of the average treatment effect: (1) outcome model-based; (2) probability of trial participation-based; and (3) doubly robust estimators. We assess the finite-sample performance of different estimators in simulation studies. Lastly, we demonstrate the implementation of the methods using data from the Coronary Artery Surgery Study. Study of 2098 eligible patients with coronary artery disease, of whom 780 were randomized into coronary revascularization surgery or medical therapy and 1319 refused randomization and self-selected into treatment.

MAGNITUDE AND DIRECTION OF SELECTION BIAS IN THE RISK RATIO AND RISK DIFFERENCE IN THE ABSENCE OF A COLLIDER WHEN EXPOSURE CAUSES DISEASE Lyndsey A. Darrow*, Lyndsey A. Darrow, Matthew J. Strickland, Michel Klein, W. Dana Flanigan, (School of Community Health Sciences, University of Nevada, Reno)

When exposure causes disease in a population of interest (target), conditioning on a variable that is affected by disease but is not itself a collider induces selection bias in risk ratio and risk differences (but not odds ratios). We describe the magnitude and direction of selection bias within a cohort study in the absence of a collider when (a) exposure is a cause of disease and (b) selection (loss to follow-up) is dependent on disease or a prognostic factor for disease. We quantify the bias for risk ratios and risk differences for a range of baseline risks and selection probability ratios of non-diseased to diseased individuals. Calculations show the risk ratio is biased toward the null when diseased subjects are preferentially selected and away from the null when non-diseased are preferentially selected. The magnitude of bias in the risk ratio increases with baseline risk, and the biased RR away from the null is bounded by the ratio of the unbiased odds ratio. The direction of bias in the risk ratio is consistent. When risks are not high (e.g., 3 fold difference), the largest bias for risk differences occurs for risks near the boundaries (probabilities of disease close to 0 or 1). When risks are small and selection described not extreme, the risk ratio and risk difference exhibit opposite directions of bias. In contrast to the risk difference, bias in the risk ratio is largely ignorable when risks are low. These patterns can inform the choice of effect measure and the interpretation of published studies where loss to follow-up, missing data, or other type of selection into a study population is related to disease. Apparent generalizability of effect measures across studies may also be affected by such selection.

LEVERAGING ADMISSION LABORATORY TEST RESULTS TO PREDICT PATIENT SEVERITY OF ILLNESS Natalia Blanco*, Natalia Blanco, Sherhdi Leekha, Lawrence S. Magder, Sarah S Jackson, Pranita D Tamma, Daniel Lemkin, Anthony D Harris, (University of Maryland School of Medicine)

Background: Hospital severity of illness (SOI) scores that are simple, widely available and non-syndrome specific are lacking. This study aims to evaluate the ability of laboratory test results, as measures of SOI, to predict in-hospital mortality. Methods: We performed a retrospective cohort study among admissions to the University of Maryland Medical Center between November 2015 and May 2017. The following selected laboratory variables were collected using the hospital's central data repository: hemoglobin, platelet count, white blood cell count; urea nitrogen; creatinine, glucose, sodium, potassium, and total bicarbonate (CO2). These were selected because they are obtained on most hospitalized patients. Laboratory tests were only included if they were ordered within 24 hours of hospital admission in order to assess SOI upon hospital admission. In the absence of linearity with the outcome, variables were categorized as abnormally low, normal, and abnormally high based on standard ranges. Three stepwise selection was used to construct multivariable logistic regression accounting for patient clustering. The C statistic evaluated the sensitivity power. Results: All laboratory tests were in the multivariable models and were significantly associated with hospital mortality. Patients with abnormally low level of CO2 (145 mmol/L for males; >148 mmol/L for females) were 2.1 (95% CI 1.7-2.5) more likely to die during their hospital stay than patients with normal levels. The model's discriminatory power was good (C= 0.77 [95% CI 0.75-0.78]). Conclusions: Hospital admission laboratory test results are strong predictors of mortality. This suggests that they can serve as severity of illness adjustment measures in multiple different epidemiologic studies.

BIAS DUE TO TIME-VARYING EXPOSURE ALTERS THE DIRECTION OF EFFECT IN A LONGITUDINAL COHORT STUDY Andrea G Buchwald, Andrea G Buchwald, Jessica Nelson, Benjamin H. Rossi, Leigh Ann Clayton, John D. Sorkin, Laura Hungerford, (University of Maryland School of Medicine)

Although cohort studies have most commonly examined human subjects, improvements in epidemiologic study design and analyses provide opportunities for understanding difficult problems in small, nonhuman populations. Worldwide, frogs are experiencing catastrophic decline. Understanding effects of morbidity on reproduction is key to managing captive populations with limited resources and a goal of optimizing animal numbers, genetic diversity, and animal welfare. Individually identified, female poison dart frogs at the National Aquarium were followed from metamorphosis to frog stage. The outcome studied was first clutch release; the exposure was illness or injury before egg release or censoring. Frogs were checked daily for morbidity and for eggs and were censored if no eggs were released by death or institutional transfer. We initially used a Poisson regression adjusted for injury (present or absent) and follow-up time. Because frogs with delayed egg release may have more time to experience morbidity (reverse causality), we alternatively examined Cox competing risk (death occurring before egg release) analysis with time varying exposure (i.e. illness or injury). Of 126 female frogs, 44 experienced illness or injury and 37 released egg clutches during follow-up. The Poisson model found that injury was associated with decreased rate of egg release (Rate Ratio=0.84; 95% CI=0.52 to 1.38). The Cox model found that injury was associated with increased egg release (Hazard Ratio=1.94; 95% CI=1.09 to 3.42). This analysis highlights bias due to time-varying exposure and the need for time-varying analyses in studies where exposure can occur after the beginning of follow-up. Additionally, these data support the hormetic theory, that stress can lead to enhanced reproductive success in vertebrates. As a practical result, this study supports the future value of frogs that recover from illness and injury for breeding in conservation of endangered frog populations.
Functional magnetic resonance imaging (fMRI) is a popular technology that measures brain activity by detecting changes associated with blood flow. The fMRI produces a large number of voxels (cubic pixels of the brain volume), thus yielding relatively high spatial-temporal resolution. A task fMRI study collects the brain imaging data while an individual is instructed to accomplish basic tasks such as viewing images and more complex tasks such as logical inference, memorizing, and decision-making. The fMRI data from such studies provides information on behavior, brain development trajectories, and metabolic diseases. A fundamental challenge of fMRI studies has been the limited sample sizes. The main reason for such small sample size is the high scanning cost. If the sample size could be shrunk without compromising the information, a great amount of money could be saved and many additional cohorts could be explored. On the other hand, the rapid technological advances in brain imaging made it possible and routine to obtain high-resolution imaging data. While traditional methods of analysis may have produced acceptable results when the imaging data was in low resolution, the high dimensional images demand better statistical methods for more precise and efficient estimations for task fMRI studies. The goal of this project is to develop novel statistical methodologies for conducting efficient multivariate inferences for task fMRI studies. We apply our method to a task fMRI study.
Prenatal inflammation may be detrimental. Newborn DNA methylation may point to which pathways are impacted but whether it only reflects proximal exposures around delivery or the influence of prenatal inflammation is unclear. We examined DNA methylation using the Infinium MethylationEPIC BeadChip in DNA extracted from cord blood of 391 singletons from the EAGeR Trial (2007-2011). The trial randomized women with previous pregnancy loss to low dose aspirin (LDA) or placebo prior to conception. Maternal levels of high sensitivity c-reactive protein (hsCRP) were measured before pregnancy and at 8, 20 and 36 weeks gestation. Homocysteine was measured prior to pregnancy. Cord blood levels of hsCRP and other cytokines (i.e., interferon gamma, interleukin 1β, IL-2, IL-4, IL-5, IL-10, IL-15, IL-23, TNFα) were measured by a multiplex ELISA. We tested methylation differences with respect to randomization to LDA or placebo and both maternal and neonatal measures of inflammatory markers. Linear mixed models were used to test for associations at each CpG site with adjustment for estimated cell count (using a cord blood reference), maternal age, race, sex and smoking, while correcting for batch effects with random effects and multiple testing with Bonferroni method. Randomization to LDA was not associated with methylation differences. Higher maternal homocysteine was associated with lower methylation at the POLR2B gene ($p=6.7 \times 10^{-9}$) and hsCRP at 36 weeks was associated with lower methylation in a region near DNAJC25 and GNG10 ($p=3.2 \times 10^{-9}$). Many significant associations were identified with cord blood levels of inflammatory markers including 24 CpGs for hsCRP, 6 for interferon gamma, 5 for IL-2, 6 for IL-4, 3 for IL-5, 1 for IL-10, 8 for IL-15, and 4 for IL-23. The strongest association was for neonatal hsCRP and decreased methylation at a CpG near SLC12A9 and TRIP6 ($p=1.8 \times 10^{-52}$). Cord blood DNA methylation strongly reflects newborn inflammation rather than prenatal levels.
Context: Serum 25-hydroxyvitamin D (25(OH)D), dietary and supplemental vitamin D intake influence cognitive outcomes. Objectives: Sex/age-specific and race-specific associations of vitamin D status and intake were examined with longitudinal change in various cognitive domains in a large sample of ethnically and socio-economically diverse US urban adults. Design: Two prospective waves of data from Healthy Aging in Neighborhoods of Diversity across the Life Span (HANDLS) study were used. Setting: Baltimore City, MD, 2004-2013. Participants: U.S. adults aged 30-64y at baseline visit, length of follow-up between visits ±1 (2004-2009) and 2 (2009-2013) with mean follow-up time±SD: 4.64±0.93y. Final analytic sample sizes ranged from 1,231-1,803 participants with 1.5-2.0 visits/participant. Main outcome measures: Cognitive performance was assessed using 11 test scores covering domains of global cognition, attention, learning/memorization, executive function, visuospatial/visuosconstruction ability, psychomotor speed and language/verbal. Serum 25(OH)D, vitamin D intake and use of supplements containing vitamin D were the key exposures. Results: Based on multiple mixed-effects linear regression models, there was a consistent relationship between vitamin D status (overall) and supplemental intake (older women and African-Americans) with a slower rate of decline in visual memory/visuosconstruction abilities and a slower rate of decline in the domain of verbal fluency. Higher dietary intake of vitamin D was linked to slower rate of decline in verbal memory among younger women and a slower rate of decline in visual memory/visuosconstruction abilities among Whites. All other associations were inconsistent. Conclusions: Vitamin D status and intake were inversely related to domain-specific cognitive decline in US urban adults. Larger population studies are needed to replicate our findings.

Background: Intracranial aneurysms (IAs) affect 5-10% of the world population. To date, no nationally-representative study has evaluated treatment outcomes for IA-diagnosed U.S. patients within racial and ethnic groups. Objectives: This study examined how health outcomes varied by treatment and race/ethnicity among hospitalized U.S. patients with IAs. Methods: A retrospective cohort study was conducted using a sample of 62,224 hospital discharges from the 2002-2012 Nationwide Inpatient sample. Logistic regression models evaluated treatment selection as predictor of in-hospital survival (IHS: 'yes', 'no'), length of stay (LOS: ≤7 days, >7 days) and total hospital charges (THC: ≤$75,000, >$75,000), overall and across racial/ethnic groups, taking hospital- and patient-level confounders into account. Results: Compared to “clipping”, “balloon/stent-assisted coiling” was associated with better IHS (unadjusted model only), whereas “combination of treatments” were associated with lower IHS (unadjusted and adjusted models). Compared to “clipping”, LOS≤7 days was less likely in patients with “combination of treatments”, and more likely among patients with “endovascular coiling”. THCs >$75,000 was more common with “endovascular coiling alone”, while being less common for “combination of treatments” or “balloon/stent-assisted coiling”, as compared to “clipping”. Observed relationships varied by race and ethnicity (P interactions<0.001). “Combination of treatments” was associated with less IHS among Blacks alone and with THC ≤$75,000 treatment among Whites and Hispanics alone, whereas “balloon/stent-assisted coiling” was inversely related to THCs ≤$75,000 among Whites and directly related to THCs >$75,000 among Hispanics. Conclusions: Racial and ethnic subgroups of IA patients experienced differential IHS and THC by treatment selection.
FOODBORNE ILLNESS IN THE ELDERLY IN MOROCCO: A 17-YEAR RETROSPECTIVE STUDY Fatine Hadrya*, Hinde Hami, Fatine Hadrya, (Laboratory of Genetics and Biometry, Faculty of Science, Ibn Tofail University, Kenitra, Morocco)

Background: Several studies have shown that foodborne diseases affect both young and older people. The aim of this study is to evaluate the epidemiological surveillance system for foodborne illnesses in the elderly used to determine the main characteristics of food poisoning in Morocco in order to reduce morbidity and mortality. Methods: This is a retrospective analysis of food poisoning cases, reported to the Moroccan Poison Control Center during the period 1992-2008. Results: There were 61 cases of foodborne illnesses, aged 75 to 98 years in Morocco. Both men and women were affected in the same way (p=0.37). The most commonly implicated food vehicles were dairy products, with 32% of cases. According to recorded data, all of the patients had digestive disorders ranging from abdominal pain to gastrointestinal bleeding. Three of these cases showed neurological symptoms, one patient had tachycardia and another patient asthenia. After an average delay in presentation to hospital of seven hours, the patient’s status has improved, especially under gut decontamination. Conclusions: The assessment of foodborne illness surveillance systems remains complicated by several factors such as under-reporting, lack of data on types of the disease and lack of laboratory testing.


Background: Studies show that circulating levels of 25-hydroxyvitamin D3 (vitamin D3) are lower in persons with higher adiposity levels. According to U.S. national data, law enforcement officers have the highest prevalence of obesity. Therefore, this study examined relationships between adiposity measures and serum concentration of vitamin D3 among 281 police officers, stratified by gender. Methods: Data were obtained from the Buffalo Cardio-Metabolic: Occupational Police Stress Study (2011-2016). Measures of adiposity were waist circumference (WC), abdominal height (AHI), body mass index (BMI), percent of body fat (PBF), fat mass index (FMI), and WC-height ratio (WCHR). Associations of these measures with vitamin D3 were obtained using multiple regression models after adjustment for age, race/ethnicity, sex (in Buffalo, NY) multi-vitamin supplement, and high-density lipoprotein cholesterol. Results: The average age of officers (71.5% men) was 48.2 years. The prevalence of obesity (BMI≥30 kg/m2) was 50.7% for men and 21.3% for women. Mean level of vitamin D3 in 28.7 ng/mL for men and 30.0 ng/mL for women. After adjustment, all measures of adiposity were inversely associated with vitamin D3 among women WC (beta coefficient=0.22±0.10, p=0.037), AHI (β=-0.46±0.42, p<0.0014), BMI (β=-0.73±0.23, p<0.002), PBF (β=-0.48±0.21, p<0.003), FMI (β=-1.06±0.36, p<0.0004), and WCHR (β=-0.41±0.16, p=0.013). Among men, there were no significant associations between the measures and vitamin D3 except for the association between FBF and vitamin D3 (β=-0.30±0.04, p=0.039). Conclusion: The selected adiposity measures were inversely associated with vitamin D3 mostly among female officers. Male and female officers have different distributions of adiposity, which may be reflected in the different vitamin D3 levels and associations with the adiposity measures.

DIETARY PATTERNS IN A FRENCH-SPEAKING POPULATION IN MONTREAL, CANADA AND PROSTATE CANCER RISK Marie-Elise Parent*, Karine Trudeau, Marie-Claude Rousseau, Dr. Irini Cazmoudi, Dr. Marie-Elise Parent. (School of Public Health, University of Montreal, Montreal, QC, Canada)

Other than obesity for advanced prostate cancer (PCa), modifiable risk factors have not been identified. However, there is great interest in the role of diet in PCa prevention. Dietary patterns, which consider foods in combination rather than the consumption of specific nutrients, constitute a promising research approach. We evaluated the role of dietary patterns on PCa risk in a case-control study conducted in the French-speaking population in Montreal, Canada, who tend to share cultural and dietary habits, as well as genetic similarities. Cases (n=5099) and controls (n=5010) were histologically confirmed for PCa in 2005-2009. Controls (n=5010) were randomly selected from the permanent electoral list and matched to cases by age (±5 years). A 63-item food frequency questionnaire focusing on the 2 years prior to diagnosis/interview was administered during in-person interviews. Principal component analysis followed by orthogonal rotation allowed the identification of three dietary patterns among controls, namely: “Healthy Eating”, “ Meat and Alcohol” and “Carbohydrates and Beverages” patterns. Unconditional logistic regression was used to estimate the association with PCa when comparing those who consumed the most (highest quartile) vs. the least (lowest quartile) of foods typical of each dietary pattern while adjusting for age, ethnicity, education, family history of PCa, time since last PCa screening, and total calories. Men who followed a "Healthy Eating" pattern had a decreased risk (OR=0.74 [95% CI: 0.60-0.91]) while those who followed a "Carbohydrates and Beverage" pattern had an increase risk (OR=1.31 [95% CI: 1.05-1.63]) of PCa. Unexpectedly, men with aggressive PCa (Gleason score of 7 with a primary score of 4, or higher), in the highest quartile of the “Meat and Alcohol” pattern had a lower risk of PCa (OR=0.72 [95% CI: 0.53-0.99]) than those in the lowest quartile. These results suggest that dietary patterns may play a role on the risk of developing PCa.

A JOINT MODEL APPROACH TO DYNAMIC PREDICTION OF THE RISK OF CLASS II/II OBESITY USING LONGITUDINALLY-MEASURED BODY MASS INDEX: THE INTERNATIONAL CHILDHOOD CARDIOVASCULAR COHORT (ICCC) CONSORTIUM Nanhai Zhang*, Si Cheng, David R. Jacobs Jr., Tian Hu, Alan Simakou, Julia Steinberger, Trudy L. Burazin, Elaine M. Ursin, Olli Rahikari, Allison Vett, Lydia Bazzano, Jessica G. Woo, (Cincinnati Children's Hospital Medical Center)

Objective: Longitudinally measured body mass index (BMI) can be an important predictor for developing class II/II obesity. Our objective was to take into account the dependency and association between longitudinally measured BMI and time to develop class II/II obesity using the joint model approach. The model is the first to link the childhood BMI trajectory to the risk of class II/II obesity in adulthood. Methods: The ICCC Consortium consists of seven long-standing cohorts, each of which measured BMI and cardiovascular risk factors in childhood during the 1970s and 1980s. 4,085 individuals with at least three BMI measures during childhood (<20 years old) and at least one BMI measure in adulthood (≥24 years) from the ICCC Consortium were included in the analysis. Class II/II obesity in adulthood was defined as BMI ≥35 kg/m2. A linear mixed model was used to model the childhood BMI trajectory over age via natural cubic spline, and the age until developing class II/II obesity in adulthood was modeled using a Cox proportional hazards model. The two models were linked through the trajectory function. Data for 90% of the individuals were used to fit the joint model, and the other 10% were used to validate the model. Results: The model revealed a significant association between the longitudinal trajectory of BMI and the age until developing class II/II obesity (p-value < 0.01). Application of the model to the validation dataset indicated significant accuracy for predicting the risk of class II/II obesity (area under the ROC curve = 0.77). The model can provide dynamic individualized prediction of the risk of developing class II/II obesity in adulthood BMI measurements are updated. Conclusions: Our findings suggest that joint modeling provides a robust and individualized method for predicting the risk of developing class II/II obesity in adulthood using longitudinally-measured BMI during childhood.
LONG-TERM REDUCTION IN CARDIOMETABOLIC CONDITIONS FOLLOWING BARIATRIC SURGERY IN MEDICAID AND COMMERCIALLY INSURED PATIENTS Erin Takemoto 

Bariatric surgery is the most durable obesity treatment with demonstrated potential to alleviate the heavy burden of cardiometabolic disease (CMD) among patients with severe obesity. Bariatric surgery effectiveness among Medicaid patients, a population with the highest burden of CMD, remains unclear. We sought to determine if the risk of CMD following bariatric surgery differs in Medicaid compared to commercially insured patients. Data were obtained from the Longitudinal Assessment of Bariatric Surgery, an observational cohort study of adults undergoing bariatric surgery (2006-2009) at one of 6 geographically diverse centers in the US. We identified 1201 patients that underwent Roux-en-Y Gastric Bypass and were followed for 5 years. Poisson mixed models with robust error variance were used to estimate RRs and compute group-level CMD (CVD) in common CMDs (Type 2 diabetes mellitus [DM] by pretreatment [HTN]; dyslipidemia [DYS]) between insurance groups over time. Continuous time was coded into 2 linear spline functions with a knot at 1-year post-surgery to allow for non-linear changes. Interactions between time and insurance group allowed differential estimates for Medicaid (N=152) and commercially insured (N=1049) patients. In years 0-4 post-surgery, Medicaid and Commercial patients both experienced substantially lower risk of disease [RR (95% CI) DM 0.40 (0.28, 0.56) vs. 0.32 (0.27, 0.38); HTN 0.61 (0.51, 0.75) vs. 0.42 (0.38, 0.47); DYS 0.66 (0.56, 0.77) vs. 0.57 (0.54, 0.61), respectively. In years 1-5 post-surgery, the risk of disease increased minimally in both groups, all RRs ranging from 1.0 to 1.1. Both patient groups experienced a substantial decrease in the risk of CMD post-surgery and experienced minimal increases in the risk beyond 1 year post-surgery. These results provide important evidence for the beneficial association between surgery and long-term reduction in CMD among Medicaid patients.

S/P indicates work done while a student/postdoc


Background: physical activity can be associated with bioimpedance phase angle. Methods: We conducted a systematic review and meta-analysis to assess the association between physical activity (STPA) and bioimpedance phase angle (BPA). MEDLINE, EMBASE, Cochrane Central Register of Controlled Trials, Scielo, Lilacs, SportDiscus, Singh and Web of Science were searched. Two reviewers assessed independently study eligibility and risk of bias. We synthesized study results using a random-effects model. The association between physical activity and BPA was assessed considering study design. Results: Nine studies, involving a total of 575 participants were included in the meta-analysis. Cross-sectional studies: the active subjects presented a higher BPA mean value when compared to controls (MD=0.07, 95%CI: 0.00 to 0.14, P=0.010) with low heterogeneity (I² = 0%). Longitudinal studies (active v. controls): the difference of BPA between groups is significantly higher for the active group when compared to the control group (MD=0.02, 95%CI: 0.01 to 0.03, P=0.001) with low heterogeneity (I²=13%, P=0.331). No evidence of publication bias was found and the overall risk of bias was moderate to high. Conclusions: Physical activity has a positive association with bioimpedance phase angle; these results reinforce the importance of including exercise routinely in healthcare, both for disease prevention and for a better prognosis in chronic diseases.

NUTRITION/OBESITY


DIET QUALITY DURING PREGNANCY AND FETAL GROWTH: A MULTIRACIAL PREGNANCY COHORT STUDY Yei Zhu* Yei Zhu, Monique M. Henderson, Susha Sridhar, Juannan Feng, Fei Xu, Anjumini Ferrara, (Kaier Permanente Northern California Division of Research)

Objectives: Emerging evidence suggests that nutritional perturbations during pregnancy may impact fetal growth and disease risk in later life, although with inconsistent data on individual foods or nutrients. Data on overall dietary intake during pregnancy in relation to fetal growth are limited. We aimed to investigate the prospective association of Healthy Eating Index-2010 (HEI-2010) scores during pregnancy with birthweight z-score and risk of small-for-gestational age (SGA) and large-for-gestational age (LGA). Methods: In a prospective cohort of 2,107 singleton pregnancies in the Pregnancy Environment and Lifestyle Study, maternal dietary intake was assessed by a food frequency questionnaire during early pregnancy. Offspring birthweight and gestational age at delivery were obtained from medical records. SGA for gestational age was categorized according to gestational age, sex, and race/ethnic specific birthweight distribution in the underlying population. Linear regression and Poisson regression with robust standard errors were used for major risk factor effects. Results: Total HEI-2010 score ranged from 37.5 to 94.2 (mean: SD 71.2 ± 10.0). After adjusting for covariates, HEI-2010 score was significantly and inversely associated with birthweight z-score (β-competing the highest vs. lowest quintiles = -0.14, 95% confidence interval CI: -0.25, -0.02). Consistently, HEI-2010 score competing the highest vs. lowest quintile was associated with a 45% decreased risk of LGA [adjusted relative risk (ARR) = 0.55, 95% CI 0.32, 0.95, P-for-trend = 0.036]. The corresponding AR was 0.67 (95% CI 0.46, 0.99) comparing good vs. poor diet quality defined by the cutoff of 75th percentile (ie. vs <75th). No significant associations were observed for HEI-2010 in relation to SGA risk. Conclusions: Better diet quality during pregnancy may reduce risk of LGA. Our findings may inform potential upstream prevention strategies to mitigate risk of fetal growth extremities.

SIP indicates work done while a student/postdoc

NORMAL WEIGHT CENTRAL OBESITY IN RELATION TO ALL-CAUSE AND CAUSE-SPECIFIC MORTALITY IN WOMEN: RESULTS FROM THE WOMEN'S HEALTH INITIATIVE Yangbo Sun* Yangbo Sun, Xuan Liu, Linda G. Snetselaar, Jennifer G. Robinson, Robert B. Wallace, Bette J. Caan, Thomas E. Rohan, Mariza L. Netuhauer, Aladdin H. Shadyab, Rowan T. Chlebowski, JoAnn E. Manson, Wei Bao, (University of Iowa)

Background: Central obesity, reflected by high waist-to-hip ratio (WHR), is present among 10% of individuals with normal body mass index (BMI). However, current public health guidelines focus on BMI and ignore central obesity. The risk of all-cause and cause-specific mortality associated with normal weight central obesity relative to other combinations of BMI and WHR remains unclear. Methods: We analyzed data on 15,1784 postmenopausal women in the Women's Health Initiative. BMI was classified as normal weight, ≤85th BMI:25, overweight, ≥85th BMI:30, and general obesity, BMI≥30. Central obesity was defined as WHR≥0.85. We used multivariable Cox proportional hazards models to estimate adjusted HRs of all-cause, CVD and cancer mortality in relation to different combinations of BMI and WHR. Results: During 17.9 years follow-up, 42,266 deaths occurred including 12,430 CVD and 11,454 cancer deaths. After adjustment for demographic characters, socioeconomic status, lifestyle factors, hormone use and baseline health status, compared with participants with normal weight and without central obesity, the HR (95% CI) for all-cause mortality was 1.28 (1.22, 1.34) for those with normal weight and central obesity, 0.95 (0.92, 0.98) for those overweight but without central obesity, 1.13 (1.09, 1.17) for those overweight with central obesity, 1.10 (1.06, 1.13) for those with general obesity but without central obesity, and 1.31 (1.27, 1.35) for those with general obesity and central obesity. The corresponding HRs (95% CI) were 1.25 (1.15, 1.36), 1.01 (0.95, 1.06), 1.21 (1.15, 1.29), 1.23 (1.16, 1.31), and 1.47 (1.39, 1.56), respectively, for CVD mortality and 1.24 (1.13, 1.36), 1.01 (0.96, 1.07), 1.20 (1.15, 1.26), 1.14 (1.07, 1.21), and 1.36 (1.28, 1.44), respectively, for cancer mortality. Conclusions: Individuals with normal weight central obesity present a high-risk population for all-cause, CVD and cancer mortality. These findings should inform future public health guidelines.
OBESITY IN PEDIATRIC LIVER TRANSPLANTATION (LT) Karina Covarrubias, Karina Covarrubias, Dorry L. Segev, Jacqueline Giromini-Wang, Xin Luo, Allen Matske, Morgan Deshard, Douglas Mogul (Johns Hopkins University School of Medicine)

The prevalence of obesity in children undergoing LT now exceeds that of the general population. Pediatric data on post-LT outcomes is limited and has not accounted for age-specific guidelines for defining obesity. We hypothesized that obese children experienced worse outcomes after LT. Using SRTR data, we explored the differences in graft failure (GF) and mortality for first-time pediatric liver transplant recipients (2002-2016) stratified by age (<24 months [infants], n=2716; 2-6 years [children], n=3131). Weight categories were defined using CDC standards. We used Cox proportional hazards models to evaluate the associations between standardized weight and GF and mortality after adjusting for age, gender, hospitalization status, diagnosis, race, graft type, and insurance. There was a no difference in the hazard ratio for GF or mortality in underweight (aHR:1.11 [0.81, 1.51]; P=0.5; 0.54, 1.34] vs normal weight infants). There was no difference in the hazard ratio for GF or mortality in overweight (aHR:1.17 [0.89, 1.53]; P=0.3; 1.17, 1.53] or obese children compared to normal weight infants. There was no difference in the hazard ratio for GF or mortality in underweight (aHR:1.21 [0.89, 1.66]; P=0.3; 0.93, 1.66] vs normal weight infants). Obese children experienced worse outcomes after LT. Physicians should emphasize on self-monitoring of dietary intake, and further recommend a low GL diet to promote optimal GL control.

Background: Iodine deficiency has long been recognized as an important public health problem. Global approaches such as salt iodization that aim to overcome iodine deficiency have been successful. Meanwhile, they have led to excessive iodine consumption in some populations, thereby increasing the risks of iodine-induced thyroid dysfunction, as well as the comorbidities and mortality associated with hypothyroidism and hyperthyroidism. We aimed to elucidate whether iodine intake is associated with mortality among U.S. adults. Methods: This is a prospective cohort study to examine mortality risks according to urinary iodine concentrations (UIC) utilizing a nationally representative sample of 12,264 adults ages 20 to 80 years enrolled in the National Health and Nutrition Examination Survey (NHANES) III. Crude and multivariable Cox proportional hazards regression models were employed to investigate the association between UIC (very low, 0-49; low, 50-99; normal, 100-299; high, 300-399; and very high, >400 µg/L) and mortality (all-cause, cardiovascular, and cancer). In a sensitivity analysis, we adjusted for total sodium intake and fat/calorie ratio in addition to other potential confounders. Results: Over a median follow-up of 19.2 years, there were 3,159 deaths from all causes. Participants with excess iodine exposure (UIC >400 µg/L) were at higher risk for all-cause mortality compared to those with adequate iodine nutrition (HR, 1.19; 95% CI, 1.04-1.37). We also found elevated HRs of cardiovascular and cancer mortality, but the 95% CI of our effect estimates included the null value for both outcomes. Low UIC was not associated with increased mortality. The results did not change substantially after adjusting for total sodium intake and fat/calorie ratio. Conclusion: Higher all-cause mortality among those with excess iodine intake, compared with individuals with adequate iodine intake, highlights the importance of monitoring population iodine status.

OBJECTIVES: To investigate whether dietary glycemic index (GI) and glycemic load (GL) are prospectively associated with type 2 diabetes mellitus (T2DM) incidence in middle-aged and older Korean adults. Methods: We used data from the Korean Genome and Epidemiology Study. In total, 7,294 Korean adults (aged 40-69 years) with no history of T2DM or cancer at baseline were followed-up, with biennial examinations, for 10 years. Dietary GI and GL were estimated based on baseline dietary information obtained from a 100-item food-frequency questionnaire. Incident T2DM was diagnosed if the participants had fasting blood glucose levels ≥126 mg/dL or postprandial 2-hour glucose levels ≥200 mg/dL in their follow-up examinations. We also included participants who were newly diagnosed with T2DM or taking anti-diabetic medications at or between the follow-ups. With adjustment of the covariates, multivariable Cox proportional hazards models were performed to identify the associations between dietary carbohydrate indicators and T2DM incidence. Results: We documented 1,259 cases of T2DM after an average follow-up period of 7.7 years. In the fully adjusted model, men in the highest tertile of dietary GI had an approximately 20% higher rate of incident T2DM (adjusted HR, 1.16; 95% CI, 1.01-1.33; P for trend <0.05) than those in the lowest dietary GI tertile. Likewise, women with the highest dietary GI had a 23% higher risk of developing T2DM (adjusted HR, 1.23; 95% CI, 1.03-1.43; P for trend <0.05) than those in the lowest dietary GI tertile. However, no association was observed between dietary GI and T2DM incidence in both sexes. Conclusions: The results of this prospective cohort study suggest that dietary GI contributes to the development of T2DM in Korean adults who consume a substantially high carbohydrate diet. Therefore, nutrition education for this population should involve an emphasis on self-monitoring of dietary intake, and further recommend a low GI diet to promote optimal GI control.

Objective: Workplace discrimination and bullying are challenging problems empirically linked to adverse health in previous studies. National prevalence estimates of workplace discrimination and bullying were generated and their association examined overall, race, sex, and income subgroups. Methods: Participants were 4,798 employed black and white men and women aged ≥45 years from a national community-based cohort, the REGARDS Geographic and Racial Differences in Stroke occupational ancillary study. Workplace discrimination (by race, sex, age, and income) and bullying in the current job were measured by computer-assisted telephone interview (2011-2013): dichotomous responses (yes, no) were reported and a composite measure of discrimination was defined (yes to one or more). Prevalence estimates and age- and region-adjusted risks were derived using SUDAAN to account for the complex sample design. Results: This sample comprised 11% blacks and 47% whites. The overall prevalence of workplace discrimination was 14%, ranging from 25% for black women (BW), 18% for black men (BM), 16% for white women (WW), to 11% for white men (WM). Blacks reported a 60% higher rate of discrimination compared to whites; women reported a 53% higher prevalence of discrimination compared to men. The overall prevalence of workplace bullying was 10%, ranging from 13% for BW, 12% for WW, 11% for BM, to 8% for WM. Women reported a 52% higher prevalence of bullying compared to men. Race differences in bullying were not significant. Discrimination was significantly associated with bullying; bullying prevalence was 4 to 8 times higher among those reporting discrimination compared to those reporting none. Conclusions: Blacks and whites reported the highest prevalence of discrimination and bullying, and discrimination was an important determinant of bullying. Targeted interventions are warranted to reduce workplace discrimination and bullying.

S/P indicates work done while a student/postdoc

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DEPRESSIVE SYMPTOMS IN POLICE OFFICERS, GENDER, AND THE RETINAL VASCULATURE Luenda E. Charles* Luenda E. Charles, Anna Mnatsakanova, (NIOSH, CDC)

Objective: Depression has adverse consequences on the vascular system. Police officers experience stressful physical and psychological work-related events and may be more prone to depressive symptoms as a result of their exposure to these stressors. The objective of our study was to investigate associations of depressive symptoms with central retinal arteriolar equivalents (CRAE), a measure of retinal arteriolar width, and central retinal venular equivalents (CRVE), a measure of retinal venular width. Analyses were stratified by gender. Methods: Participants were 221 police officers from the Buffalo Cardio-Metabolic Occupational Police Stress study. Depressive symptoms were assessed using the Center for Epidemiologic Studies Depression scale (CES-D) and the Beck Depression Inventory-II (BDI-11). Four police officers from the Buffalo Cardio-Metabolic Occupational Police Stress study.

Results: The average age of the officers (73.1% men) was 48.9 ± 8.2 years. Women had a significantly higher mean level of depressive symptoms than men overall, depressive symptoms were not significantly associated with CRAE or CRVE. However, after gender-stratification, the mean CRVE (but not CRAE) significantly increased with higher tertiles of CES-D (T1=214.2 ± 2.98; T2=225.2 ± 3.02; and T3=225.4 ± 2.28; p for trend=0.029) and higher tertiles of BDI-11 (T1=213.0 ± 4.08; T2=223.2 ± 2.66; and T3=224.9 ± 2.29; p for trend=0.040) among women only, after adjustment for age, race/ethnicity, and smoking history.

Conclusions: Higher levels of depressive symptoms were associated with wider (i.e., worse) retinal venules for trend=0.040) among women only, after adjustment for age, race/ethnicity, and smoking history. Conclusions: Higher levels of depressive symptoms were associated with wider (i.e., worse) retinal venules for trend=0.040) among women only, after adjustment for age, race/ethnicity, and smoking history.

S/P indicates work done while a student/postdoc

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RECENT OCCUPATIONAL PESTICIDE EXPOSURE AND SERUM THYROID MARKERS IN THE AGRICULTURAL HEALTH STUDY Catherine Lerro*, Catherine Lerro, Laura Beane Freeman, Curt Dellavalle, Muhammad Khilya, Brian Aschebrook-Kilfoy, Farzana Jasmine, Stella Kostros, Christine Parks, Dale Sandler, Michael Alavanja, Mary Ward, Catherine Lerro*, Laura Beane Freeman, Curt Dellavalle, (NIOSH, CDC)

Background: Animal studies suggest that exposure to pesticides may alter thyroid function; however, few epidemiologic studies have examined this association. We evaluated the relationship between pesticides and thyroid function in 679 male farmers enrolled in the Biomarkers of Exposure and Hect in Agriculture (BEHA) study, a sub-study of the Agricultural Health Study cohort. Methods: We obtained self-reported occupational use of pesticides in the last year and blood samples at BEHA enrollment (2010-2013). In serum, we measured thyrotropin-stimulating hormone (TSH), thyroxine (T4), and triiodothyronine (T3) using Millipore multiplexing kits, and anti-thyroid peroxidase antibodies (anti-TPO) using a Luminescent-based kit. We evaluated 19 pesticides with five exposed subclinical hypothyroidism cases (defined TSH>4.5 mIU/L). We used logistic regression to evaluate anti-TPO positivity and subclinical hypothyroidism, and linear regression to estimate associations for continuous T4 and T3, adjusting for age, state, body mass index, smoking history, and past exposure (prior to the last 12 months) to pesticides previously shown to be associated with thyroid function (aldrin, dicofol, chlorpyrifos, and methyl bromide). Results: The herbicide glyphosate was inversely associated with subclinical hypothyroidism (OR=0.60, 95% CI=0.39-0.92), while another herbicide, dicamba, was associated with 9.76 ng/dL (95% CI=1.30-18.21) increase in T3 (inter-quartile range [IQR] 101-138 ng/dL). The organophosphate insecticide chlorpyrifos was associated with anti-TPO positivity (OR=3.05, 95% CI=2.0-7.78) and higher T4 (0.52 ng/dL, 95% CI=0.07-0.96, IQR 6.00-7.51 ng/dL). There were no other statistically significant associations. Conclusions: Preliminary results suggest that recent exposure to glyphosate, dicamba, and chlorpyrifos may alter thyroid function among male pesticide applicators. Further work is needed to understand how the intensity and timing of recent exposure impacts these associations.
EDITORIAL AUTHORSHIP IN EPIDEMIOLOGIC JOURNALS

Riaz Qureshi* Riaz Qureshi, Jimmy Le, Tianjing Li, Michel Ibrahim, Kay Dickersin,
(Johns Hopkins Bloomberg School of Public Health, Department of Epidemiology)

Background: Journal editors invite accomplished individuals to write editorials. We studied the distribution of gender among authors who were editors for 5 high-impact epidemiology journals between 2010 and 2017. Methods: We searched MEDLINE to identify articles meeting our eligibility criteria indexed as "editorial," published between 2010 and 2017, inclusive; having named author(s) and in a journal with "epidemiology" in the name, publishing primary research, and with the five highest Scopus 2016 impact factors. We imported citations into EndNote X8. Two investigators independently classified author gender based on name or professional profile and noted discrepancies by discussion. We assessed proportion of women editorial authors overall, by journal, year, and authorship order, and whether this differed significantly from an expected 50%. We performed analyses using Stata 13. Results: We identified 169 authors associated with 212 eligible editorials in the American Journal of Epidemiology, Clinical Epidemiology, European Journal of Epidemiology, International Journal of Epidemiology, and Journal of Clinical Epidemiology. Although 28% (47/169) of unique authors were women, they comprised only 19% (85/433) of listed authors. Women's authorship was less than 50% in all journals and appeared to be differentially represented by journal but by year of publication. Of editorials with a single author, 22% (44/196) were authored by women, and of editorials with two or more authors, the proportions of women first and last authors were 14% (21/147) and 25% (37/147), respectively.

Conclusions: Women are underrepresented in editorial authorship in high-impact epidemiology journals. The results of this study will be made available to editors in the hope that it may begin a discussion of contributing factors and ways to remedy the situation.

TRENDS IN PREEXISTING COMORBID CONDITIONS IN OLDER PATIENTS WITH INCIDENT END-STAGE KIDNEY DISEASE: INITIATING HEMODIALYSIS VERSUS PERITONEAL DIALYSIS

Jingbo Niu* Jingbo Niu, Wolfgang C. Winkelmaier, (Baylor College of Medicine)

The presence of several comorbidities affects survival in patients with end-stage kidney disease (ESKD). Over time, incident ESKD patients have had an increasing comorbidity burden, with hemodialysis (HD) patients generally living more comorbidities than peritoneal dialysis (PD) patients. Whether these differences have changed over time is not sufficiently studied. We used the US Renal Data System (1996-2013) to compare the time trends of preexisting comorbidities in HD and PD patients. Patients 67 years who initiated dialysis for ESKD were eligible if they had been enrolled in Medicare. At the end of the 2 years pre-ESKD. Comorbidities were defined based on pre-ESKD Medicare claims and Medical Evidence Reports. Prevalence differences in PD vs HD over time were compared using Poisson regression models with robust variance, adjusting for age, sex, ethnicity, and Medicaid dual eligibility. Hypertension remained high (90%) throughout in both groups. Prevalence of diabetes was slightly lower in PD than HD in 1996 and the difference increased due to faster rise in HD over time, with a 6.0% [95% CI: 9.3%, -2.7%] greater difference between PD and HD in 2013 vs. 1996. Similar time trends were observed for atrial fibrillation and pulmonary hypertension. Prevalence of cardiovascular disease was similar in HD and PD in 1996 and decreased over time in both groups, but faster in PD with a -10.3% [95% CI: -13.6%, -7.1%] greater decline than HD in 2013 vs. 1996. Similar trend was observed for heart failure. Prevalence of cerebrovascular disease and peripheral vascular disease were lower in PD than HD in 1996 and decreased over time in PD but not in HD. In conclusion, the difference in comorbidity burden between PD and HD has increased from 1996 to 2013 independent of changes in sociodemographic characteristics.

LONG-TERM RENAL FUNCTION IN LIVING KIDNEY DONORS WITH RENAL CYSTS

Madeleine Waldram* Madeleine Waldram, Alvin Thomas, Courtenay Holscher, Anh Nguyen, Samantha Halpern, Saad Anjum, Jennifer Alejo, Robert T. Selby, (University of Minnesota)

Background: Pet ownership has been inconsistently associated with health benefits in humans, and may depend on the bond between owner and pet. We examined predictors of considering cats or dogs as family members at the 2015 Minnesota State Fair. Methods: Adult Minnesota residents visiting the University of Minnesota exhibit were asked about their pets as well as completing demographic and behavioral questionnaires. Exposures included age, sex, race, body mass index (BMI), marital status, having children, working full-time, education level, home ownership, smoking and drinking, and scores on a mental and physical quality of life survey in addition to whether pets lived inside. Predictors of considering pets as family members were determined using stepwise logistic regression with a 2-sided type I error of 0.05 considered statistically significant. C-statistics were used to assess goodness-of-fit. Results: Of the 639 participants, 54.5% were women, 9.4% were white, 69.8% married, 69.2% never smokers, 74.2% had no children, 71.5% had at least a college education, and 77.8% lived in suburbanurban compared to rural Minnesota based on zip code. Mean standard deviation for age was 48.9±14.6 years, and mean BMI was 27.3±6.0 kg/m². Results: There were 190 cat owners and 261 dog owners, with 79.4% and 90.4% considering them as family members, respectively. For cats, multivariable predictors of family membership were urban residence (OR: 95% CI: 1.49, 16.5) and living inside (OR: 5.29 [1.50, 18.7]), p=0.021. For dogs, urban residence (OR: 3.30 [1.35, 8.03]) and living inside (OR: 5.27 [2.15, 12.9]) were also statistically significant predictors. Conclusions: These data suggest limited predictors can determine factors associated with bonding with good model fit. Lifestyle factors and role of pets in households may explain the discrepancies in their association with human health between studies. Replication in other populations is needed.

PREDICTORS OF BONDING WITH PETS IN A POPULATION-BASED SAMPLE

Pamela J. Schreiner* Pamela J. Schreiner, (University of Minnesota)

Background: In the context of a severe organ shortage, live donor kidney transplantation is the best treatment option for patients with end-stage renal disease (ESRD) and offers a solution to the donor shortage. Preoperative factors, which may indicate subclinical renal impairment at the time of donation, have been continuously enrolled in Medicare claims and Medical Evidence Reports. Patients 67 years who initiated dialysis for ESKD were eligible if they had been enrolled in Medicare. At the end of the 2 years pre-ESKD. Comorbidities were defined based on pre-ESKD Medicare claims and Medical Evidence Reports. Prevalence differences in PD vs HD over time were compared using Poisson regression models with robust variance, adjusting for age, sex, ethnicity, and Medicaid dual eligibility. Hypertension remained high (90%) throughout in both groups. Prevalence of diabetes was slightly lower in PD than HD in 1996 and the difference increased due to faster rise in HD over time, with a 6.0% [95% CI: 9.3%, -2.7%] greater difference between PD and HD in 2013 vs. 1996. Similar time trends were observed for atrial fibrillation and pulmonary hypertension. Prevalence of cardiovascular disease was similar in HD and PD in 1996 and decreased over time in both groups, but faster in PD with a -10.3% [95% CI: -13.6%, -7.1%] greater decline than HD in 2013 vs. 1996. Similar trend was observed for heart failure. Prevalence of cerebrovascular disease and peripheral vascular disease were lower in PD than HD in 1996 and decreased over time in PD but not in HD. In conclusion, the difference in comorbidity burden between PD and HD has increased from 1996 to 2013 independent of changes in sociodemographic characteristics.

LONG-TERM RENAL FUNCTION IN LIVING KIDNEY DONORS WITH RENAL CYSTS

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Background: In the context of a severe organ shortage, live donor kidney transplantation is the best treatment option for patients with end-stage renal disease (ESKD) and offers a promising solution to the donor shortage. Preoperative factors, which may indicate subclinical renal impairment at the time of donation, have been continuously enrolled in Medicare claims and Medical Evidence Reports. Patients 67 years who initiated dialysis for ESKD were eligible if they had been enrolled in Medicare. At the end of the 2 years pre-ESKD. Comorbidities were defined based on pre-ESKD Medicare claims and Medical Evidence Reports. Prevalence differences in PD vs HD over time were compared using Poisson regression models with robust variance, adjusting for age, sex, ethnicity, and Medicaid dual eligibility. Hypertension remained high (90%) throughout in both groups. Prevalence of diabetes was slightly lower in PD than HD in 1996 and the difference increased due to faster rise in HD over time, with a 6.0% [95% CI: 9.3%, -2.7%] greater difference between PD and HD in 2013 vs. 1996. Similar time trends were observed for atrial fibrillation and pulmonary hypertension. Prevalence of cardiovascular disease was similar in HD and PD in 1996 and decreased over time in both groups, but faster in PD with a -10.3% [95% CI: -13.6%, -7.1%] greater decline than HD in 2013 vs. 1996. Similar trend was observed for heart failure. Prevalence of cerebrovascular disease and peripheral vascular disease were lower in PD than HD in 1996 and decreased over time in PD but not in HD. In conclusion, the difference in comorbidity burden between PD and HD has increased from 1996 to 2013 independent of changes in sociodemographic characteristics.
HOW VALID ARE SMALLER GROUP ESTIMATES WHEN USING CITYWIDE TELEPHONE SURVEY DATA? A COMPARISON OF TWO SURVEYS IN NEW YORK CITY. Aldo Castro, Aldo Castro, Jillian Jessup, Sue Yan Liu, Carmen Jassil, David B. Hamit, Simin Hua, Fangtiao He, Amber Leavon Seligson, Shangwu Lin (New York City Department of Health and Mental Hygiene)

Population-level surveys like the New York City Community Health Survey (CHS) are essential to public health surveillance and practice. However, it can be challenging to get reliable estimates for smaller geographic or demographic groups. To determine whether a citywide sample yields similar health estimates as a targeted sample for Latinos in the Bronx, we used baseline face-to-face questionnaire (2009-2012) data from the Bronx site of the Hispanic Community Health Study/Study of Latinos (HCHS/SOL), a population-based cohort study of Hispanics/Latinos in 4 U.S. cities, to compare prevalence estimates of selected self-reported conditions from CHS data (collected via phone interviews) for the Latino population living in a comparable geographic area of the Bronx. We identified ZIP codes in the Bronx that include with the HCHS/SOL Bronx catchment area. Using a CHS data for 2009–2013, we calculated age-adjusted prevalence estimates for obesity, hypertension, diabetes, smoking, and insurance coverage among Latinos within these ZIP codes. Estimates were calculated overall and stratified by selected demographics. Estimates were adjusted for complex sampling designs and weighted to population data. We tested differences in prevalence estimates using a t-test with pooled variance. Prevalence estimates were significantly higher in HCHS/SOL compared with CHS for obesity (HCHS/SOL estimate – CHS estimate = $\Delta = 14.4\%$, $p<0.01$) and current smoking ($\Delta = 4.9\%$, $p<0.01$), insulin resistance ($\Delta = 1.2$, $p<0.05$) and hypertension ($\Delta = 0.7$, $p<0.05$). When stratified by sex, hypertension estimates were significantly different for men ($\Delta = 7.6\%$, $p<0.01$) and women ($\Delta = 4.7\%$, $p<0.01$). Stratified by geography and Latino-ethnicity, we found that CHS data yielded similar estimates of select conditions to HCHS/SOL data, except for obesity and current smoking. Sampling strategies or modes of data collection may contribute to these differences.

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CLINICAL UTILITY AND INTERPRETATION OF CKD STAGES IN LIVING KIDNEY DONORS. Allan B. Massie, Dorry L. Segev, (Johns Hopkins University)

Current definitions of chronic kidney disease (CKD) staging define any individual with estimated glomerular filtration rate (eGFR) $<60$ as having stage 3 or higher CKD. Nearly half of living kidney donors (LKDs) have post-donation eGFR below this threshold, but the clinical interpretation of eGFR $<60$ in donors is unknown. Is this threshold relevant to living kidney donors? Using national registry data, we studied enrollee renal disease (ESRD) risk in 67,571 LKDs: 1999-2015 with at least one reported postdonation serum creatinine (SCr). eGFR was calculated via the CKD-EPI equation. Measurements with eGFR $<60$ were excluded from analysis. We modeled the association between eGFR category ($\leq 60$, 60-69, 70-74, >74) and our results support current guidelines recommending longitudinal followup of renal function in living kidney donors.

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KIDNEY TRANSPLANT BENEFIT TO PATIENTS WITH LONG DIALYSIS VINTAGE. Allan B. Massie, Dorry L. Segev, (Johns Hopkins University)

Following a recent organ allocation policy change, deceased donor kidney transplant (DDKT) waitlist registrants with long dialysis vintage now have high allocation priority. However, having survived for many years on dialysis, these patients may tolerate dialysis well; moreover, longer dialysis vintage is associated with worse post-donor kidney transplant (DDKT) patient survival. Among patients alive within those ZIP codes. Estimates were calculated overall and stratified by selected demographics. Estimates were adjusted for complex sampling designs and weighted to population data. We tested differences in prevalence estimates using a t-test with pooled variance. Prevalence estimates were significantly higher in HCHS/SOL compared with CHS for obesity (HCHS/SOL estimate – CHS estimate = $\Delta = 14.4\%$, $p<0.01$) and current smoking ($\Delta = 4.9\%$, $p<0.01$), insulin resistance ($\Delta = 1.2$, $p<0.05$) and hypertension ($\Delta = 0.7$, $p<0.05$). When stratified by sex, hypertension estimates were significantly different for men ($\Delta = 7.6\%$, $p<0.01$) and women ($\Delta = 4.7\%$, $p<0.01$). Stratified by geography and Latino-ethnicity, we found that CHS data yielded similar estimates of select conditions to HCHS/SOL data, except for obesity and current smoking. Sampling strategies or modes of data collection may contribute to these differences.

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ESTIMATING THE EFFECTIVENESS OF RECOMBINANT GROWTH HORMONE THERAPY AMONG CHILDREN WITH CHRONIC KIDNEY DISEASE AND GROWTH FAILURE USING A TARGET TRIAL APPROACH
Deek K. Ng,* Deek K. Ng, Megan Carroll, Frederick A. Kaskel, Susan L. Furrh, Bradley A. Warden, Larry A. Greenspan, (Johns Hopkins Bloomberg School of Public Health, Department of Epidemiology)

Clinical trials have demonstrated that recombinant human growth hormone (rhGH) is an effective treatment for growth failure among children with chronic kidney disease (CKD); however, causal effects in clinical settings have not been estimated. To determine rhGH effectiveness, we employed a target trial study design nested within the Chronic Kidney Disease in Children (CKiD) study. Eligible children had growth failure (height <4th percentile, or -1.75 SDs of the normal population) and were classified by rhGH initiation. A third comparison group included children who initiated rhGH but did not have growth failure. Between-group and within-individual increase from -1.22 to -0.95 at 18 months of follow-up. Those receiving rhGH experienced improved growth, but this effect was substantially attenuated compared to clinical trials (+0.91 SDs). The emulated target trial study design in this observational cohort not only documented the under-utilization of rhGH, but provided a more realistic and generalizable estimation of therapy effectiveness for this high risk population.

PRE- AND EARLY PREGNANCY DEPRESSION AND RATE OF GESTATIONAL WEIGHT GAIN FROM MID TO LATE PREGNANCY
Sylvia E. Budun,* Sylvia E. Budun,* Monique M. Hedenskog, Lynsay A. Avalos, (Kaiser Permanente Northern California Division of Research)

Gestational weight gain (GWG) outside recommended ranges is associated with adverse perinatal outcomes. Women with depression before and during pregnancy may be at especially high risk for GWG outside recommendations, given associations of depression with birth weight loss and weight gain outside of pregnancy. Using Kaiser Permanente Northern California's universal perinatal depression screening program, we identified 8,760 pregnancies from 2012 to 2016 screened for depression ≤10 weeks gestation using the Patient Health Questionnaire (PHQ-9). Depression was defined as a diagnosis, antidepressant dispensing, or PHQ-9 score ≥10 from 6 months before pregnancy to 20 weeks gestation. We created mutually exclusive joint exposure groups for pre- and early pregnancy depression (both pre- and early pregnancy depression: chronic depression; depression in early pregnancy only: pre-depression only; no pre- or early pregnancy depression). Rate of GWG from depression screening to delivery was categorized according to Institute of Medicine (IOM) recommendations. Early pregnancy depression was associated with 0.03 lbs/week greater GWG rate (95% CI: 0.02, 0.04) compared to no pre- or early pregnancy depression. Chronic depression and pre-pregnancy depression were associated with 27% (OR=1.27, 95% CI: 1.16, 1.39) and 24% (OR=1.24, 95% CI: 1.10, 1.40) greater odds of GWG rate below the IOM recommendations compared to within the recommendations. Pre-pregnancy depression and early pregnancy depression were associated with 13% (OR=1.13, 95% CI: 1.05, 1.23) and 11% (OR=1.11, 95% CI: 1.04, 1.19) greater odds of GWG rate above the IOM recommendations compared to within the recommendations. Our findings suggest that women with pre-pregnancy or early pregnancy depression may require tailored prenatal counseling or intervention for appropriate GWG.

CHARACTERIZATION OF OVARIAN GROWTH AND DEVELOPMENT OF FOLLICLES IN GIRLS FROM BIRTH TO 9 MONTHS
Heia Chin,* Giovanna Beirat, Margaret Adjent, Gillen Ford, Kavita Dargar, Sussexan Kaplan, Virginia Stalling, David Umbach, Walter Rogan, (Epidemiology Branch, National Institute of Environmental Health Sciences, RTP, NC)

Childhood ovarian development may influence adult ovarian function, but there are limited descriptions of healthy ovarian growth in girls, particularly during infancy. We used data from the Infant Feeding and Early Development Study, a longitudinal cohort study of estrogen-responsive outcomes in healthy infants, to examine ovarian growth trajectories and describe the presence of ovarian follicles in girls 0-9 months old. There were 136 girls who completed the study and were included in the analysis. Ultrasound scans were performed on the infants within 72 hours of birth and at 4, 16, 24, and 32 weeks. Ovarian volume was calculated as the geometric mean of the right and left ovary at each ultrasound visit. The number of ovarian follicles present was recorded as none, 1-3, or more than 3, and the diameter of the largest follicle was measured. A weeks-specific analysis was done to assess the association between follicle size and ovarian volume. We used mixed-effects regression splines to examine the overall age trajectory of ovarian volume. The mean ovarian volume increased from 0.2 cm³ (SD=0.2) at birth to a maximum mean value of 1.0 cm³ (SD=0.6) at 16 weeks, which was followed by a slight shrinking and leveling off in late weeks. The largest follicle varied in size over the 9-month study period, from a mean diameter of 0.3 cm (SD=0.1) at birth to 0.6 cm (SD=0.2) at week 16. We observed a positive association between the diameter of the largest follicle and overall ovarian volume at each individual visit study among girls with observable ovaries at the first visit, the growth trajectory differed by the number of follicles identified (none vs. 1-3, p<0.01; none vs. more than 3, p<0.01). Our results show an increase in initial ovarian volume shortly after birth, which may be driven by the number and size of developing follicles. Further research is needed to understand the factors for early increases in follicular and ovarian development.

ASSOCIATION BETWEEN SLEEP QUALITY AND PREGNANCY OUTCOMES: EVIDENCE FROM A CHINESE BIRTH COHORT
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Background: Recent studies suggested that sleep disorder and short sleep duration during pregnancy may increase the risk of preterm birth (PTB) or gestational diabetes mellitus (GDM). Little analysis about the correlation of the sleep quality and pregnancy outcomes, including PTB, GDM, pre-pregnancy depression and early pregnancy depression were associated with 27% (OR=1.27, 95% CI: 1.16, 1.39) and 24% (OR=1.24, 95% CI: 1.10, 1.40) greater odds of GWG rate below the IOM recommendations compared to within the recommendations. Pre-pregnancy depression and early pregnancy depression were associated with 13% (OR=1.13, 95% CI: 1.05, 1.23) and 11% (OR=1.11, 95% CI: 1.04, 1.19) greater odds of GWG rate above the IOM recommendations compared to within the recommendations. Our findings suggest that women with pre-pregnancy or early pregnancy depression may require tailored prenatal counseling or intervention for appropriate GWG.

PERINATAL & PEDIATRIC

S/P indicates work done while a student/postdoc
CHILDHOOD ABUSE, INTIMATE PARTNER VIOLENCE, AND PLACENTAL ABRUPTION AMONG PERUVIAN WOMEN

Susanna D. Mitro*, Sixta E. Sanchez, Henry Palomino, Bizu Gelaye, Michelle A. Williams, (Harvard T.H. Chan School of Public Health)

Experiencing childhood abuse (CA) or intimate partner violence (IPV) has been linked to numerous adverse pregnancy outcomes, and some evidence suggests greater than additive effects if experiencing both types of abuse. We examined whether history of CA and IPV during the current pregnancy are independently and jointly associated with the odds of placental abruption (PA). We recruited 662 PA cases and 665 full-term controls (without PA nor 3rd trimester bleeding) from 6 hospitals in Lima, Peru. Participants were interviewed after delivery. We used multivariate logistic regression models to estimate odds ratios (ORs) and 95% confidence intervals (CIs) adjusting for maternal demographic and obstetric factors, education, and parity. PA cases were more likely than controls to report major depression (18.3% vs 10.5%) and fair or poor self-rated pre-pregnancy health (20.2% vs 13.6%). Approximately 42% of both cases and controls reported a history of CA: 50% of cases and 49% of controls reported IPV during pregnancy. While history of any CA was not associated with PA, history of severe CA (≥1 CA event; experienced by 25% of the population) was associated with 38% increased odds of PA (aOR=1.38; 95%CI:1.07-1.79) after adjusting for IPV. There was a small but statistically nonsignificant association between severe IPV and PA (experienced by 20% of the population) and odds of PA (aOR=1.22; 95%CI:0.92-1.62), adjusting for CA. Women who experienced both severe CA and severe IPV had 206% higher odds of PA (95%CI:1.25-3.40) increased odds of PA compared to women who experienced no or minor abuse. Although the joint effect of CA and IPV was positive, it was statistically nonsignificant on the multiplicative scale (interaction aOR=1.18; 95%CI:0.79-2.79) and additive scale (relative excess risk due to interaction RERI= -0.01; 95%CI:4.39-178). Our findings provide further evidence that public health efforts to prevent exposure to violence or mitigate its effects may improve maternal outcomes.

SIP indicates work done while a student/postdoc.
TRAJECTORIES OF SOCIAL SUPPORT IN THE PERINATAL PERIOD
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(University of Calgary)

Background Low social support during the perinatal period can increase the risk of postpartum depression and anxiety up at one year after giving birth but little is known about women's trajectories of social support during this time. This study will identify trajectories of social support among women from second trimester to 4 months postpartum. Methods Using data from a longitudinal birth cohort, All Our Families, 3231 women were asked about their perceived social support during their second trimester, third trimester, and at 4 months postpartum. Group based trajectory modeling was used to determine the number of groups, shape of trajectories and proportion of women with differing trajectories. Model fit was assessed using Bayesian Information Criterion and model adequacy statistics. Multinomial regression was used to compare probability of group membership. Results Six distinct trajectory groups were identified, with the majority of participants belonging to groups with stable, high social support (60.6%) or stable moderate social support (35.8%). Only 2.9% of women had consistently low levels of social support and 1% had rising levels. Groups with stable high social support were more likely to have higher incomes, be Caucasian, less in Calgary than those without (relative risk ratio 2.72, 95% CI 1.05, 7.06 and 3.50 95% CI 1.36, 9.00).

THE ASSOCIATION OF GROWTH PRIOR TO KIDNEY TRANSPLANT WITH POST-TRANSPLANT KIDNEY FUNCTION AMONG CHILDREN WITH ENDSTAGE RENAL DISEASE Yijun Li* Yijun Li, Derek K. Ng, Larry A. Greenbaum, Beatlely A. Wasad, Susan L. Firth, (Kines Hopkins Bloomberg School of Public Health)

Among pediatric kidney transplantation (KT) recipients, previous studies have shown poor linear growth at transplant is associated with increased mortality, while lower body surface area (BSA) may be protective. Linear growth (LG) may be an indicator of nutritional deficits, disease severity, and socioeconomic status (SES) before KT, while lower BSA is hypothesized to be less demanding of a new organ. This analysis aimed to describe the risk of poor KT outcome associated with short stature and BSA based on the Chronic Kidney Disease in Children study. KT outcomes were quantified by time from receiving the kidney transplant to the first occurrence of an estimated glomerular filtration rate (eGFR) <<45 mL/min/1.73 m2 among individuals who received a KT before age 21. Poor LG was defined as age- sex-specific height z-score < -0.67 at the time of transplant. The association of poor LG with time to eGFR <45 was estimated by parametric survival models and inverse probability weighting. Among 138 pediatric KT recipients, the median time to eGFR <45 was 6.6 years. Participants with poor LG had a 49% shorter time to eGFR <45 than those without (relative time, RT = 0.51, 95% CI 0.28, 0.93) after adjusting for SES. Higher recipient BSA at KT was associated with increased risk of having an unfavorable outcome. Each standard deviation increase in BSA was associated with 35% (RT = 0.65, 95% CI 0.49, 0.87) and 15% (RT = 0.85, 95% CI 0.51, 1.43) shorter time to eGFR <45 in children with and without poor LG, respectively. Poor linear growth before transplant was independently associated with shorter time to eGFR <45/mL/min and modified the effect of recipient BSA on KT outcome. Future research should identify mechanisms explaining the potential positive influence of higher BSA and risks related to poor linear growth in this high-risk population.
DELIVERY BY CESAREAN SECTION AND RISK OF CHILDHOOD ASTHMA
Lyndsey A. Darrow* Lyndsey A. Darrow, Hong Chen, Jeannette R. Ferber, Audrey F. Pennington, De-Kun Li, (School of Community Health Sciences, University of Nevada, Reno)

Background: Previously reported associations between cesarean delivery and childhood asthma are biologically plausible but could also be due to uncontrolled confounding. Methods: The relationship between cesarean delivery and childhood asthma was investigated among 230,312 mother-child pairs enrolled in Kaiser Permanente Northern California (births 2005-2014). Delivery mode was obtained from electronic medical records (EMRs); for births after 2009, cesarean deliveries were further divided into (1) elective vs. emergency and (2) subgroups defined by time interval between labor and membrane rupture, and delivery. Using EMRs, asthma was defined at each follow-up age using a combination of asthma diagnoses, including inpatient diagnosis (ICD-9 code 493, ICD-10 code J45), and at least one asthma medication dispensing. Covariates included duration of breastfeeding, prenatal and early-life antibiotic exposure, gestational age, sex, and maternal characteristics (pre-pregnancy BMI, age, education, race, smoking, parity, and asthma, atopy, by self-report and diagnosis). Risk ratios were estimated using Poisson regression with robust standard errors. Results: 28% of children were delivered by cesarean section; 56% of cesareans were emergency and 42% were elective. In preliminary analyses, adjusted risk ratios (RR) for cesarean delivery were 1.10 (95% CI 1.05-1.16) for asthma at age 2 (n=230,312); 1.09 (95% CI 1.05-1.13) for asthma at age 4 (n=168,193); and 1.06 (95% CI 1.03-1.10) for asthma at age 6 (n=112,245). Crude RRs were higher (1.20, 1.20, and 1.17, respectively, with adjustment for breastfeeding, gestational age, and pre-pregnancy BMI) having the greatest impact. Discussion: Preliminary analyses indicate cesarean delivery was related to some asthma traits among offspring.

ELEVATED MATERNAL CORTISOL LEVELS AND ADVERSE PERINATAL OUTCOMES: A NESTED CASE-CONTROL STUDY
Nel Roeleveld* Nel Roeleveld, Rechelle Venekamp, Judith Prins, Marleen van Gelder, (Department for Health Evidence, Radboud university medical center, Nijmegen, The Netherlands)

Background: Maternal hypersecretion of cortisol during pregnancy has been hypothesized as the intermediate process between stress and depression during pregnancy and adverse perinatal outcomes. Therefore, we examined the associations between fetal exposure to elevated cortisol levels during pregnancy and selected perinatal outcomes in a nested case-control study. Methods: This study was embedded in the Pregnancy and Infant Development (PRIDE) Study, an ongoing prospective cohort study primarily using web-based questionnaires. From the children born in 2012-2016, we selected all cases with preterm birth (n=73), low birth weight (n=54), small-for-gestational-age (n=65), and Apgar score 75th percentile, 12.29 (mg/dL) and the selected cutpoints for confounders. Results: We did not observe associations between elevated cortisol levels and preterm birth (OR 0.99, 95%CI 0.51-1.92), low birth weight (OR 1.25, 95%CI 0.38-4.13), and small-for-gestational-age (OR 1.22, 95%CI 0.62-2.40). However, elevated cortisol levels were associated with a low Apgar score (OR 2.59, 95%CI 1.03-6.40), especially by the time the saliva samples were collected in gestational weeks 20-22 (OR 5.60, 95%CI 1.61-19.51). Conclusion: Despite several limitations, this study clearly showed no indications for associations between elevated maternal cortisol levels in mid-pregnancy and adverse perinatal outcomes, except for an increased risk of low Apgar scores at 5 minutes after birth.
EVALUATION OF SELECTION BIAS IN STUDIES OF RISK FACTORS FOR BIRTH DEFECTS AMONG LIVE BIRTHS: EVIDENCE FROM THE NATIONAL BIRTH DEFECTS PREVENTION STUDY


Prior research suggests that risk factor studies of birth defects are affected by selection bias when restricted to live births. However, the degree of bias in estimating association measures in actual studies has not been quantified. Using data from the National Birth Defects Prevention Study, we evaluated the association of established risk factors with congenital anomalies and perinatal outcomes, including stillbirth and termination, amniocentesis, D&C, and stillbirth. We considered the range of strength of association with both risk and controls, and corresponding risk of prenatal loss: first trimester smoking, (moderate/moderate), first trimester antiepileptic drug (AED) use (strong/strong), and multiple gestation (strong/strong). We used logistic regression to estimate ORs and 95% CIs adjusted for maternal age, race/ethnicity, and preconceptional folate acid use. Potential selection bias was evaluated by comparing ORs across models that included only live births, live births and stillbirths, and all outcomes (live births, stillbirths, and termination). No differences were observed in ORs among live births only compared to those among all outcomes for AED use, smoking, or multiple gestation for each of these examined, except for smoking: the OR for multiple gestation was twice as high among live births (OR=4.9, 95% CI: 3.2, 7.4) as among all outcomes (2.4; 1.7, 3.4) but in an intercensal risk remained; small numbers precluded examining AED use for anencephaly. These observations indicate that results from analyses conducted only among live births were not materially affected by selection bias, even when the exposure was expected to be associated with prenatal loss. However, selection bias may occur when the birth defect is strongly associated with pregnancy loss and the exposure is postconceptional.

Introduction: Over the past several years, caesarean section (CS) rates have increased around the world, mostly due to an increase in elective rather than labour induction of labour. In Canada, caesarean section (CS) rates have increased from 16% to 36% among First Nations and Inuit women and from 16% to 36% among Cree- references for the 90th percentile at 40 weeks were 4,88g (male) and 4,40g (female) compared to 4,40g (male) and 4,20g (male), using Canadian-references, 2% is an obstetric indication, mostly for women who are at high risk for a complication associated with vaginal birth. In the Seychelles Child Development Study (SCDS), we examined the association between mode of delivery and child development at 20 months of age in a large prospective cohort of children born in the Republic of Seychelles. Methods: The Seychelles Child Development Study Nutrition Cohort 2 is an observational study in the Republic of Seychelles. Children were evaluated at 20 months of age in eight development outcomes using the Bayley Scales of Infant Development II (BSID-II), the MacArthur Bates Communicative Development Inventories (CDI), and the Infant Behavior Questionnaire-Revised (IBQ-R). Multivariable linear regression evaluated the relationship between delivery mode (CS v. vaginal) and each development outcome, while controlling for child sex and age, socioeconomic status, maternal age, and family status. Results: Of the 1351 complete observations, 241 (17.8%) were delivered by CS. Delivery mode was associated with BSID-II or CDI outcomes, but was associated with IBQ-R severity. Specifically, compared to vaginal delivery, children born with CS delivery demonstrated higher IBQ-R surgery scores (F: 0.104, 95% CI: 0.004 - 0.212, p = 0.004). High surgery scores indicate higher activity and positive emotion, but also suggest difficulty with self-regulation and later inhibitory control. Discussion: Although we observed an association between mode of delivery and child development, our study does not strongly support the notion that CS birth is associated with early-life child development. However, the current literature and the prevalence of CS births will likely continue to increase worldwide, further research on CS and child development is needed.
AN INTEGRATED DATA SYSTEM FOR SCHOOL HEALTH: PATTERNS OF HEALTH SERVICE USE AMONG NEW YORK CITY CHILDREN 2006-2013

Aims: To characterize the quantity and diagnoses associated with hospital inpatient and emergency department (ED) visits for New York City (NYC) public school students enrolled in 2006 to 2013. Background: In order to inform disease surveillance, environmental risk assessment, and targeted prevention, public health agencies need timely, non-aggregated data from multiple sectors such as healthcare and education. Given their mission to provide student health services, school health agencies are uniquely positioned to integrate and use multi-stream data to respond rapidly to health problems facing children.

Methods: The NYC public school enrollment registry was matched to the New York Statewide Planning and Research Cooperative System (SPARCS) for students 4 to 18 years of age in 2006 to 2013. SPARCS collects patient level data on diagnoses, treatments and charges for inpatient and ED visits. The total sample consist of 2,000,057 unique students attending 1,389 schools. For SPARCS matched students, we described inpatient and ED utilization and length of stay in the hospital. We classified principal diagnoses into clinically meaningful categories to assess the most common reasons for health service use. Results: Forty-five percent of students had at least one discharge during the study period. Over the study period, there was 5% growth in ED visits and an 11% decline in hospitalizations. Asthma, mood disorders, epilepsy and appendicitis were the most common reasons for hospitalization. Upper respiratory tract infection, asthma and superficial injury were the most common reasons for ED visits.

Conclusions: In this study, integration of school enrollment and hospital discharge databases showed key health conditions that contribute to morbidity and health service utilization. For public health agencies, integrated databases will improve case-finding, measurement of health disparities, and targeting of preventive services.

RATES OF STILLBIRTH FROM 2006 TO 2014 IN GUANGZHOU, CHINA - A POPULATION BASED RETROSPECTIVE STUDY

Introduction: Stillbirths cause large global burden in worldwide. It was estimated over 122,000 stillbirths in 2015 in China. Unfortunately, few studies reported the rates of stillbirth in China based on population data. The objective of the study was to report the population-based trends of stillbirth rate (SBR) in Guangzhou, China.

Methods: Stillbirth was defined as baby born with no signs of life weighing ≥1000 g or after 28 completed weeks of gestation. SBR was calculated as the number of stillbirth per 1000 total (live and stillborn) births. All the data of births from 2006 to 2014 were obtained from the Guangzhou Perinatal Health Care and Delivery Surveillance System. Joinpoint regression analysis was conducted to quantify the changes of SBR in total and stratification by maternal age (<25, 25-29, 30-34, ≥35 years) and the gender of babies. Average annual percent change (AAPC) was used to indicate change in trends during the research years. Results: There were 9989 cases of stillbirth from 2006 to 2014 in Guangzhou, China. In total, the SBR has decreased from 8.82 to 4.56 per 1000 total births during the years, with the AAPC of -7.0% (95% CI, -5.3%, -8.6%). For both male and female babies, there were significant decreases from 2006 to 2014 (AAPC for males was -7.6% [95% CI, -5.6%, -9.6%]; AAPC for females was -6.3% [95% CI, -4.4%, -8.2%], respectively). More reductions of SBRs were observed in the higher maternal age groups. The SBR of nulliparous over 35 years old showed the fastest decreasing, which from 15.05/1000 in 2006 to 5.16/1000 in 2014, with the AAPC of -12.6% (95% CI, -9.8%, -15.3%). Conclusion: The rate of stillbirth decreased during 2006-2014 in Guangzhou, China. The underlying contributions for the reduction of SBR will be further explored, which may provide scientific evidence to improve the quality of perinatal health care and prevent more pregnant losses before delivery.
IMPACT OF FLORIDA'S PRESCRIPTION DRUG MONITORING PROGRAM AND PILL MILL LAW ON HIGH-RISK PATIENTS - A COMPARATIVE INTERRUPTED TIME SERIES ANALYSIS Irene Munini1
G. Caleb Alexander, Helen-Yen Chang, Lainie Rutkow, (Johns Hopkins Bloomberg School of Public Health)

States have relied heavily upon prescription drug monitoring programs (PDMP) and pill mill laws to address the opioid epidemic, yet relatively little is known regarding their effects. We quantified the effects of Florida's PDMP and pill mill law on high-risk patients. To do so, we used QuintilesIMS IRA's Lifelink data to identify patients receiving prescription opioids in Florida (intervention state, N = 1.13 million) and Georgia (control state, N = 0.54 million). The pre-intersection, intervention, and post-intersection periods were: July 2010-June 2011, July 2011-September 2011, and October 2011-September 2012. We identified three types of high-risk patients: (1) concurrent users: patients with concomitant use of benzodiazepines and opioids; (2) chronic users: long-term high-dose opioid users; (3) opioid shoppers receiving opioids from multiple sources. We compared changes in prescribing between Florida and Georgia before and after policy implementation among high-risk/low-risk patients. Our monthly measures included: (1) Average morphine milligram equivalent (MME) per transaction (2) total opioid volume across all prescriptions (3) average days supplied per prescription and (4) total number of opioid prescriptions dispensed. Among opioid-receiving individuals in Florida, 6.6% were concurrent users, 1.96% were chronic users, and 0.66% were opioid shoppers. Following policy implementation, Florida's high-risk patients experienced relative reductions in: MME (opiod shopper -108 mg/month, 95% confidence interval [CI] -1.62 to -0.54), total opioid volume (chronic users: -4.58 kg/month, CI -5.41 to -3.76), and number of dispensed opioid prescriptions (concomitant users: -640 prescriptions/month, CI -950 to -340). Low-risk patients generally did not experience statistically significant relative reductions. Thus, compared to Georgia, Florida's PDMP and pill mill law were associated with larger relative reductions in prescription opioid utilization among high-risk patients.

KIDNEY FUNCTION, POLYPHARMACY, AND POTENTIALLY INAPPROPRIATE MEDICATION USE IN A COMMUNITY-BASED COHORT OF OLDER ADULTS Alex Secora1 Alex Secora, G. Caleb Alexander, Shoshani Baidw, Josef Coren, Morgan Grana, (Johns Hopkins University)

Background: Chronic kidney disease (CKD) affects many older adults, and increases the risk for medication adverse events. Objective: To assess the prevalence and associated morbidity and mortality of polypharmacy and potentially inappropriate medication (PIM) use in a community-based population of older adults, looking for differences by CKD status. Methods: We quantified baseline medication and PIM use (from Beers criteria, the Screening Tool of Older People's Prescriptions, and Micromedex®) by level of estimated glomerular filtration rate (eGFR) in the Atherosclerosis Risk in Communities study (N = 3,932). We used negative binomial and Cox proportional hazards regressions to assess the relationship between polypharmacy, and PIM use, and subsequent hospitalization and death. Results: Mean participant age was 76 (±5) years, 99% were female, and 29% had CKD (eGFR < 60; medications). On average, participants with CKD reported more medications. A PIM based on kidney function was used by 36% of those with eGFR < 60. Over a median of 26 years, greater medication use was associated with higher risk of hospitalization and death. PIM use (age- or kidney-based) was not associated with hospitalization or death. While those with CKD had higher absolute risks of adverse outcomes, there was no difference in the relative risks associated with polypharmacy by CKD status. Conclusion: Polypharmacy and PIM use were common in the former associated with higher risk of hospitalization and death; relative risks were similar for those with and without CKD.

USE OF PROTON PUMP INHIBITORS AFTER AVAILABILITY AS OVER-THE-COUNTER DRUGS, Anna-Therese Leinhch1 Anna-Therese Leinhch, Julia Wichertski, Susanne Moeurn, Karl-Heinz Jeckel, Andreas Steng, (Center of Clinical Epidemiology, University Duisburg-Essen)

Background: Proton pump inhibitors (PPIs) are widely used. Some PPI-formulations with low dose became available as over-the-counter drugs in Germany in 2009. We wanted to describe the trend in PPI use due to the changed availability in a population-based study. Methods: We used data from the second (2005-2008, n = 4,157, 49% male, 48-81 years old) and third (2011-2015, n = 3,097, 49% male, 55-88 years old) examination of the Heinz Nixdorf Recall Study, Germany. Prescribed and non-prescription medication took place in the last 7 days were self-reported. The ATC-codes, we defined drugs against acid-related disorders (A02) and as subgroups: antacids (A02A), PPIs (A02BC) and H2-receptor antagonists (A02BA). We restricted the data set to participants, who took part in both examinations and to observations with overlapping age fractions (55-88 years). We estimated age-standardized prevalences and incidence proportions with 95% confidence limits for the intake of different drug groups. Results: The age-standardized prevalence of drugs for acid-related disorders increased from 9.8% (95% CI 8.4-11.2) in 2005-2008 to 13.8% (95% CI 12.4-15.2) in 2011-2015. During the same period the age-standardized prevalence of PPI-intake increased from 6.9% (95% CI, 5.7-8.1) to 12.5% (95% CI 11.1-13.9). The incidence proportion of drug use for acid-related disorders was 98 (95% CI 87-109) per 1000 participants, 89 (95% CI 79-100) per 1000 participants for PPI use and 5 (95% CI 38) per 1000 participants for antacids and H2-receptor antagonists each. 37% of patients taking antacids or H2-receptor antagonists during the second examination switched to PPIs in the third examination. Conclusion: The increased use of drugs against acid-related disorders is mostly driven by the increased use of PPIs. The aging of participants had a minor role. PPIs are the dominant drug group for acid-related disorders and the availability is over-the-counter drugs might have added to this situation.
A RANDOMIZED CONTROLLED TRIAL OF A CONTRACEPTIVE INTERVENTION ON MATERNAL AND CHILD OUTCOMES IS IT EVEN FEASIBLE? Katherine Ahrens*, Rob Olsen, Katherine Ahrens, Brittani Frederiksen, Slanem Messokosky, (Rob Olsen LLC, George Washington Institute of Public Policy)

Objective: To estimate the sample size required for a randomized controlled trial (RCT) evaluating the effects of a contraceptive intervention on maternal and child outcomes. Method: Parameters for the RCT included: unintended pregnancy rate (7.9% per year in intervention group and 15.4% in control group, based on evidence from Harper et al., 2015), outcome prevalence in control group (10% from 10% to 90%), impact of an unplanned birth on the outcome (from 5 to 50 percentage points), randomization level (individual or clinic-level), number of participants enrolled at each clinic (25, 50, or 100 women), and probability of pregnancy leading to live birth (66% or 80%). Power was set at 0.95 and alpha level was 0.05. Results: Under most scenarios, over 1,000 clinics would be needed to detect effects. The scenario that resulted in the smallest required sample size (43 clinics with 4,300 study participants) was a participant outcome with 10% (or 90%) prevalence, impact of unplanned birth (40 percentage points), individual-level randomization, and high probability of pregnancy leading to live birth (80%). In a more likely scenario, with outcome prevalence of 10% (or 90%), a fairly low impact of unplanned birth (10 percentage points), more feasible clinic-level randomization, and a more realistic probability of pregnancy leading to live birth (60%), the required sample size would be greater (3,761 clinics, even with 100 study participants per clinic). Birth-related outcomes not observable for all study participants (e.g., preterm birth, low birthweight, all child outcomes) would require even larger sample sizes; further, restricting analyses to live births can lead to biased estimates. Conclusions: While RCTs are generally considered the gold standard, these results suggest that the sample size required to detect effects of a contraceptive intervention on maternal and child outcomes is prohibitively large to be feasible and non-experimental study designs should be considered.

FACTORS DETERMINING THE USE OF INTRACYTOPLASMIC SPERM INJECTION IN WOMEN WITHOUT MALE FACTOR INFERTILITY Xu Xi, Xu Xi, Richard P. Dickey, Pierre Badawi, Jeffrey G. Shaffer, Gabriella Prij, Jan, (Tulane University School of Public Health and Tropical Medicine)

Background and Objective: Intracytoplasmic sperm injection (ICSI) technique was initially used for couples with male factor infertility. Despite the increasing evidence of benefit over conventional in vitro fertilization (IVF), ICSI use has markedly increased in recent decades among couples without male factor infertility. The reasons for this increasing trend of ICSI use are unknown. We assessed the frequency of ICSI use and factors associated with the use of ICSI in women without male factor infertility. Methods: A retrospective cohort study was conducted in 83,868 women diagnosed without male factor infertility using 2006-2010 data from the Society for Assisted Reproductive Technology Clinic Outcome Reporting System (SART CORS). Results: Between 2006 and 2010, overall ICSI use in women without male factor infertility increased from 53% to 59.2%. The factors associated with an increased use of ICSI were Hispanic ethnicity (adjusted odds ratio aOR: 1.3, 95% confidence interval CI: 1.2-1.4), obesity (aOR: 1.1, 95% CI: 1.1-1.5), those whose prior history of ART treatments with fresh eggs (aOR: 1.4, 95% CI: 1.3, 1.6 for 4 and more treatments), and women diagnosed with diminished ovarian reserve (aOR: 1.2, 95% CI: 1.2, 1.3) and other factors for infertility (aOR: 1.4, 95% CI: 1.3, 1.5). Multigravida, women with prior history of miscarriages, and women diagnosed with tubal factor infertility were less likely to use ICSI. Conclusions: ICSI procedures were performed among more than half of couples without male factor infertility. Although several demographic and reproductive factors were found to be associated with an increased use of ICSI, the questions remain whether its use is necessary or justified in women without male factor infertility.

PREDICTORS OF POSTPARTUM IUD INTEREST WITHIN 6 WEEKS AFTER DELIVERY, AMONG PREGNANT WOMEN AND COUPLES COUNSELED ON LARC METHODS IN KIGALI, RWANDA Vanessa Da Costa, Vanessa Da Costa, Kristin Wolff, (Rollins School of Public Health, Emory University)

Background: The desire to space or prevent future pregnancies is high among postpartum women in Rwanda. However, the use of long-acting reversible contraception (LARC) especially the highly effective and cost-effective copper intrauterine device (IUD), is very low, and rates of unintended pregnancy in postpartum periods are high. This study aims to determine what factors are associated with pregnant women’s and couples’ interest in receiving a postpartum IUD within 6 weeks after delivery. Methods: Pregnant women or couples attending antenatal care (ANC) in Kigali, Rwanda were consented and enrolled in this cross-sectional study. After participating in a postpartum LARC counseling session, they were interviewed about their demographic, pregnancy behaviors, postpartum LARC knowledge, attitudes, and practices. Additionally, they were asked about their interest in receiving a postpartum IUD within 6 weeks after delivery. Results: Among 150 pregnant women (105 women alone and 45 couples) consented to participate, 142 (88%) of women or couples were interested in the postpartum IUD while 26 (17%) were not. Lower number of months pregnant (adjusted odds ratio [aOR] 0.81 95% CI 0.64-0.80), LARC knowledge, attitudes, and practices. Additionally, they were asked about their interest in receiving a postpartum IUD. Demographic factors did not predict postpartum IUD interest. Conclusions: Recommendations to increase postpartum IUD uptake include educating pregnant women and couples about the benefits and disadvantages during early stages of pregnancy and addressing client myths and misconceptions about the IUD. This strategy provides pregnant women and couples with detailed knowledge to make an informed decision about their future contraception use, reduce the need for family planning, and reduce unintended pregnancy.

THE ASSOCIATION BETWEEN MATERNAL EDUCATION AND INFANT MORTALITY: A MEDIATION ANALYSIS INTO THE ROLES OF LOW BIRTH WEIGHT, PRETERM BIRTH AND SMALL FOR GESTATIONAL AGE Yongfu Yu, Yongfu Yu, Zeyan Liew, Aolin Wang, Jiaxing Li, Jorn Olsen, Sven Eriksen, Glóyurur Qin, Carsten Olsen, Bo F, Jiang Li, (Department of Clinical Epidemiology, Aarhus University Hospital, Aarhus, Denmark)

Objective To estimate the extent to which low birth weight (LBW), preterm birth (PTB), and small for gestational age (SGA) mediate the association between maternal education and infant mortality. Methods: We included all live singletons born in Denmark in 1981-2004 (N=1,384,708). Follow-up started at birth and ended at death, emigration, the day before the 1st birthday, or end of follow-up (December 31st 2005), whichever came first. Maternal education at delivery was categorized as low, medium or high. We used causal mediation analysis by assessing one mediator at a time to estimate natural direct (NDE) and indirect (NIE, mediated by LBW/PTB/SGA) effects of maternal education on infant mortality, further stratified by neonatal deaths and postneonatal deaths. The proportion of education-related excess deaths mediated through the mediators was reported if MRs of NIE and NDE were in the same direction. RESULTS: MRs of associations between maternal education (low vs high) and mortality were 1.24 (95% CI 1.14-1.34) for infant deaths; 1.19 (0.76-1.41) for neonatal deaths and 1.24 (1.17-1.31) for postneonatal deaths. The proportion of education-related excess deaths mediated through LBW, PTB and SGA were 76%, 53% and 19% in different mediator model, respectively. The mediating effects of LBW, PTB and SGA were larger for neonatal mortality than postneonatal mortality. CONCLUSION: The estimated effect of maternal education on infant mortality is partly mediated by LBW, PTB and SGA. The mediating effect was greatest for LBW but excess infant deaths mediated by LBW should largely be due to the mediation of PTB on neonatal mortality. Public health strategies for education-related neonatal mortality in high-income countries may need to address preterm risk factors of preterm birth and impaired fetal growth. The substantial direct effects of maternal education on postneonatal mortality could reflect persisting education disparities in infant care.
MISSING: A REVIEW OF THE FETAL DEMISE BURDEN ASSOCIATED WITH ZIKA VIRUS

Susannah Leisher*

Aim: We aimed to summarize available data on the fetal demise burden of Zika-affected pregnancies.

Rationale: In 2015, there were 2.6 million stillbirths, accounting for 4.4% of all global deaths. Despite this burden, global attention to stillbirths has been limited. Evidence has accumulated that Zika virus infection causes multiple adverse outcomes, possibly including fetal demise (stillbirths, miscarriages, abortions), but there has been limited reporting and analysis of these outcomes.

Methods: This was a quasi-systematic review (PubMed, Embase, Web of Science; no language limits). Proportions of fetal demise of completed Zika-affected pregnancies were calculated. RRs for fetal demise among completed, Zika-affected versus uninfected pregnancies were estimated from cohort data.

Results: Seventeen reports included 19,928 pregnant women or infants/fetuses with confirmed, probable or suspected Zika infection. Pregnancy outcomes that included fetal demise were known for 23% (4,492). There were 244 cases of fetal demise (5%). 20% of confirmed as compared to 7% of suspected Zika-affected pregnancies ended in fetal demise. Only one cohort study included asymptomatic as well as symptomatic mothers; the crude risk of fetal demise was nearly 13 times higher for Zika-affected as unaffected mothers (RR 12.76, 95% CI 3.94, 41.37, p-value <0.0001), as compared to a crude RR of microcephaly of 6.63 (95% CI 0.78, 57.83, p-value 0.07). Most studies included only symptomatic pregnant women or infants/fetuses with Zika-related anomalies; misclassification of infection status was possible.

Conclusions: Available data on fetal demise associated with Zika virus infection is limited, especially in comparison to other outcomes such as microcephaly, yet there is evidence that fetal demise may be a significant burden of Zika virus infection. Studies of Zika infection outcomes should report on fetal demise.

CESAREAN DELIVERY AND POSTPARTUM READMISSION IN THE UNITED STATES

Jenifer E. Allsworth, PhD*

Background: Postpartum readmission is an important measure of quality of care and results in significant preventable medical expenditures, yet recent evidence indicates readmission rates may be increasing. In this study, we examine the rates of postpartum readmission within 30 days overall and among women with cesarean deliveries in the United States.

Methods: We examined data from the 2013 and 2014 Nationwide Readmission Databases (NRD). The NRD is a nationally representative survey of discharges that includes data from approximately 70 million discharges (weighted) from 21 (2013) - 22 (2014) states. Postpartum and cesarean deliveries were identified using International Classification of Diseases, Ninth Revision (Clinical Modification) diagnosis and procedure codes and All Patients Refined Diagnosis Related Groups (APR DRG). Eligible patients included women between the ages of 18 and 50 years who delivered in the first 9 months of the year who were not missing length of stay for their initial hospitalization. Rates and odds ratios estimated using SAS survey procedures to adjust for the survey design characteristics.

Results: NRD included 2,564,330 births with 16,610 remissions within 30 days (1.9%) in 2013-2014. Rates of readmission did not increase in 2014 compared to 2013 (odds ratio (OR)=1.00, 95% CI 0.95, 1.06). Women with cesarean deliveries had higher rates of postpartum rea (OR=1.14, 95% CI 1.05, 1.23) overall and after adjustment for number of diagnoses and APR DRG severity of illness (OR=1.9, 95% CI 1.10-3.28). Women whose deliveries followed an elective admission had lower rates (OR=0.81, 95% CI 0.77, 0.85), however rates of postpartum readmission for cesarean deliveries did not differ by elective admission (p=0.71). Conclusions: Rates of postpartum readmission within 30 days were higher among women with cesarean delivery. The differences in readmission rates were not explained by underlying illness or elective admission.
EVALUATION OF LAB-BASED INFLUENZA SURVEILLANCE SYSTEM IN PAKISTAN, 2017

Background: Globally, 5-10% of adults and 20-30% of the children are affected by influenza annually. Annual epidemics result in 3-5 million cases and 500,000 deaths. Influenza is a common illness in Pakistan; however, absence of a robust surveillance system makes assessment of burden of disease an issue. Purpose: Study was conducted to identify key strengths and weaknesses of the system and to make recommendations based on findings.

Methods: An evaluative descriptive study was conducted from April to July 2017. The Lab-based Influenza Surveillance System was conducted at the national level. Assessment of qualitative and quantitative system attributes was done utilizing the CDC's Updated Guidelines for Evaluating Public Health Surveillance Systems, 2001. Desk review of literature, departmental documents and reports were also conducted. The stakeholders were identified and interviewed using a semi-structured questionnaire.

Findings: The system was found to be simple and easy to operate but less flexible to integrate with other diseases. Data quality was good as 80% of observed forms were completely filled. Timeliness was good as the data takes 24–48 hours from sample collection to report submission to the central level. Acceptability is good as private and public sector hospitals and labs are involved. Sensitivity calculated was 62% and Predictive Value Positive (PVP) was 37.2%. The representativeness of Lab-based influenza surveillance system is poor as it is a sentinel surveillance with specific reporting sites strategically placed. Data from all sentinel sites is analyzed at national reference lab where it is summarized to use for planning and management purposes.

Conclusions: The system is meeting its objectives. Sustainability and stability of the system need to be improved by allocation of public funds. Extension of the coverage of the system will result in improved representativeness. Regular capacity building of the staff at reporting site will ensure continued quality of reporting.

COAL FLY ASH AND ASTHMA AMONG CHILDREN 6-14 YEARS OLD

Jack Pfeiffer*, Jack Pfeiffer, Barbara Polivka, Lonnie Sears, Kristina Zierold, (University of Louisville)

TITLE: Coal fly ash and asthma among children 6-14 years old

AUTHORS: Jack Pfeiffer, MS, Barbara Polivka, PhD, Lonnie Sears, PhD, Kristina Zierold, PhD

INTRODUCTION: Coal fly ash is a coal-combustion byproduct composed of particles with diameters less than ten micrometers (PM10) that typically contain a variety of potentially toxic metals which are readily absorbed into the body through inhalation. Relatively little research exists examining the effects of fly ash exposure and health outcomes. This is the first study to examine the association between exposure to fly ash in the home and asthma among children 6-14 years old.

METHODS: Fifty-two participants provided data for analysis. Data was collected using personal modular impactors, lift tape samples, and multiple questionnaires. Laboratory methods used to analyze the samples included gravimetric analysis, scanning electron microscopy, energy dispersive x-ray, and proton-induced x-ray emission. Statistical methods used to analyze the data included binomial logistic regression and the likelihood ratio test.

RESULTS: Twenty-five (48%) participants had previously diagnosed or suspected undiagnosed asthma. Forty-one (79%) participants had fly ash found in their homes. An odds ratio for the association between all asthma and presence of fly ash in the home was calculated to be 12 (p = 0.047, 95 CI= 1.03 – 138), adjusting for gender, the presence of outdoor allergies, guardian-reported breathing issues, elevated dust levels in home, and smoking in the home.

DISCUSSION: The findings suggest a clear possibility that asthma can be related to fly ash exposure in the home. While this study had a small sample size, a relationship did exist. Additional research is required to elucidate the exact nature of observed associations.
Introduction: Both lifestyle and behavior factors predispose individuals to lifestyle-related diseases (LSRDs). In a practical community health activity based on health promotion, a primary prevention is one of the most effective ways to prevent LSRDs. In general, although young adults have a low incidence rate of LSRDs, the cumulative exposure to behavioral disadvantage across the life course may be strongly associated with predispose LSRDs. However, an appraisal way for health conditions in a phase of susceptibility based on the theory of natural history of diseases has not been established yet. The purpose of the present study was to examine the validity of a screening test of health state at risk in susceptibility phase on the natural history of disease, the semihealth state, among young adults in Japan.

Methods: A self-report questionnaire consisted of 54 items was administered to university students in Japan between 2015 and 2017. As analyzed data without defect values, 2,873 samples derived from university students. A principal component analysis (PCA) was applied to valid data. Results: The PCA was applied to the sample in order to extract the semihealth index. Then the semihealth index score was calculated by the norm eigenvector of the first principal component. Furthermore, a distribution of young adults with the semihealth conditions was determined by using the score. As a result, the prevalence, sensitivity, specificity, positive predictive value, and negative predictive value showed 20.2%, 86.0%, 83.8%, 57.3%, and 95.9%, respectively. Conclusions: This method has shown to be useful for the assessment of the semihealth state among young adults from a light of health promotion activities.
DOES SOCIAL CAPITAL MODERATE THE ASSOCIATION BETWEEN CHILDREN'S EMOTIONAL OVEREATING AND PARENTAL STRESS? A CROSS-SECTIONAL STUDY OF THE STRESS-BUFFERING HYPOTHESIS IN A SAMPLE OF MOTHER-CHILD DYADS Jennifer Mandlebaum* Jennifer Mandlebaum, Spencer Moore, Patricia P. Silvera, Michael J. Meneray, Robert D. Levitan, Laurette Dube, (University of South Carolina)

Background: The stress-buffering hypothesis posits that resources accessed via one's social network may attenuate the impact of stress on health. Children exposed to parental stress are at greater risk of emotional overeating (EO), yet little research examines how parental social resources affect this relationship. Prior research found evidence for the protective effects of social support less is known about social capital as a stress buffer. This study aimed to examine whether social resources (social support and social capital) moderate the association between parental stress and children's EO. Methods: The Maternal Adversity, Violence, and Neurodevelopment Study (MAVAN) is a community-based birth cohort of mother-child dyads. The sample was restricted to dyads at the 72-month assessment (n=84). Relationships among parental stress, EO, social support, and social capital (measured as network diversity) were examined with Poisson regression. Analyses are adjusted for sociodemographic and economic variables, as well as parent concerns about children's weight. Results: Bivariate analyses showed parental stress (b=.28), maternal educational attainment (b=-10), and weight concerns (b=14) independently associated with children's EO (p<.05). Parental social capital mediated the positive association between parental stress and children's EO, such that stress was associated with children's EO only in mothers with low social capital (b=-12, p<.05). Conclusion: This study brings new insight to the study of social capital by demonstrating the importance of network diversity in buffering the adverse impact of parental stress on children's EO. Findings suggest that social capital may disrupt the transmission of stress from parents to child, thereby playing a potential role in the production and reproduction of health inequalities across generations. Interventions for child health should consider improving parental social capital.

RURAL CHILDHOOD RESIDENCE AND DEPRESSIVE SYMPTOMS AMONG MIDDLE-AGED ADULTS IN THE UNITED STATES Audrey R Murchland* Audrey R Murchland, M. Marla Glymour, Jean A. Casey, Elizabeth Rose Meyers, (University of California, San Francisco Department of Epidemiology and Biostatistics)

Mounting evidence reveals significant geographic health disparities in the United States. Residency in a rural area during childhood could influence mental health in adulthood through multiple pathways, including educational environment. To examine the associations between rural childhood residence and prevalence of depressive symptoms in midlife, we included U.S. adults ages 50-56 years in the 1998, 2004, and 2010 waves of the Health and Retirement Study (n=6,285). We examined the association of self-reported rural childhood residence with elevated depressive symptoms (>4 out of 8 symptoms to reflect probable diagnostic thresholds) using logistic regression, adjusting for individual-level covariates and applying sampling weights. To evaluate cohort effects, we examined interactions between birth cohort (1942-1947, 1948-1953, or 1954-1959, selected based on the HRS enrollment design) and rural childhood residence. Across successive birth cohorts, prevalence of elevated depressive symptoms increased (1942-1947: 8.3%, 1948-1953: 12.9%, 1954-1959: 13.9%). In age, race/ethnicity, and sex-adjusted models, rural childhood residence was associated with higher depressive symptoms (OR 1.26; 95% CI: 1.08, 1.48). Depression for parental education and southern birth substantially attenuated this association (OR 1.11; 95% CI: 0.94, 1.31), as did additional adjustment for own education (OR 1.03; 95% CI: 0.87, 1.22). We found no evidence of cohort differences in the estimated effects of rural childhood residence (OR close to null and p=.05 for all interactions). We found that rural childhood residence was associated with elevated depressive symptoms among middle-aged U.S. residents. Educational environment, both parental education and personal education, appeared to contribute to this disparity. Further research is needed to elucidate life course pathways through which rural residence may influence mental health.

SOCIAL CAPITAL AND HEALTH STATUS: RACE/ETHNIC AND GENDER DIFFERENCES IN THE HEALTH AND RETIREMENT STUDY Ester Villaonga Olivé* Ester Villaonga Olivé, Yafat, Ichiro, (University of Maryland)

Social capital involves the resources available through membership in social networks. The association between social capital and health is hypothesized to vary by race/ethnicity and gender, which has not been sufficiently examined. Moreover, a life course perspective of the relation between social capital and health is lacking in the literature. We examined the longitudinal effects of social capital on health status and effect modification by race/ethnicity and gender, controlling for relevant sociodemographic variables. Data were drawn from the Health and Retirement Study, a nationally representative panel study of US adults aged 50-60 years, waves 10-14 (year 2006-2014). We used fixed-effects longitudinal ordinal logistic regression to assess social capital variables (a)neighborhood social cohesion/physical disorder and (b) positive/negative social support with self-reported health status, adjusting for age, education and wealth. Interactions with race/ethnicity and gender were assessed at p<0.05. The sample was 7,555 men and 7,794 women (52% female). Higher negative social support and neighborhood physical disorder were related to lower health status (aOR = 0.97; CI 0.95-0.99, p<0.05) and (OR = 0.97; CI 0.96-0.99, p<0.05), respectively). Race/ethnicity modified the relationship of neighborhood social cohesion and health status. The negative effect was weaker among African Americans compared to whites aOR = 0.94 (CI 0.96-0.99, p<0.05). Gender modified the relationship between positive social support and health status. The positive relationship was stronger for females compared to males aOR = 1.01 (CI 1.00-1.02, p<0.05). We found that, over one’s life course, social capital is causally associated with poorer or greater self-rated health. However, the positive or negative relationship significantly depends on the race/ethnicity or gender group. The construction and reinforcement of social capital is crucial for the health status of the elderly population.
MORTALITY PROFILES ACROSS LATIN AMERICAN CITIES IN 10 COUNTRIES: THE SALURBAL PROJECT Usama Bilal* Usama Bilal, Carlos Guevel, Amelia Friche, Mari Fattama Pina, Yvonne Michael, Tanitif Affaro, Jaime Miranda, Dinesh Rodriguez, Ana Diaz-Roxx (Drexel University)

Objective: We studied the variability and predictors of proportionate mortality across major cities of 10 Latin American countries. Methods: We used population and vital registration data for 2015 from Argentina, Brazil, Chile, Colombia, Costa Rica, El Salvador, Guatemala, Mexico, Panama, and Peru. We defined cities as urban agglomerations with a population above 100,000 as of 2010 (n=363). We aggregated deaths using WHO’s Global Health Estimates to 7 groups: infectious (ID), maternal/neonatal/nutritional (MNN), cancer, cardiovascular, other non-communicable (NCDs), accidental injuries, and violence. We redistributed deaths attributed to defined causes using conditional mean imputation by age, sex, country, and year. We used linear mixed models to quantify the variability in proportionate mortality (defined as 1-CC). We evaluated city (population and growth year over the last 5 years) and country-level (Gross Domestic Product [GDP] per capita) predictors of proportionate mortality. Results: Cardiovascular (28%) and other NCDs (16%) were the most common causes of death, followed by cancer (15%) and ID (11%). The within-country variability in proportionate mortality was highest for violence and accident (67%), and lowest for ID (28%). Larger cities had a lower proportion of MNN and accidental injury deaths (-0.08% and -0.15% per 1 million people), while growing cities had a higher proportion of accidental and violent injury deaths (0.85% and 0.35% per 1% increase in population per year). Cities in countries with higher GDP per capita had a higher proportion of cancer and cardiovascular deaths (0.62 and 0.72 per thousand USD), and a lower proportion of MNN, accidental and violent deaths (-0.21, -0.23 and -0.42 per thousand USD). Discussion: This study confirms significant variability in the mortality profiles of Latin American cities, and points to some predictors of this variability to be studied in further research.

GENDER AND RACE SPECIFIC DISPARITIES IN MEASURES OF SOCIAL CONTEXT: RESULTS FROM A NATIONALLY REPRESENTATIVE SAMPLE Jared Durieux* Vinay K. Cheruvu, Jared Durieux, (College of Public Health, Kent State University, Kent, OH, 44242)

Understanding gender and race specific disparities in housing insecurity and food insecurity as social determinants of health (social context) may help develop targeted interventions to effectively reduce such disparities and thereby improve health outcomes. The objective of this study is to use recent nationally representative data to understand the gender and race specific disparities with respect to housing insecurity and food insecurity. Cross-sectional data from the 2013-2015 Behavioral Risk Factor Surveillance System (BRFSS) were used for this study (n=28,047). Housing insecurity and food insecurity were used as measures of social context. Weighted prevalence estimates of housing insecurity and food insecurity along with corresponding 95% confidence interval (CI) were computed. Logistic regression was used to determine gender and race specific disparities in housing insecurity and food insecurity. Statistical analysis accounted for complex sampling design of the BRFSS and adjusted for the relative impact of select sociodemographic factors including income. The estimated prevalence of housing insecurity only was 13.9% (95% CI: 13.6-14.2), food insecurity only was 5.4% (95% CI: 5.2-5.6), and both housing insecurity and food insecurity was 18.2% (95% CI: 17.9-18.5). Correspondingly, the estimated prevalence of both housing insecurity and food insecurity was highest among the Hispanics (29.9%) followed by American Indian/Alaskan Natives (27.1%), African Americans (24.3%), and Caucasians (15.1%). Asians reported lowest insecurity with housing and food (12.8%). Compared to males, females were more likely to report both housing and food insecurity (21.0% vs. 15.3%). Findings from the current study suggest significant gender and race specific disparities in measures of social context. Researchers should develop targeted intervention programs to address and effectively reduce these disparities and help improve the health outcomes.
A TEMPORAL AND GEOSPATIAL ANALYSIS OF PREHOSPITAL NALOXONE ADMINISTRATION IN A MIDSIZED NEW YORK COMMUNITY

Molly McCann, Molly McCann, James Brodell, Courtney Marie Com Jones, Heather Lenthardt, Michael Meyer, Jeremy Cushman (University of Rochester School of Medicine and Dentistry)

Objective: The opioid epidemic is an ongoing crisis in many communities. Understanding the frequency and distribution of naloxone administrations among first responders is a critical component to overall epidemic surveillance. This study aims to describe the community wide administrations of naloxone by first responding agencies. Methods: As part of routine quality assurance, each unique prehospital naloxone administration was collected and reported by first responding agencies. Emergency Medical Services (EMS), fire and law enforcement, from Jan 1 2014-July 31 2017. Data included administering agency, date, time, location of use, age and gender of the patient and the amount and route of administration. Geospatial distributions were pictorially generated using converted geographical coordinates. Results: Analyses were analyzed using descriptive statistics. Results: During the study period, 2,174 individuals received naloxone by one of the aforementioned first responding agencies. Average patient age was 40.0 years (Range: 0-70 years), with naloxone treatment occurring almost twice the number of females (4,181) to 2,720, respectively. Intranasal was the most common route of administration, accounting for over half of all administrations (50.29, 47.06%). More than half of patients (50.8%) received more than one dose, with a minimum dose of 0.5 mg administered to a single patient. Naloxone administrations occurred most frequently on Friday and Saturday, with heavy concentration in the area's urban center. Conclusion: The opioid epidemic is an ongoing public health concern frequently encountered by first responders, highlighting the need for community wide surveillance. Information gained can be used to allocate resources and develop targeted public health interventions within high risk communities.

FREQUENCY OF CANNABIS USE AND NONMEDICAL USE OF PRESCRIPTION PAIN RELIEVERS IN ADOLESCENTS AND ADULTS IN THE UNITED STATES, 2002-2014

Samanthi S.M. Drover, Devika Chawda, Samanthi S.M. Drover, Alan Kimhong, Shubhla L. Rankawat, (University of North Carolina at Chapel Hill)

Introduction: Widespread speculation about the role of cannabis use as a "gateway" to other drug use has impacted U.S. federal cannabis regulations. In this study, we examined the association between frequency of cannabis use and nonmedical use of prescription pain relievers (NMUPR). Methods: We conducted a cross-sectional study using nationally representative data of US adolescents and adults (age ≥12 years) from the National Survey of Drug Use and Health (NSDUH) during 2002-2014 (n=703,732). We categorized self-reported cannabis use as never, occasional (in past year but not past month), semi-regular (1-9 times in past month), regular (≥10 times in past month), and non past-month NMUPR across exposure categories. To control confounding and account for NSDUH sampling design, we constructed weights by multiplying interperson probability of exposure weights to NSDUH-defined sampling weights. We used these weights in log-binomial models to estimate standardized prevalence ratios (SPR) with robust variance estimates using Stata 15 (IC). Results: The weighted distribution of cannabis use was 59.6% never, 34.3% occasional, 3.0% semi-regular, and 2.0% regular use. Weighted prevalence of past-month NMUPR, by exposure group, was 0.7% and 2.0%, respectively. Compared to never cannabis users, prevalence of past-month NMUPR was similar for occasional users (SPR 4.59, 95% CI 0.86-4.20), but higher for semi-regular (SPR 5.95, CI 3.33-5.34) and regular (SPR 10.48, 95% CI 3.42-5.16) cannabis users. Conclusions: Occasional cannabis use, which characterized 84.9% of cannabis users, was associated with the same prevalence of NMUPR at never use, whereas cannabis use on a semi-regular or regular basis was associated with higher prevalence of NMUPR. Future research should leverage longitudinal designs and examine heterogeneity across subpopulations to further assess the link between cannabis use and NMUPR.

FROM DSM-IV TO DSM-V ALCOHOL USE DISORDERS AMONG UNIVERSITY STUDENTS FROM LEBANON: EPIDEMIOLOGICAL AND CLINICAL IMPLICATIONS

Lilian Ghandour, Sirine Anouti, (American University of Beirut)

A total of 1,115 university students selected from 8 large private and public universities in Lebanon participated in an anonymous self-filled survey in May 2016. Data on DSM-IV and DSM-V criteria of alcohol-related disorders were gathered from the 82 past-year drinkers, of which 203 (34.88%) were selected for DSM-V any alcohol-use disorders (AUD) and 377 (64.78%) for abuse/dependence (64.6% abuse and 82.50% dependence). Of the 203 diagnosed with DSM-V any AUD, 58% had mild, 21% moderate, and 21% severe alcohol-related problems. Both DSM-IV and DSM-V classified 199 students (34.3% of the sample) and 197 (33.8%) as having AUD-positive and AUD-negative, respectively. Still, a total of 180 students (31.8%) were AUD-negative as per DSM-IV, but were positive for DSM-V abuse (but not dependence), mostly driven by the "hazardous use criterion." The 6 students who were AUD-positive according to DSM-IV but not DSM-V had reported positively on the newly added criterion of "craving." Of the 191 students who had a score of 1 on DSM-V defined AUD, only 5 (2.6%) met the DSM-V criterion of "legal problems" (excluded in DSM-V). Overall percent agreement was 68% (kappa 0.41). Nonetheless, using a summation score for DSM-IV abuse and dependence criteria (range 0-11), and DSM-V any AUD as the reference, the area under the ROC curve was 0.959, and a cut-off of 11 for DSM-V abuse/dependence yielded a sensitivity and specificity of 96.55% and 98.68%, respectively. In this university sample of young adults, DSM-5 diagnostic criteria do not seem to inflate prevalence rates of AUD as compared with DSM-IV. A substantial percentage of young adults who don't meet DSM-V criteria of any AUD may still be a source of harm to themselves and others due to their driving, or operating machinery in general after having had too much to drink.

Background: It has been argued that alternative ways to manage pain, such as marijuana, can decrease the use of POs, so that states that legalize medical marijuana and make it more available may see a reduction in opioid-related harm. Few studies have examined this problem, and all of them consider data at the state level, thus ignoring local patterns of variation in the impact of state laws. We examined the association between the implementation of MML, including the adoption of legal medical marijuana dispensaries (MMD) and county-level fatal overdose involving POs. Methods: We used spatiotemporal Bayesian Poisson models to estimate the effect of the law in the same year and up to three years after enactment, using data from 2002 to 2015, in 49 US states (Alaska was excluded). Models were adjusted for time-varying demographic and socioeconomic characteristics of the counties and co-occurring policies at the state level. Models also accounted for county-varying linear time trends and state fixed effects. Results: The implementation of MML was associated with an elevated risk of fatal PO overdoses (Rate Ratio [RR]= 1.23; 95% Credible Interval [CI]: 1.18, 1.28) beginning 1 year after implementation. The effects of MML implementation in the second and third years post-implementation were: RR = 1.38 (95% CI: 1.32, 1.44), and RR = 1.54 (95% CI: 1.46, 1.62), respectively. The adoption of MMD was associated with lower rates of PO overdose in the same year, and up to the third year following implementation. The RR were from 0.92 (95% CI: 0.88, 0.96) to 0.83 (95% CI: 0.80, 0.87). Conclusions: MML enactment was associated with higher rates of PO fatal overdoses at the county level. However, in states where MML included provisions to open MMD there was a decrease in the rate of PO fatal overdoses following enactment of this provision. This suggests that the reduction in PO overdose associated with marijuana legalization may be specific to states that allow dispensaries.


Background: Opioid overdose mortality has surged in recent years. Nonfatal overdose is a well-established predictor of fatal overdose among people who use drugs however there are no longitudinal studies among high-risk populations such as opioid-using female sex workers (FSW). This study examines the longitudinal correlates of non-fatal overdose among opioid-using FSW. Methods: The Sex workers And Police Promoting Health In Risky Environments (SAPPHIRE) study is an ongoing cohort study of street-based FSW in Baltimore, Maryland. We collected data at 3-month intervals across multiple domains including demographics, drug use, overdose and naloxone. Longitudinal correlates were modeled using marginal logistic regression with generalized estimating equations (GEE). Results: 180 opioid-using FSW were observed over 543 follow-up visits. Mean age at baseline was 36 and 79% were white (non-Hispanic). 60% were unstably housed (stayed at 22 places, past 3 mo.). 75% inject drugs, 84% smoked crack, 56% used heroin, 26% misused prescription opioids. Over 5 years (25%) experienced 21 non-fatal overdose during follow-up. Two overdoses (1%) were fatal. Naloxone was administered at 7% of recent overdoses mostly by EMS (58%) or a family member (pre (33%)). Longitudinal correlates of non-fatal overdose were age (OR=0.96,9.93,1.00), perceiving that drugs were “laced with fentanyl” (OR=2.919,9.135,2.36), daily injecting (OR=197.95,9.16,3.67) and unstable housing (OR=2.43,9.150,0.15). Naloxone seeking was not associated with non-fatal overdose (OR=0.81,9.150,0.28-2.30). In multivariable analysis, perceiving fentanyl in drugs remained significantly correlated with overdose (aOR=2.65,9.95,9.11,6.29). Conclusions: These data demonstrate that street-based female sex workers who misuse opioids experience high rates of nonfatal overdose and are at high risk for fatal overdose. Interventions that target fentanyl usage and unstable housing among FSW are urgently needed.

TRENDS IN PREMATURE DEATH RATES FROM DRUG OVERDOSES: THE USA COMPARED TO 23 OECD COUNTRIES FROM 2001 TO 2014 Yingxi Chen* Yingxi Chen, Meredith S Shiels, Neal D Freedman, Ana Best, Diana Willrow, Susan Spillane, Salar Khan, Amy Berrington de Gonzalez, (NIH National Cancer Institute)

Background: The USA is experiencing a public health crisis due to drug overdoses, which is now the 10th most common cause of death, surpassing breast cancer. International comparisons in trends can provide insight into the potential drivers of these trends. We compared the trends in premature mortality rates due to drug overdose in the USA to 23 countries of the Organization for Economic Co-operation and Development (OECD) from 2001 to 2014. Methods: We estimated age-standardized premature mortality (age 25-64 years) rates for drug overdose in the 24 OECD countries with available comparable data in the WHO Mortality Database. Drug overdose deaths were defined using ICD-10 codes: X40-X44 (intentional), X60-X64 (suicide), X85 (homicide), Y10-Y14 (undetermined). We used Joinpoint regression to estimate annual percent changes (APCs) in rates. Results: There were 623,593 drug overdose deaths in the 24 OECD countries from 2001 to 2014. Whilst the rates increased during this time period for men in women in most of the countries (APC ranging from -282 to +494%/year), there were decreases in Hungary, Germany, Latvia, and Portugal. In 2014, the USA had the highest premature drug overdose mortality rate (23.4/100,000), followed by Iceland (15.1/100,000), while Portugal had the lowest rate (0.8/100,000). Conclusion: The overall trend of increased deaths from drug overdoses in OECD countries shows this is a growing international public health issue. Comparisons of the trends and rates across countries with very different public health policies may help provide insights into strategies for preventing these deaths.
To transport an effect estimate from a source to a target population, researchers must measure effect measure modifiers whose distributions differ between the two populations. Causal graphs used for transportability identify a set of variables sufficient to transport an effect estimate to the target population, but this set may include variables that are unnecessary for a given scenario. For example, a variable may be necessary to transport a risk ratio but not a risk difference, or vice-versa. With finite resources, measuring an unnecessarily extensive set of variables may be impractical in real-world applications. We developed an algorithm to isolate the necessary and sufficient variables from those identified by a causal graph. We used a Virtual Twins approach incorporating ensemble learning and Lasso variable selection to identify which covariates contribute to effect heterogeneity on the scale of interest. Using inverse-odds of selection weights estimators (IOSW) in 2500 simulations, we compared the performance of the algorithmically selected covariate set to the full set of variables identified by the causal graph. We assessed the algorithm's performance in real-world data using an IOSW logistic regression to transport the results of the iPrEx study from the Peru to the Ecuador site, and compared the transported estimated effect of randomization on infection to the observed treatment effect. In simulations, the algorithm reduced mean-squared error of the IOSW estimator of the risk difference (AMSE: -0.056 (95% CI [0.016, -0.096]) and did not increase percent bias (-2.6% 95% CI [-9.8%, 4.5%]). In iPrEx, 9 of the 22 variables in the sufficient set were selected by the algorithm to transport the study results from Peru to Ecuador. Transferred estimates resembled the observed treatment effect in Ecuador (transported RR 0.51 (95% CI [0.31, 0.85]) vs true RR 0.53 (95% CI [0.34, 0.84])). Variable selection algorithms can improve the efficiency of transport estimators.
EXOGENOUS ESTROGEN INCREASES VITAMIN D BINDING PROTEIN CONCENTRATION Quaker Harmon* Quaker Harmon, Andrew Hoofnagle, Donna Baird, (NEISH)

Increasing awareness of the importance of adequate vitamin D has ignited interest in determinants of 25-hydroxyvitamin D (25(OH)D) and the role of the vitamin D binding protein (VDBP). Previous work has reported 1) differences in VDBP concentration by VDBP isoform, 2) associations between genetic variants in the VDBP gene (GC) and the concentration of 25(OH)D, and 3) increased VDBP concentration with use of exogenous estrogen. However older monoclonal immunosassays for 25(OH)D had significant measurement error. We re-evaluate these findings using a valid VDBP assay in African Americans who have a high risk of vitamin D deficiency. We used a sample of 100 black women (age 24-36) from the Study of Environment, Lifestyle, & Fibroids (SELF) to 1) quantify the concentration of VDBP and 25(OH)D using LC/MS/MS, 2) identify the isoforms of VDBP, and 3) examine differences in VDBP concentrations by isoform and by exogenous estrogen use. Differences were assessed using ANOVA without adjustment. In this population common isoforms of VDBP were GcL/GcL (51%), GcF/GcF (22%) and Gc2/GcF (22%). Mean VDBP concentration was 266 μg/ml and mean 25(OH)D was 16.0 μg/ml, neither differed by VDBP isoform (p=0.2 and p=0.9 respectively). Women using exogenous estrogen (combination birth control) had elevated VDBP (222 μg/ml) compared to those not using exogenous hormones (N=60) (230 μg/ml, p=0.001). These findings support previous associations between exogenous estrogen and increased VDBP, although the biological relevance of this finding is unclear. Earlier reports of an association between VDBP isoforms and the concentration of VDBP are likely due to assay error. Although GWAS studies have suggested that functional polymorphisms in GC are associated with 25(OH)D, we do not find evidence that VDBP isoforms themselves are associated with 25(OH)D.

Previously identified associations in vitamin D biomarkers must be re-evaluated using valid assays in populations of interest.

S/P indicates work done while a student/postdoc

PRETERM DELIVERY AND THE MATERNAL LIPID PROFILE DURING AND 7.15 YEARS AFTER PREGNANCY Baiying Sun* Baiying Sun, Claudia Holzman, Marrie Bertolet, Janet M. Calow, (Department of Epidemiology, University of PittsburghMagee-Women's Research Institute)

There is little information on trajectories of maternal lipids measured in pregnancy and years later, particularly comparing trajectory of women with full-term delivery (FTD) and preterm delivery (PTD). We examined relationships between lipids, measured at two time points, and PTD, using PC-CHIME, a sub-cohort recruited in pregnancy and reassessed at follow-up, 7-15 years post index birth. We included 6-88 women having lipid (total cholesterol [TC], HDLc, LDLc, triglycerides [TG]) measured at 16-27 weeks gestation and at follow-up. We used generalized linear models to compare each lipid between delivery outcomes (0=spontaneous PTD, 1=induced PTD, 2=induced FTD, and 48 PTD (refractory) and considered both mid-gestation and follow-up lipid levels. Changes from mid-gestation to follow-up were also compared. Models were adjusted for gestational age at blood draw, race, age, pre-pregnancy BMI, and parity. We additionally adjusted for mid-gestation lipids z-score, follow-up time, and lifestyle factors when comparing follow-up levels and changes. Compared with FTD, women with ≥PTD had 9.6% (p=0.01) higher TC, similar TC, LDLc, and LDL during pregnancy, but had 4.2% (p=0.02) higher TC, 6.9% (p=0.06) higher HDLc, and similar TG and HLDLc at follow-up. In contrast, ≥PTD had 5.5% (p=0.05) lower TC, similar TG, and LDLc at mid-gestation, but had 19.1% (p=0.01) lower TC, similar TG, HDLc, and LDLc at follow-up. Average declines (mg/dL) in TC (37.6 vs. 45.0, p=0.03) and LDL (8.1 vs. 15.7, p=0.01) were less in ≥PTD than FTD, while declines in TG were less following ≥PTD (43.7 vs. 73.3, p=0.07), even after accounting for mid-gestation level. In conclusion, lipids were associated with PTD differently at mid-gestation and at follow-up. Blunted trajectory of lipids from mid-gestation to follow-up in the PTD group may reflect an impaired lipid adaptation to pregnancy compared to FTD, which may in part explain the excess risk of later cardiovascular disease in women with PTD.

VALIDITY OF MORTALITY RECORD LINKAGE OF MOTHERS FROM THE COLLABORATIVE PERINATAL PROJECT Ana Z Pollack** Ana Z Pollack, Cuffin Zhang, Edwina H. Yung, Pauline Mendola, Katherine L. Gansz, Simi L. Mumford, James L. Milh, Enrique F. Schisterman, Stefanie N. Hinkle, (Department of Global and Community Health, George Mason University)

Background Studies linking large, multiregional, US pregnancy cohorts with mortality data are needed to address questions about the implications of pregnancy on life course health. We examined the feasibility and validity of linking the Collaborative Perinatal Project (CPP), a large US prospective cohort study of pregnant women (1958-1965), to death records from US state vital statistics via the National Death Index (NDI) (1979-2016). Method: Essential NDI variables were manually abstracted for CPP mothers (n=48,337). Linkage was completed through 2016. NDI vital status was compared to two other sources: the social security death master file (SSDMF) (n=40,406) and a random search by expert genealogists (random sample n=1250). Agreement between the NDI and the SSDMF and expert genealogists was estimated among those considered deceased and alive at the end of follow-up. NDI true matches were considered deceased. Agreement analyses were conducted for women with abstracted data for NDI linkage and who survived delivery. As proof of concept of the reliability of this linkage, we examined associations between NDI mortality and smoking [high 2-patch/low without (ref)] using Cox proportional hazards regression, adjusting for marital status, race, income, and age at last CPP pregnancy. Results: NDI variables were successfully abstracted from the CPP on 96.4% of women. NDI vital status agreement with the SSDMF was 82.4% (95% CI 81.6, 83.1) for deceased, and 79.7% (95% CI 79.3, 80.2) for alive. NDI vital status agreement with expert genealogists was 80.2% (95% CI 76.1, 84.3) for deceased and 88.4% (95% CI 86.1, 90.7) for alive. Smoking was associated with mortality as expected, [high HR=1.49 (95% CI 1.38, 1.47)], Conclusion Linking the historic CPP with the NDI was feasible with reasonable agreement on vital status. This finding facilitates opportunities to examine pregnancy, long-term health and mortality in a US cohort.

JAPANESE ENCEPHALITIS VACCINATION IN PREGNANCY AMONG US ACTIVE DUTY MILITARY WOMEN Zerna G Khodd* Zerna G Khodd, Ana T Bukowinski, Richard N Chang, Gu R Gumbos, Susan C Farrish, Ana Marie S Conlin, (The Henry M. Jackson Foundation for the Advancement of Military Medicine, Inc.)

Japanese encephalitis (JE) is a flavivirus transmitted through mosquito bites and endemic to regions in Asia and the Western Pacific. JE vaccination (3 dose series ≤2011, 2-dose series ≥2012) is an inactivated vaccine required among US service members deployed to and stationed in regions endemic to JE. The current JE vaccination formulation used in the United States has been shown to be safe in pregnancy through animal models, but epidemiologic studies are lacking. We conducted a descriptive analysis to determine the prevalence of JE vaccination in pregnancy among active duty military mothers. The study population included 163,556 pregnancies to military mothers that ended in live deliveries and occurred from 2003-2014. Pregnancies were captured by the Department of Defense Birth and Infant Health Research program and linked to immunization records. Women who received JE vaccination in pregnancy were compared with those who did not. Descriptive analyses compared characteristics between vaccinated and unvaccinated mothers. There were 446 mothers vaccinated in pregnancy-415 in the first trimester and 31 in the second/third trimester. Half (231 of 415) received their initial dose in the first trimester. The majority of mothers received multiple JE vaccinations in pregnancy, only 1 received a dose from both the 1- and 2-dose formulations. Most mothers were vaccinated with the 3-dose (69.1%) versus 2-dose (30.9%) formulation. Vaccinated mothers were more likely to be younger, unmarried, in the Marines, of enlisted rank, and in an occupation other than health care or combat. These mothers were also more likely to have received other non-recommended vaccines in pregnancy. Understanding the characteristics of women who receive the JE vaccination in pregnancy may help guide future policy. Given the increasing number of military women, vaccine safety in pregnancy is a priority for protecting military families.

S/P indicates work done while a student/postdoc
Geophagy, the intentional consumption of soil, is common especially among pregnant women in some low- and middle-income settings. Soils may contain a variety of non-nutritive components such as heavy metals and microbes or substances that interfere with gastrointestinal absorptive processes, posing health risks to pregnant women. Several hypotheses regarding the practice have been proposed but very few have examined the role of maternal stress. The practice of geophagy may help to alleviate stress during gestation from perceived dietary or other pregnancy-related concerns. In this exploratory study, we evaluated several measures of maternal stress (general anxiety, Pregnancy-Related Anxiety Scores and Perceived Stress Scores) in relation to geophagic behaviour in early pregnancy in 227 pregnant women (12 to 19 weeks gestation) using penalized (LASSO) regression recruited from two hospitals in the Nyamagana district of Mwanza City, Tanzania. Geophagy was reported by 24.7% of the pregnant women. Maternal stress appeared not to play a role in participants' geophagic behaviour. Treatment of the symptoms of nausea or vomiting during pregnancy (adjusted OR= 3.71, 95%CI: 1.78 to 7.55, secondary or higher paternal education level (adjusted OR=0.36, 95%CI: 0.17 to 0.76) and antenatal hospital site (adjusted OR=3.12, 95%CI: 1.43 to 6.83) were associated with geophagy. Given that relatively little has been done to examine geophagy in relation to the public health risk it may pose to pregnant women, further investigation is warranted.
PHYSICAL EXERTION IMMEDIATELY PRIOR TO PLACENTAL ABRUPTION: A CASE-CROSSOVER STUDY
Harpreet S Chahal* Harpreet S Chahal (University of Toronto, Harvard TH Chan School of Public Health)

Background: While there is consistent evidence that episodes of physical exertion are associated with an immediately higher risk of heart attacks and ischemic strokes, the effect of episodes of physical exertion on the acute risk of placental abruption (PA) — “an ischemic placental disorder” — has not been studied. We assessed the risk of PA immediately following episodes of physical exertion. Methods: In a multicenter case-crossover study, we interviewed 663 women within 72 hours of experiencing PA at 6 hospitals in Peru, South America between 2013 and 2015. We asked women about their frequency of physical exertion during the week before PA and the intensity of their exertion. We compared physical exertion in the hour before symptoms of PA to their usual frequency of physical exertion over the prior week. Results: Among 352 women who engaged in moderate or heavy physical exertion in the week before PA, 34 women reported having engaged in moderate or heavy physical exertion in the hour before the onset of PA. Compared to times with light or no exertion, the risk of PA was 7.8 (95% CI: 5.5, 11.0) times greater in the hour following moderate or heavy physical exertion. The RR was higher following heavy exertion (RR=13.7, 95% CI: 7.0, 26.5) compared to moderate exertion (RR=6.0, 95% CI: 4.0, 6.0; P-homogeneity=0.004). The RR of PA within an hour of moderate or heavy physical exertion was lower for women who habitually engaged in moderate or heavy physical activity more than 3 times per week the year prior to pregnancy (RR=30.9, 95% CI: 16.1, 5.9) compared to those sedentary women (RR=7.3, 95% CI: 11.3, 26.7; P-homogeneity < 0.001) and the RR was higher among women with preclassifications/eclamptic pree (RR=13.6, 95% CI: 7.0, 26.2) than among women without (RR=6.7, 95% CI: 4.4, 10.0; P-homogeneity=0.07).

Conclusion: The risk of PA onset is transiently elevated in the hour after physical exertion and is higher among more sedentary women and women with preclassifications/eclamptic pree.
DOES DELIVERY MODE INFLUENCE INFANT WEIGHT GAIN AND ADIPOSITY OVER THE FIRST YEAR OF LIFE? Mingyu Zhang* Mingyu Zhang, (Johns Hopkins Bloomberg School of Public Health)

Background: Potentially driven by the lack of mother-to-infant transmission of microbiome at birth, Cesarean section (C-section) delivery has been associated with higher offspring risk of overweight or obesity in childhood and adulthood. Yet, no studies have examined when delivery mode differences in adiposity begin to emerge. In this study, we examine differences in infant adiposity trajectories from birth to 12 months by delivery mode. Method: From 2013 to 2015, we recruited pregnant women into the Nurture Study and followed up 666 infants. We ascertained maternal delivery method and birth weight from medical records. We measured weight, length, and skinfolds (subscapular, triceps, abdomen) when infants were 3, 6, 9 and 12 months of age. The main outcome, infant weight-for-length z-score, was derived based on the WHO Child Growth Standards. We used linear regression to detect the difference at each time point and used linear mixed models to examine the growth rate for infant weight and adiposity trajectories. We controlled for maternal age, race, marital status, education level, household income, smoking status, maternal pre-pregnancy body mass index, and child birth weight. Results: 179 children (31.8%) were delivered by C-section. From birth to 12 months, the rate of increase in weight-for-length z-score was 0.02 units/month (p=0.03) greater for C-section delivered than vaginally delivered children. At a result, compared to vaginally delivered infants, C-section delivered infants had higher weight-for-length z-scores (0.26 units, 95% CI 0.05-0.47) subscapular skinfolds (0.42 mm, 95% CI 0.02-0.83), and triceps skinfolds (0.27 mm, 95% CI 0.09-0.05) at 12 months. Conclusion: Compared to vaginal delivery, C-section was associated with greater offspring rate of weight gain in the first year and differences in adiposity that emerge as early as 3 months of age. Screening Cesarean delivered infants for excess weight gain may help guide primordial prevention of obesity later in life.

PREGNANCY DURATION AND RISK OF OVARIAN AND ENDOMETRIAL CANCER Anderes Hushy* Anderes Hushy, (Department of Biomedical Data Science, Stanford University and Department of Epidemiology Research, Statens Serum Institut)

BACKGROUND: Full-term pregnancies markedly reduce a woman's risk of both ovarian and endometrial cancer, but little is known about the effect of shorter pregnancies, such as induced abortions, on these two cancers. METHODS: We established a cohort of all Danish women born from January 1, 1935, and linked information on induced abortions, childbirth, surgical procedures (including hysterectomies and oophorectomies), socioeconomic factors and cancer from nationwide registries by use of unique personal identification numbers. Relative risk of ovarian and endometrial cancer by duration of pregnancy were estimated by comparing risk analysis using log-linear Poisson regression. RESULTS: Overall, 8,117 cases of ovarian cancer and 7,808 cases of endometrial cancer occurred among 2.3 million Danish women during 61.1 million person-years of follow-up. For primiparous women, we found the shortest pregnancies (induced abortions ≤12 weeks) were associated with a relative risk of 0.78 (95% CI 0.69 to 0.90) of ovarian cancer, while the longest pregnancies (pregnancies lasting 36+ weeks) were associated with a relative risk of 0.58 (95% CI 0.52 to 0.64). Comparative, short pregnancies were associated with a relative risk of 0.54 (95% CI 0.46 to 0.64) of endometrial cancer, while long pregnancies were associated with a relative risk of 0.50 (95% CI 0.45 to 0.56). For multiparous women, we found the corresponding relative risks for short and long pregnancies to be respectively 0.94 (95% CI 0.89 to 0.98) and 0.77 (95% CI 0.73 to 0.81) for ovarian cancer, and 0.82 (95% CI 0.78 to 0.86) and 0.76 (95% CI 0.72 to 0.81) for endometrial cancer. Adjustment for socioeconomic differences did not modify the results. CONCLUSION: Our findings indicate that the protective effect of pregnancy on endometrial and ovarian cancer risk have separate underlying mechanisms, as pregnancy duration influences risk reduction of the two cancers differently.

TEACHING REPRODUCIBILITY IN EPIDEMIOLOGY: A NEW COURSE FOR FUTURE EPIDEMIOLOGISTS Tarik Bentmarhnia* Tarik Bentmarhnia, (University of California, San Diego)

There is growing concern among epidemiological researchers about the reproducibility of published results. It is imperative that PhD students develop the skills to conduct transparent and reproducible research. Yet, in our knowledge, PhD programs in Epidemiology do not typically incorporate such training into their curriculum. We designed a new course to introduce students to the concept of reproducibility in epidemiologic research and develop their knowledge of the critical information that needs to be provided in the methods section or supplemental material to allow others to reproduce their results. Curation methodological errors were also discussed as important contributing factors to irreproducible research. We organized the course into two phases. In phase one, we selected five papers published with a dataset in Plos One or Plos Medicine (2016-2017), assigned each paper to a group of 3-4 students, and asked each group to reproduce the paper's tables and figures by analyzing the data according to the information provided in the paper. In phase two, each group was asked to develop another research question, write the methods section (and supplemental material) to address their question, analyze the data, and generate tables and figures of their results. Then, a different group of students was asked to analyze the data and reproduce the results using the information provided by the first group of students. During the first course, our students found several critical reproducibility issues (which sometimes altered the paper's conclusions) and identified common methodological mistakes, such as p-hacking and the "Table 2 fallacy." We will present the course structure, findings from the first course, and students' feedback on the course. We expect this course to serve as a model for developing similar courses in other PhD programs, and ultimately help contribute to training the next generation of epidemiologists to conduct transparent and reproducible research.

BIAS ADJUSTMENT TECHNIQUES ARE UNDERUTILIZED IN HIV RISK ESTIMATION Nguyen Khai Tran* Nguyen Khai Tran, (Department of Epidemiology and Biostatistics, Dornsife School of Public Health, Drexel University)

Background: Valid measurement of HIV infection among men who have sex with men (MSM) is critical for intervention planning and resource allocation. Sexual minority research concerning HIV risk often relies on proxy exposures of sexual behaviors such as sexual orientation and partner gender. Inferring high risk sexual behaviors (i.e., condomless anal intercourse) from these proxies inaccurately capture HIV risk, but few studies have attempted to correct for this bias. Methods: A systematic review of methods for estimating risk of HIV infection among MSM, published Jan 2015 to Dec 2017. A priori, we selected 12 leading journals in areas of HIV infection/disparities, medical research, and epidemiological methods. We applied pre-determined inclusion criteria: 1) exposure of condomless anal intercourse between men assessed through proxy variables and 2) their risk for HIV acquisition. We summarized methodologic practices for addressing exposure misclassification. Results: Among 3,923 articles initially included, we identified 26 studies in which high risk sexual behavior was assessed from proxy variables, including sexual orientation or gender of partners; 31% (n=8) did not acknowledge exposure misclassification; 61% (n=16) discussed misclassification of sexual behavior as a potential limitation, however, among these studies, no attempts were made to correct misclassification; and 8% (n=2) explicitly considered this information bias and conducted a Bayesian approach to correct for misclassification. Conclusion: Without analytic correction, HIV risk estimation in recent epidemiological studies may be inaccurate. While it is preferable to reduce exposure misclassification during data collection, we recommend using analytic techniques to correct for misclassification around sexual identity and behaviors when potentially misclassified risk data have been previously collected or if detailed collection of risk data is not practical.
CONDUCTING CASE-CONTROL STUDIES USING SURVEY DATA WITH COMPLEX SAMPLING DESIGNS: A SIMULATION STUDY Catherine X. Li* Catherine X. Li, (University of California, Berkeley School of Public Health)

The case-control study design requires identification of an appropriate study base from which to draw controls. Population-based surveys such as the American Community Survey and National Health and Nutrition Examination Survey may represent possible sources from which to draw controls for case data arising from large sections of the population. However, these surveys have complex sampling structures and survey weights that could lead to biased estimates of measures of association if not accounted for properly in analyses. The best approach for incorporating survey-based controls in case-control studies is currently unknown. We used a simulation approach to study the performance (bias, variance, mean-squared error) of different approaches to estimating measures of association from case-control studies with controls drawn from survey data with sampling weights. We simulated population data with representative demographics and a known exposure-outcome relationship. We then applied a range of survey sampling approaches (probability, cluster, stratified, and complex; matched and unmatched; varying case-to-control ratios) to the data, and tested methods for incorporating these survey-based controls and their sampling weights (e.g., weighted regression, dataset expansion) to estimate the OR or IRR in cumulative or dually-sampled case-control studies, respectively. We compared estimator performance over 2000 simulations. Preliminary results suggest that estimates of the OR or IRR in cumulative case-control study designs obtained using weighted logistic regression are unbiased (<0.5% relative bias). This was true for all sampling designs considered and for varying case-to-control ratios. The results suggest that unbiased estimates may be obtained with controls drawn from survey data with complex sampling structures when weights are accounted for. The knowledge generated from this study could inform the design of future studies for a wide range of health exposures and outcomes.

THE BALANCED CASE-CROSSOVER DESIGN Tarik Benmarhnia* Tarik Benmarhnia, (University of California, San Diego)

The case-crossover (CCO) design is an efficient way to identify associations between transient exposures and incidence of acute health outcomes. The CCO design is very popular, especially in environmental epidemiology, and many variations in the design have been proposed. An important advantage of the CCO is the ability to control for the influence of measured and unmeasured confounders that remain constant in the subject (time fixed variables). Indeed, this is true because each included case is compared to itself at another time. Yet, there may be time-varying confounders that still require consideration. For example, specific weather patterns may confound the relationship between daily air pollution and myocardial infarction. To deal with time-dependent covariates, several CCO approaches have been proposed, including the symmetric bidirectional CCO in which two control days are selected to be equidistant to the event day or the time-stratified CCO (in which one or several control days are selected usually the same day of the week). However, both approaches rely on arbitrary or pseudo-random choices to select control days. Yet, it is possible to exploit collected information on time varying confounders and adjust for them. We propose a “balanced CCO” design that relies on inverse probability weighting (IPW) of time-varying confounders to consider potential control days. We hypothesize that this method will improve the validity and precision of CCO inference when compared to existing approaches in the presence of time-varying confounders. We provide theoretical arguments and results from a simulation study of air pollution health effects, which quantify the direction and magnitude of bias that may result from selecting control days using bidirectional, time-stratified, and balanced approach. Finally, we demonstrate the implementation of these 3 design strategies using data on the impact of daily exposure PM2.5 on preterm births in California.

A DOUBLY ROBUST APPROACH TO EVALUATING THE IMPACT OF NATURAL EXPERIMENTS USING SYNTHETIC CONTROLS Roch A Naimso* Roch Naimso, (UCLA Fielding School of Public Health)

Natural experiments are often difficult to evaluate because it is difficult to find appropriate exposure control groups. Propensity score matching (PSM) and synthetic controls are two methods that have been used to address this issue. Both methods are subjects to model misspecification and require the untestable assumption of no uncontrolled confounding among others. In this study, we demonstrate how to generate synthetic controls using the parametric g-formula and use a doubly robust estimation that combines PSM and g-computation (PSM-g-computation) in an attempt to minimize biases that can arise from model misspecification. We implemented the PSM using a nearest available neighbor to select appropriate controls from the pool of available unconfounded communities, matching them to be as similar as possible in their observed characteristics. Then we applied the parametric g-formula to generate synthetic controls. Finally, we estimated the average treatment effect among the treated (ATT). Synthetic controls are effectively constructed via g-computation by applying the consistency and conditional exchangeability assumptions using the intuitive stacking approach. In the absence of uncontrolled confounding, IPTW, propensity and PSM-g-computation consistently estimates the ATT. Third, the doubly-robust estimation yields consistent estimate when either the exposure or the outcome model is correctly specified. It is possible and desirable to implement synthetic controls via g-computation as it produces more efficient and stable estimates of the ATT. This study demonstrates that a doubly-robust estimation approach combining g-computation/PSM is a viable solution to the problem of model misspecification when using synthetic (exposure) controls to estimate potential outcomes of the treated had they, contrary to fact, been subjected to no or a well-defined alternative treatment.

CORRESPONDENCE OF SELF-REPORTED BIRTH CHARACTERISTICS WITH BIRTH RECORDS IN A WEB-BASED PROSPECTIVE COHORT STUDY Lauren A. Wise* Lauren A. Wise, (Department of Epidemiology, Boston University School of Public Health)

Objective: In a study that recruits and follows subjects via the Internet, we assessed the extent to which self-reported data on birth characteristics agreed with birth records. Methods: Self-reported data were derived from Pregnancy Study Online (PRESTO), a North American web-based preconception cohort study. Eligible women were aged 21-45 years, trying to conceive, and not receiving fertility treatment. Women completed online questionnaires at baseline and bi-monthly for up to 12 months or until pregnancy, whichever came first. Pregnant women completed additional questionnaires at one, 3, 6, 84 weeks, and at 32 weeks' gestation, and one 6 months post delivery. We obtained birth records from states with the largest numbers of subjects (MA, CA, PA, TX, MI, and FL) and linked birth record data with self-reported questionnaire data. Result: Among 45,518 women who self-reported singleton births and resided in states providing birth records, 94% (845/350) of women who reported singleton births and resided in states providing birth records were successfully linked. Among these women, 84.2% reported the same GA as the birth record and 91.8% reported GW within 1 week of the birth record. Self-reported birth weight (GW) was matched with birth record for 100% (100/100) of women. When GW was categorized as <4, 4.3-39, 39-41, and >42 weeks, self-reported GW agreed with birth records for 100% (5/5), 100% (131/131), 95% (41/43), 96% (175/182), and 75% (34/45) of women, respectively. Agreement was similar when self-reported GW directly, but lower when GW was computed as the difference between last menstrual period and birth date. Self-reported low birth weight (<2500 g) was matched with birth record for 93% (14/15) of women. Conclusion: Self-reported data from a web-based cohort study showed high agreement when compared with birth weights, particularly for preterm births.
Background: Previous studies have shown correlations of early growth and childhood traits with the development of cardiometabolic diseases and anthropometric traits in later life. Genetic variants that influence both traits may underlie these associations. Methods: Using genome-wide single nucleotide polymorphism (SNP) data contributed by five consortia studies, we implemented a unified statistical approach to test for pleiotropy and enrichment of functional loci in 75 pairs of traits consisting five early life (ELTs) including birth weight, birth length, height, birth head circumference, and blood pressure; and 15 later life traits or diseases (LLTs) including adult body mass index, waist-to-hip ratio, waist circumference, height, fasting plasma glucose, fasting plasma insulin, glycated hemoglobin, insulin sensitivity, coronary artery disease, myocardial infarction, low-density lipoprotein cholesterol, high-density lipoprotein cholesterol, total cholesterol, and total glycemia. Results: Pleiotropic genetic effects were significant for 73 of the 75 ELT-LLT pairs (P = 5 × 10^{-4}); functional deleteriousness was significantly higher for SNPs associated with both an ELT and a LLT compared to SNPs associated with either trait or only one trait for 69 ELT-LLT pairs (P = 5 × 10^{-4}). In addition, 42 loci were associated with birth traits as ELT and LLT pairs; a false discovery rate of 5% of 40 out of the 42 loci were novel. Variants with birthweight-reducing effect were associated with higher risk of type 2 diabetes, myocardial infarction, and coronary artery disease. For 18 novel loci, the lead SNPs were cis-eQTLs that are associated with the expression of genes in tissues implicated in cardiometabolic diseases. Conclusions: This first comprehensive investigation of pleiotropy found shared genetic variants that contribute to the associations between early and later life cardiometabolic and anthropometric traits.

LB023 SP

THE ASSOCIATION BETWEEN ABUSE HISTORY IN CHILDMHOOD AND SALIVARY RHYTHMS OF CORTISOL, DHEA IN POSTMENOPAUSAL WOMEN

Olivia R. Orta, Olivia R. Orta, Harvard T.H. Chan School of Public Health

Background: A history of child abuse (CA) can impact the hypothalamic-pituitary-adrenal axis (HPA axis) with consequences across the life course. This study evaluated the association between CA history and two key hormones of the HPA axis (cortisol and its antagonist dehydroepiandrosterone (DHEA)) among postmenopausal women. Methods: In 2013, 233 women from the Nurses' Health Study II were asked to provide saliva samples over one day, immediately upon awakening, 45 minutes, 4 hours, and 10 hours after awakening, and before going to sleep. 217 provided saliva samples and completed a Revised Conflict Tactics Scale for CA history and severity in 2001. CA severity scores were derived by classifying self-reported emotional, physical, and sexual abuse prior to the age of 18 and assigned from 0 (none) to 6 (most severe). Saliva samples were analyzed using a competitive chemiluminescence immunoassay. Piecewise linear mixed models computed diurnal rhythms of cortisol and DHEA, and their ratio (i.e., slopes between collection points) between participants with CA scores of 4-6 (n=72) versus 0-3 (n=145). Models adjusted for collection characteristics, health status, sleep quality, and medication/medication use. Results: Cortisol rhythms did not differ between women with high CA scores (4-6) and women with low CA scores (0-3). However, compared to women with low CA scores, women with high CA scores had blunted diurnal rhythms of DHEA (i.e., less steep declines; % difference (95%CI) = 8.7, 15.9), steeper evening declines in DHEA (95%CI = 6.4-1.9), and steeper overall declines in DHEA across the day (% difference (95%CI) = 4.0, 8.5). Additionally, the cortisol to DHEA ratio was lower at awakening (% difference (95%CI) = 25.1, 36.6), and the evening decline of this ratio was blunted (% difference (95%CI) = 2.8, 9.9). Conclusions: In postmenopausal women, CA was associated with differences in diurnal rhythms of DHEA but not cortisol suggesting an enduring impact on compensatory stress-response mechanisms.
ASSOCIATIONS BETWEEN CURRENT AND CUMULATIVE MARIJUANA USE AND CHANGES IN COGNITIVE PROCESSING SPEED AND FLEXIBILITY FOR 17-YEARS IN HIV-POSITIVE AND HIV-NEGATIVE MEN IN THE MULTICENTER AIDS COHORT STUDY Chukwuemeka Okafor*, chukwuemeka okafor, (Division of Infectious Diseases, David Geffen School of Medicine at University of California, Los Angeles, 10833 Le Conte Avenue, Los Angeles, California 90095-1688, USA)

Background Marijuana is common in the U.S., yet the association of current and long-term usage with cognitive function is unclear. Objective To determine associations between current and cumulative exposure to marijuana and changes in cognitive processing speed and flexibility. Methods We used data from 788 HIV-positive (HIV+) and 1,132 HIV-negative (HIV-) men in the Multicenter AIDS Cohort Study. Current and cumulative (1-use-year: 36 days of use) marijuana exposure were the predictor variables. Cognitive processing speed was assessed using the Trail Making Test A (TMTA) and Symbol Digit Modalities Tests (SDMT) and cognitive flexibility was assessed using the Trail Making Test B (TMTB). Linear mixed models were used to estimate associations between marijuana exposure and cognitive function over a 17-year period. Inverse probability of attrition weighting was used to address selective attrition resulting from dropout/death. Models were adjusted for sociodemographic factors, cardiovascular factors, current and cumulative substance use and HIV disease clinical indicators. Results Among HIV+ men only, current daily marijuana use was significantly associated with a higher annual percentage rate of decline in the TMTA (r=0.67, 95% CI [0.23, 1.01], p=0.03) and SDMT (r=-0.21, 95% CI [-0.39, -0.02]; p=0.02). We found no significant association with cumulative marijuana exposure on any cognitive function test among the HIV- men. We found no significant association with current marijuana use and cognitive function. However, we found both current marijuana use-years was significantly associated with decline on the TMTA (r=0.17, 95% CI [-0.03, 0.00]; p=0.04). Conclusion Current daily marijuana use is associated with slowed cognitive processing speed among HIV+ men. Overall, the findings do not indicate clinically meaningful detrimental impact of marijuana use in these cognitive domains in either HIV+ or HIV- men.

SEX-SPECIFICITY IN THE ASSOCIATION OF MATERNAL CORTISOL AND THEIR INFLUENCING FACTORS AMONG RURAL CHINESE ADULTS Chang Rui* Chang Rui (Fudan University)

Objective To explore the epidemiological status of overweight and obesity and their influencing factors among rural Chinese adults. Methods Random cluster sampling was used to select 8 rural communities in Qingyuan, China, and a cross-sectional survey was conducted in 2006-2008, 2011-2012 and 2013-2014. Data were collected by questionnaires, physical examination and laboratory tests. Overweight and obesity were grouped by body mass index (BMI). Overweight and obesity was defined as 24kg/m2 and BMI28kg/m2, respectively. Logistic regression was applied to explore the influencing factors of overweight/obesity and estimate adjusted odds ratio (aOR) and its 95% confidence interval (CI). Results Totally, 612 eligible subjects were recruited in 2006-2008, 2011-2012 and 2013-2014. The prevalence of overweight and obesity were significantly increased as 22.3%, 29.7% and 28.1% (χ² trend = 4.09, P< 0.05), 3.1%, 3.6% and 4.4% (χ² trend = 19.75, P< 0.01) in 2006-2008, 2011-2012 and 2013-2014, respectively. The logistic regression showed that the overweight/obesity were statistically related to older age (aOR 90-99 years=1.33, 95%CI:1.19-1.48; aOR 60-69 years=2.94, 95%CI:2.60-3.36; aOR 70-79 years=4.89, 95%CI:3.60-6.54; aOR 80 years=1.11, 95%CI:0.94-1.31) and higher family income level (aOR medium level=1.12, 95%CI:0.93-1.31; aOR high level=2.5, 95%CI:1.11-4.41) after the adjustment of covariates. Conclusion The prevalence of overweight and obesity increased over years among rural Chinese adults. Older age, non-farmer and higher family income level were important influencing factors for overweight/obesity. It should be taken to control the overweight and obesity for rural Chinese adults.

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EXTENDED MORTALITY FOLLOW-UP OF A COHORT OF WORKERS EXPOSED TO ACRYLONITRILE Stella Koutras* Stella Koutras, (National Cancer Institute)

Background/Objectives: We extended the mortality follow-up of a cohort of 25,460 workers employed at eight U.S. acrylonitrile-producing or using facilities by 21 years. Based on 8,124 deaths and 1,023,921 person-years of follow-up, we evaluated the relationship between occupational exposure to acrylonitrile and mortality. Methods: Standardized mortality ratios using deaths through December 31, 2011 were calculated. Personnel records, work histories, and monitoring data were used to develop quantitative estimates of exposure to acrylonitrile. Adjusted hazard ratios (HR) were estimated by Cox proportional hazards regression. Results: All-cause mortality and mortality from all cancer was significantly less than expected compared with the general population. Internal analyses by cumulative and average exposure revealed elevated risk of cancer of the lung and bronchus (N=908 deaths) and bladder (N=55 deaths). The HR for lung cancer was significantly elevated in the highest quintile of cumulative exposure (1.40, 95% CI 1.11-1.78, p trend =0.04) compared to unexposed workers average exposure was associated with a small non-significant increased risk (HR=1.20, 95% CI 0.95-1.52). Average exposure was associated with a significantly elevated risk of bladder cancer; workers in the top tertile had an HR=2.89, 95% CI 1.35-6.18, p trend =0.01 compared to the unexposed, while cumulative exposure was associated with a non-significant increased risk (HR=1.37, 95% CI 0.65-2.90). Significant HRs were not observed for other smoking-related outcomes. Conclusions: Extended mortality follow-up of the largest cohort of acrylonitrile-exposed workers provides some evidence of a possible association between high exposure to acrylonitrile and cancers of the lung and bladder.


Epidemiologic research demonstrates protective effects of social networks for late-life health and well-being. However, having more relations does not always imply more support, and previous scholarship, which examines either structural (e.g., number of relations diversity in relations) or functional (e.g., emotional closeness, support) aspects of social networks, but not both, fails to capture the complexity of social networks. Unlike prior studies that used crude summary measures consisting of a few items to characterize social networks, our objective was to identify distinct network types among older adults by simultaneously considering the structure, function, and quality of relationships. We also identify sociodemographic and health-related prediction of membership in these network types. Participants included 3,005 adults aged 57-85 years at baseline in 2005-2006 from the National Social Life, Health, and Aging Project (NSHAP). Using latent class analysis, participants were classified into five social network types: (1) diverse-supportive network with partner present (16%); (2) restricted, family-centered network with partner absent (11%) (3) diverse, supportive network with partner present (31%); (4) average network with partner present (15%); (5) partner-centered network (26%). Results of multinomial logistic regression showed that older adults with networks high in diversity of relations and social support were more likely to be younger, female, less educated, and reported fewer chronic conditions than older adults with restricted and less supportive networks. This study extends existing literature by including several important dimensions of social relationships and utilizing the more novel latent class approach, where previous studies employed various clustering procedures, to construct older adults' social network types. Identification of major network types among older adults can inform development of relevant risk assessment tools and interventions.

THE COST OF HEPATITIS B INFECTION IN SOUTH KOREA FROM 2002 TO 2015 Dihye Baik* De-hye Baik (National Cancer Center Graduate School of Cancer Science and Policy)

The economic evaluation is needed to utilize the limited medical resource efficiently. South Korea has high prevalence of hepatitis B virus (HBV) infection and the policies in anti-viral medication treatment has been changed recently. Moreover related research has not been studied for the past 10 years. The objective of this study is to estimate the economic burden of hepatitis B infection and figure out the trend of changes in its cost during 2002-2015. Data from National Health Insurance Service (NHIS) claims data were used. To identify the cases, we used the ICD-10 code B16 for acute hepatitis B, B17.0, B17.8, and B17.9 for chronic hepatitis B on the basis of a primary diagnosis in the data. This study was carried out from societal perspectives which contain both direct cost and indirect cost. In terms of transportation cost, caregiver costs and opportunity costs lost as a result of medical care or premature death, we used the data from Korean National Health and Nutrition Examination Survey (KNHANES), Korean Health Panel (KHP) and Korean Statistical Information Service (KOSIS). The annual direct cost for acute and chronic hepatitis B increased to 129.8 million dollars in 2015 from 32.6 million dollars in 2002. As the number of patient in acute hepatitis B has been decreased annually, the direct cost also decreased to 1.9 million dollars in 2015 from 5 million dollars in 2002. Whereas the direct cost for chronic hepatitis B has consistently increased to 127.8 million dollars in 2015 from 27.6 million dollars in 2002. Among health care cost, the average proportion of copayment was 41%. In terms of chronic hepatitis B, outpatient cost was about 13 times higher than inpatient cost in 2015. Both of the health care costs per patient for acute and chronic hepatitis B have upward trend. The burden of chronic hepatitis B infection has been increased in South Korea. The cost related to chronic hepatitis B infection is required to be lessened.

INCREASED RISK OF PREMATURE AND EARLY MENOPAUSE IN WOMEN WITH OVERWEIGHT IN EARLY ADULTHOOD Seung Ah Choe* Seung Ah Choe (CHA University)

Premature or early menopause is known to be associated with increased risk of cardiovascular disease, osteoporosis and neurodegenerative disorders. Overweight and obesity in adolescence and early adulthood is associated with earlier puberty, menstrual disorders, postmenopausal breast cancer as well as cardiovascular disease in adulthood. The purpose of this study was to explore the possible effect of early adulthood body weight on the timing of natural menopause. Data from the Korean Genome and Epidemiology Study (KoGES) conducted from 2004 to 2013 were used. Among the women who reported their menstrual status, those who naturally experienced menopause ≤ age of 40 years were classified to have premature menopause and 40-45 years were to have early menopause. Restricted body weight at the age of 18-20 and self-reported body weight and height were used for comparing early adulthood and current body mass index (BMI). Potential confounding factors such as age at menarche, parity, age at first birth, level of education, early onset of smoking, alcohol use and year of birth were included in the analysis. Korean women who aged ≤ 45 year at the time of survey and born between 1930 and 1970 were included in the analysis. A total of 80,664 women were included in the final analysis excluding infragrade or premature menopause. The prevalence of premature and early menopause was 0.6% and 2.9%, respectively. Pearson correlation coefficient between BMI in early adulthood and current BMI was 0.31. Women who were overweight during their early adulthood showed higher odds for premature menopause (OR = 1.69, 95% CI 1.00, 2.86) and early menopause (OR = 1.46, 95% CI 1.12, 1.91) compared to the other BMI groups, independent of confounding factors including current BMI classification and age at menarche. This finding suggests potential long-term effect of body weight during early adulthood on female reproductive lifespan.
PARENT OF ORIGIN EFFECTS FOR COMMON VARIANTS IN FOLATE, HOMOCYSTEINE AND TRANSSULFURATION PATHWAYS AND RISK OF OBSTRUCTIVE HEART DEFECTS IN A LARGE POPULATION-BASED STUDY

Wendy N. Nemeth

(University of Arkansas for Medical Sciences)

Background: The etiology of obstructive heart defects (OHD) is unknown but is likely due to relationships between genetic variants, epigenetic factors and environmental exposures. Most research has focused on the association between OHD and maternal and infant genetic variants, prenatal environmental exposures and their interaction. Little is known about the potential parental genetic influence on risk of OHD. We examined parent-of-origin effects in transmission of alleles in the folate, homocysteine, or transsulfuration pathways on risk of OHDs by offspring.

Methods: Data on 599 cases of liveborn infants with OHDs born October 1997-August 2008 from the National Birth Defects Prevention Study were used to conduct a family-based case only study. Maternal, paternal and infant DNA was genotyped using Illumina GoldenGate custom single nucleotide polymorphism (SNP) panel. Relative risks (RR), 95% CI, and the likelihood ratio tests from the logistic model were used to determine the parent-of-origin effect of 877 SNPs on 60 candidate genes in the folate, homocysteine, and transsulfuration pathways on the risk of OHDs. Bonferroni correction was used for multiple testing. Results: We identified 3 SNPs in the transsulfuration and 1 SNP in the folate pathway that were statistically significant after adjusting for multiple testing. The RR of OHDs for a child who inherited a paternally derived copy of a allele from a SNP in genes involved in the transsulfuration pathway ranged from 0.93 (95% CI: 0.80-1.08; P=0.01-0.07) to 1.04 (95% CI: 0.90-1.21; P=0.01-0.07) compared to inheriting a maternal copy of the same allele. Relative risk of an OHD for a child who inherited a paternally derived copy of the G allele of the rs681258 SNP in the RFC1 gene in the folate pathway was reduced compared to inheriting a maternal copy of the same allele (RR=0.11; 95%CI: 0.04-0.29; P=9.16×10^-7). Conclusion: Paternal genetic variants in these pathways may be protective for OHDs.

LB035 SP

GEOPHASIC VARIATION IN VPTB RISK AMONG HISPANIC WOMEN AS INDICATOR OF SPATIALLY VARYING RISK ENVIRONMENTS

Kailyn K Stanhope

(Emory University)

A growing share of US births are to Hispanic mothers (23.3% in 2016). Hispanic women are a diverse and geographically dispersed population facing unique contextual stressors, including hostile sub-federal immigration policy climates. Geographically varying social and regulatory contexts may produce spatial variation in experienced stress, which may result in spatial variation in very preterm birth (VPTB) risk for Hispanic women. Research on the impact of context on perinatal health among Hispanic women is limited. Quantifying unexplained variation in VPTB risk after controlling for individual risk determinants will allow for inference about the possible role of place-based social and regulatory contexts. The goal of this analysis is to determine if VPTB risk among Hispanic mothers varies across US states and counties and if variation remains after controlling for individual risk factors.

Data from the 2004, 2005 and 2011-2014 US natality files were used to fit a series of multilevel, generalized linear models with random effects for state and county. For each model, the pseudo-intraclass correlation coefficient (pseudo-ICC) quantifies unexplained within- and between-state variation in risk. County-level combinations with less than 100 eligible births were excluded. 3,429,004 births to Hispanic women in 627 counties and 40 states were included. 1.5% (51,069) were extremely preterm births. Across states, VPTB rates ranged from 0.8% to 2.7% (median: 1.6-1.8). For the empty model, the pseudo ICC was 0.0117 for state and 0.0556 for county. After including individual predictors (age, parity, marital status, education, year and foreign born) the pseudo ICC declined less than 1% for county (0.0044) and not at all for state (0.0131). Residual geographic variation in Hispanic women's VPTB risk above and beyond individual factors supports the hypothesis that geographic context is a determinant of VPTB risk for Hispanic women.

LB034 SP

OBSTETRIC RISKS BY MATERNAL AGE ACCORDING TO RACE: A POPULATION-BASED STUDY IN THE UNITED STATES

Laura Schummers*

(Harvard T. H. Chan School of Public Health)

Objective: To estimate absolute risks of birth outcomes in the United States according to maternal age for all women and separately by maternal race.

Methods: Using Cohort Linked Birth and Infant Death Files available through the National Center for Health Statistics, our study population included all births in the United States from 2004-2011. We estimated absolute risks of each outcome at each maternal age from 15 to 45 years using logistic regression. We modeled maternal age flexibly to allow curvilinear shapes and plotted risks to illustrate the shape of the risk curve for each outcome. Risks were modeled in the overall population and stratified by race. Methods: Using Cohort Linked Birth and Infant Death Files available through the National Center for Health Statistics, our study population included all births in the United States from 2004-2011. We estimated absolute risks of each outcome at each maternal age from 15 to 45 years using logistic regression. We modeled maternal age flexibly to allow curvilinear shapes and plotted risks to illustrate the shape of the risk curve for each outcome. Risks were modeled in the overall population and stratified by race.

Results: In the overall population, multiple gestations, cesarean delivery, and stillbirth risks were lowest at young maternal ages and increased risks at older ages varied by racial group. Within racial groups, increased risks at young maternal ages were most pronounced for non-Hispanic white and Asian/Pacific Islander women, for whom young child bearing was least common. Conversely, risks at older ages were most pronounced for black and American Indian/Alaska Native women for whom delayed childbearing was least common. In addition to having the highest baseline risks, risks for black women increased most steeply with age after 30 years. Conclusion: Obstetric risks for first births were lowest from age 20-30 for women of all races. While slopes of increase at younger and older ages varied by racial group, the overall shapes of the risk curves were similar for all women.
DOES THE RELATIONSHIP BETWEEN INTERPREGNANCY INTERVAL AND ADVERSE PREGNANCY OUTCOMES VARY BY MATERNAL AGE? Laura Schummers* Laura Schummers, (Harvard T.H. Chan School of Public Health)

Background: Interpregnancy interval (delivery to conception) < 12 months is associated with higher risks of adverse outcomes. Relationships between interpregnancy interval and outcomes may vary by maternal age due to differences in pregnancy intention or biological interaction between interpregnancy interval and age, though differences are not well understood. Methods: We analyzed all pregnancies in British Columbia from 2001-2014 to women with ≥2 singleton pregnancies, with the first resulting in a live birth. We evaluated several maternal morbidity (ventilation, ICU admission, organ failure, death), small-for-gestational age (SGA), fetal-infant composite (stillbirth, infant death, very SGA, delivery <28 weeks), spontaneous and induced preterm delivery. Stratified by maternal age at pre-interval birth (20-34; ≥35), we calculated adjusted risk ratio (RR) comparing predicted risks at 6- and 18-month intervals for each age group, and examined 95% confidence intervals for overlapping across groups to assess effect modification.

Results: Our study population included 148,343 births. We found increased risks of severe maternal morbidity at 6-month interpregnancy intervals for women ≥35 (aRR: 2.6 [95% CI 2.3, 2.9]), but not for women 20-34 (aRR: 1.1 [95% CI 1.0, 1.4]). The increased in spontaneous preterm delivery risk at 6-month interpregnancy interval was greater for women 20-34 (aRR: 1.7 [95% CI 1.6, 1.7]) than women ≥35 (aRR 1.4 [95% CI 1.4, 1.4]). Risks according to interpregnancy interval did not vary by age for other outcomes. Conclusions: Short interpregnancy intervals are associated with increased maternal and infant-fetal risks for women 20-34 and for women 35 or older at index birth. This paper provides novel information to motivate delaying subsequent pregnancies to allow for 12 to 24-month interpregnancy intervals for all women.

LITERACY AND CONTRACEPTIVE USE AMONG WOMEN IN SWAZILAND Ewinka Romulus*, Ewinka Minerva Romulus, (Arcadia University)

Contraceptive usage is an important component of maternal health with potential benefits for positive health outcomes. However, many women fail to use any contraceptive methods resulting in adverse effects. Literacy has been identified as an important predictor of well-being, but little research has evaluated its role in contraceptive use. This study examined the relationship between literacy and use of contraceptives among women in Swaziland. Data for this study obtained from the most recent Demographic and Health Survey (DHS) in Swaziland that was conducted in 2006. Women (n = 4,923) were asked about contraceptive use (modern method versus not modern method or none) and as well as the covariates of education age, marital status, wealth status, urban/rural setting, and presence or absence of an STI. Literacy was measured by an indication of being able to read at least a full sentence (yes/no). Logistic regression models were used to examine literacy and contraceptive usage adjusting for all covariates. Data analysis was weighted and analyzed using SPSS V.25. In all, 70.2% of women reported using a form of modern contraceptive method (OR= 4.942, 95% CI= 4.337, 5.631) in comparison with women who were not literate. Higher literacy among women increases the likelihood of using modern contraceptive methods. Future research is needed to substantiate the relationship between literacy and use of contraceptives.

Effective strategies should be investigated to incorporate literacy into contraceptive public health initiatives.

BERAL BREAKER

TRENDS IN PREVALENCE AND CONTROL OF HYPERTENSION ACCORDING TO THE 2017 ACC/AHA GUIDELINE Kirsten S. Dormans* Kirsten S. Dormans, (Tufts University School of Public Health and Tropical Medicine)

Background: Hypertension is a major risk factor for cardiovascular disease and all-cause mortality. Compared with prior guidelines, the 2017 American College of Cardiology/American Heart Association hypertension guideline recommends lower blood pressure thresholds for defining hypertension, for initiating antihypertensive medication, and for antihypertensive medication treatment goals. Methods: To better understand potential impacts of the 2017 guideline, we studied trends in mean systolic and diastolic blood pressure, prevalence and burden of hypertension, and proportion of controlled hypertension among those treated for hypertension and proportion of controlled hypertension in the U.S. adult population ages ≥20 from 1999 through 2016. To test for temporal trends, we used weighted least squares regression models and used piecewise regression to test for changes in trends over time. We used data from 38,276 adults from the National Health and Nutrition Examination Survey. Results: Age-standardized prevalence of hypertension decreased over time, from 48.4% in 1999-2000 to 45.4% in 2015-2016. However, absolute burden of hypertension consistently increased, from 87.0 million in 1999-2000 to 108.2 million in 2015-2016. Age-standardized proportion of controlled hypertension among adults receiving antihypertensive pharmacologic treatment increased from 1999-2000 (25.6%) to 2015-2016 (43.5%). There was not consistent improvement in control throughout the full period among non-Hispanic blacks, individuals ages ≥60, or those with diabetes, chronic kidney disease, or high CVD risk. Conclusions: Based on the 2017 guideline, from 1999 to 2016, age-standardized prevalence of hypertension decreased and the proportion of control among those treated for hypertension improved. However, absolute hypertension burden increased. Among those treated, the control rate did not consistently improve in all subgroups. These data emphasize the need for continuous efforts for the prevention and control of hypertension in the U.S. general population.

S/P indicates work done while a student/postdoc
TWO-YEAR IMPLEMENTATION RESULTS FROM A COMMUNITY PARK-BASED MENTAL HEALTH PROMOTION AND VIOLENCE PREVENTION PROGRAM TARGETING AT-RISK MINORITY YOUTH
Emily M. D’Agostino* Emily M. D’Agostino. (Miami-Dade Department of Parks, Recreation and Open Spaces)

In 2015, over 4,000 juvenile arrests (incidence rate of 679.2 per 100,000) were made in Miami-Dade County, Florida. Simultaneously, there was an upward trend in violence that includes >30% increase in youth shootings (45 vs. 60 events in 2014 and 2015, respectively). The Fit2Lead mental health promotion program was designed to provide daily mental/emotional/physical health and wellness activities and communication/problem-solving skills training for at-risk youth through interdisciplinary collaboration between the Miami-Dade County Parks, Juvenile Services, and Public School Departments, University of Miami and Florida International University, and community-based organizations. Fit2Lead is a free program offered on school Monday-Friday at 12 Miami-Dade County parks to youth (n=405) ages 12-14 in high-needs neighborhoods. We examined the effects of Fit2Lead on neighborhood youth violence from 2015-2017. Juvenile arrests were tracked over two years of Fit2Lead implementation across zip codes matched by (1) park; and (2) baseline youth crime and socioeconomic factors. Regression models were fit to test the association of Fit2Lead implementation (binary variable) and change in number of juvenile arrests by zip code, adjusting for area-level gender, age, poverty, race/ethnicity, and year. The study population was 50% male, 61% Hispanic, 28% non-Hispanic black, and 35% lived below the federal poverty line. A reduction in youth violence was observed in areas where Fit2Lead was implemented. These findings suggest that park-based programs have potential to change behavior in underprivileged youth.

Objective: To examine the association between Fit2Lead implementation (binary variable) and changes in youth crime and violence.

Methods: We conducted a longitudinal, multivariate regression analysis using weighted and adjusted multivariable linear regression models. Adjustments were made for age, gender, race, marital status, education, insurance, and smoking. The effect modifying role of age group (18-39, 40-59, 60+ years old (YO)) and gender was examined. Results: Out of the final study sample of 59,402 Brazilians, 47.2% were 18-29 YO, 18.2% were 60+ YO and 35.4% were females. The prevalence of BD was 13.8%, of HD was 7.6% and of DE was 7.6%. There was a significant association between BD and DE among females 18-39 YO (OR=1.5, 95% CI: 1.1-2.0) and 40-49 YO (OR=0.9, 95% CI: 0.6-1.4). There was a significant association between BD and DE among males 18-39 YO (OR=1.8, 95% CI: 1.1-2.8) and 40-49 YO (OR=2.4, 95% CI: 1.5-4.1). Conclusions: The protective factor of BD for DE among middle-aged Brazilian females needs to be further investigated and understood. Longitudinal research is needed to provide further evidence of associations found in this study. Public health policies must consider the different alcohol drinking patterns among young and middle-aged Brazilians to effectively target the heavy alcohol drinkers to reduce the possible harmful consequences of heavy alcohol consumption.
PRENATAL EXPOSURE TO PERFLUOROOALKYL SUBSTANCES AND BIRTH OUTCOMES: A POOL ANALYSIS IN THE DANISH NATIONAL BIRTH COHORT Qi Meng, Qi Meng. (Department of Epidemiology, Fielding School of Public Health, University of California, Los Angeles (UCLA))

Background: Perfluoroalkyl substances (PFASs) are widespread persistent organic pollutants. Animal studies indicated that in-vivo PFASs exposure affects fetal growth, but findings from human studies are still inconclusive; few studies have evaluated adverse birth outcomes primarily due to small sample size. Methods: We conducted a pooled analysis using data of 3,535 mothers and infant pairs from three sub-samples originating from the Danish National Birth Cohort (DNBC). Each sub-sample has 1998, 543, and 1592 mutually exclusive births respectively. All sub-samples have first trimester maternal plasma concentrations of PFOS and PFOA, and 4 additional PFAS (PFHxS, PFNA, PFHpS, and PFDA) were measured in sub-sample 2 and 3. PFAS treatments were analyzed as continuous variables after natural-log transformation or categorized into tertiles. We estimated the changes in birth weight (grams) or gestational age (days), the odds ratio (OR) and 95% confidence intervals (CI) for infants born preterm (<37 gestational week) or low birth weight (<2500 grams). A range of potential confounders were included and the matching weights of each sub-sample were accounted in statistical analyses. Results: We estimated that each Log10 unit increase in PFOS, PFOA, and PFHpS was associated with a 64g, 74g or 80g decrease in average birth weight. However, only PFOS was positively associated with the risk of low birth weight, i.e., the adjusted ORs for Log10-PFOS and low birth weight was 1.92 (95% CI 1.03, 3.58). Several PFASs (PFOS, PFOA, PFNA, and PFHpS) were also associated with a small decrease in the gestational age at delivery, but no apparent associations were found for any PFAS and preterm birth risk. Conclusions: Our pooled analyses demonstrated that several prenatal PFASs are inversely associated with birth weight and gestational age, and prenatal PFOS exposure is associated with low birth weight. Our findings strengthen the evidence that in-vivo PFASs exposure affects fetal growth.

IMPACT OF CANNABIS USE ON POST STROKE OUTCOMES: INSIGHTS FROM THE NATIONWIDE INPATIENT SAMPLE (NIS) STUDY Ritikum Patell, Ritikum Patell (Ardacis University)

Background: Cannabis use increases the risk of stroke as it is associated with physiological mechanisms that exacerbate stroke prognoses such as increased cerebrovascular resistance. No previous studies have been conducted to evaluate hospitalization outcomes in relation to cannabis use among stroke patients. Purpose: To study the relationship between cannabis use, inpatient stay, care utilization, and treatment modalities, and thereby increases healthcare cost and mortality. Further research to support development of integrated-care-models for early diagnosis and treatment of Cannabis use disorder to improve quality of healthcare.

RISK OF SUICIDE AMONG US VETERANS OF BOSNIA/KOSOVO IN PEACEKEEPING MISSION Tim Bullman, Tim Bullman (US Department of Veterans Affairs)

Studies of veterans have reported conflicting results related to suicide risk associated with deployment to a combat theater. This study examined for the first time, the risk of suicide associated with serving as part of a peacekeeping mission in Bosnia/Kosovo, comparing the post-military service mortality of 33,320 veterans who were deployed to Bosnia/Kosovo between 1995 and February 2002 to that of 117,267 veterans who served in the military between 1995 and 2002, but were not deployed to Bosnia/Kosovo. All veterans separated from active duty between 1995 and 2002. Any veteran who was deployed as part of other peacekeeping missions, the first Gulf War, or Operations Enduring Freedom and Iraqi Freedom was excluded. Using Standardized Mortality Ratios (SMRs) the observed number of suicides in both cohorts were compared separately to the expected based on the US general population. Risk of suicide associated with deployment was assessed using a Hazard Ratio (HR) generated by Cox Proportional Hazard Model. Follow-up began on end date of last data capitation for non-deployed and end date of last deployment for deployed. End of follow-up was the earlier of either date of death or December 31, 2014. There were 200 suicides among deployed veterans, Rate=25.3/100,000 person years at risk (PYR), and 563 suicides among non-deployed, Rate=113/100,000 PYR. Both deployed and non-deployed veterans had excesses of suicides when compared to the US population, SMR=124; 95% confidence interval (CI), 1.07-1.42 and SMR=1.53; 95% CI, 1.41-1.66) respectively. Deployment to Bosnia/Kosovo was not associated with an increased risk of suicide, HR=0.84; (95% CI, 0.72-1.00). This is the first study to assess suicide risk among Bosnia/Kosovo veterans specifically or any US Veterans of a peacekeeping mission. These findings support other studies that have concluded military service in general, rather than deployment specifically is associated with increased risk of suicide.

ARBOVIRAL INFECTION IN PEACE CORPS VOLUNTEERS: IMPROVED POPULATION HEALTH SURVEILLANCE FOR EMERGING INFECTIOUS DISEASES Renne Ferguson, Renne Ferguson, Peace Corps}

Quantifying the burden of arboviral infections such as dengue, chikungunya, and Zika virus disease in long-term traveler populations is challenging given fluctuating geographic distributions of disease agents, vectors, and hosts, as well as limitations in laboratory testing capabilities in many settings. Peace Corps Volunteers serve overseas, typically, for 27 months, and receive healthcare from Peace Corps Medical Officers. Monitoring cases of dengue among Volunteers, the Peace Corps Epidemiology and Surveillance Unit leveraged capabilities in the electronic medical record, PCMEDICS. Combining diagnostic and procedural codes with a select list of notifiable conditions allowed for improved surveillance of arboviral infections in the face of a rapidly changing disease landscape. In January-December 2016, the rate of arboviral infections (dengue, chikungunya, and Zika) was 1.57 cases per 100,000 Volunteers; 95% CI, 1.28-1.89). In comparison, the preliminary rate was 0.36 cases per 100,000 Volunteers in 2015 (95% CI, 0.22-0.57) in January-September 2017, the difference was statistically significant (p=0.05). The proportion of arboviral infections due to confirmed Zika virus disease decreased from 7.4% to 5.26%. Well-designed case inclusion/exclusion criteria and the electronic medical record have allowed for improved data collection and reporting on meaningful differences in the burden of arboviral disease in the Volunteer population.
THE RISK OF HIGH BLOOD PRESSURE IS ASSOCIATED WITH HIGH BLOOD PRESSURE AMONG CLOSE, BUT NOT DISTANT, SOCIAL TIES
Todd Sponholtz* Todd Sponholtz (Boston University School of Medicine)

The spread of cardiovascular risk factors, such as obesity and diabetes, within social networks has been reported; however, hypertension has been little studied. We investigated this question using 29 years of data in the Framingham Offspring Study (FOS). Participants' social ties were compiled using administrative information: family and friends (potential contacts for participant tracking), neighbors (geocoded home addresses), coworkers (place of employment). Blood pressure was measured twice by trained study personnel at each FOS exam and averaged. High blood pressure was defined as systolic blood pressure >150 mm Hg, diastolic blood pressure >90 mm Hg, or current use of antihypertensive medication. OR and 95% CI for the association of alters' (i.e. the social ties') obesity status and high blood pressure at the prior exam with ego's (the focal individual) were estimated using logistic regression adjusted for exam and ego age, sex, and obesity status. We accounted for multiple observations of the same ego using generalized estimating equations. The analysis included 3065 FOS participants. The ORs for the associations of alters' high blood pressure at the previous exam with incident high blood pressure among ego's were: 1.39 (95% CI: 1.15, 1.68), 1.33 (95% CI: 0.97, 1.83), and 1.44 (95% CI: 1.27, 1.64) for spouses, friends, and siblings, respectively. Ego incident high blood pressure was not associated with the prior exams' blood pressure status among neighbors living within 25 m (OR: 1.07, 95% CI: 0.79, 1.44) or coworkers (OR: 0.95, 95% CI: 0.82, 1.10). Spousal obesity was associated with elevated risk of high blood pressure (OR: 1.20, 95% CI: 0.98, 1.48), but this was not the case among other social ties examined. Our data suggested associations of ego incident hypertension with the hypertension status of close social ties. Lack of associations with neighbors' and coworkers' status implies little influence by weak ties or shared neighborhood and work environments.

ARE US VIETNAM WAR VETERANS DIFFERENT? VE-HEROES A NATIONAL SURVEY OF CURRENT HEALTH
Victoria J. Davey* Victoria J. Davey, (Office of Research & Development)

Background: The Vietnam Era Health Retrospective Observational Study (VE-HEROeS) evaluates the current physical and mental health of surviving Veterans who served in Vietnam, Cambodia, and Laos (VV) and compares them to veterans who served elsewhere (EraV) and to US non-veterans (NV). This is the first large national survey of Vietnam-era veterans that collected data on demographics, military service location (for veterans), perceptions of current health, clinician-diagnosed illnesses or shared neighborhood and work environments.

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MULTIGENERATIONAL LOW BIRTHWEIGHTS AMONG AUSTRALIAN ABORIGINAL INFANTS: IS THERE ANY EVIDENCE OF FETAL PROGRAMMING?
Alison Gibberd* Alison Gibberd, (The University of Sydney)

Low birthweight (BW) is common among Aboriginal infants. BW is correlated across generations due to the transmission of genetic and environmental factors. Another cause may be fetal programming, where a fetus' response to a hostile uterine environment leads to poorer adult health and, in turn, a poorer uterine environment for her offspring. If so, Aboriginal people would be disproportionately affected, following years of low BW and chronic disease. Identifying a causal relationship between maternal BW and offspring BW is complex. However, we can gain insights using several family-based approaches. WA has the only database of family relationships in Australia. We used linked birth, hospital, and mental health records of 12,865 Aboriginal singletons born 1998 to 2011 in Western Australia (WA) whose mother linked to a WA birth record from 1980 onwards, and their parents' records. 17% of births were small for gestational age. Using a linear regression model with a generalised estimating equation approach for offspring BW z-score (BWZ), the coefficient for maternal BWZ was 0.17 (95% CI: 0.14, 0.20), compared to 0.13 (95% CI: 0.10, 0.16) for paternal BWZ. The difference in coefficients (0.03 [95% CI: -0.01, 0.08]) provides only limited support for the fetal programming hypothesis, particularly when infant sex and maternal smoking are considered. Other associations of offspring BWZ were much larger, including maternal smoking (-0.39 [95% CI: -0.45, -0.34]). After restricting the sample to contain less than 10% paternal BWZ, maternal BWZ was still attenuated (-0.01 [95% CI: -0.07, 0.05]), suggesting transmission of maternal genetic and environmental factors alone can explain the association, though the 95% confidence interval was wide. Both approaches indicate fetal programming has a limited role in the persistently high rates of low BW among Aboriginal infants compared to other risk factors in the current pregnancy.
ESTIMATED PREVALENCE OF LIFETIME CIRCULATORY SYSTEM DISEASE FROM THE 2016-2017 VIETNAM ERA HEALTH RETROSPECTIVE OBSERVATIONAL STUDY (VE-HEROES) Erick Ishii, VHA Patient Care Service/Post Deployment Health/Epidemiology Program

Background: The health status of surviving veterans who served during the Vietnam Era (1961-1975) is a topic that still deserves continued investigation. VE-HEROES is a nationwide study designed to compare the health of veterans who served in Vietnam, Cambodia, or Laos (VV), veterans who served elsewhere during the Vietnam Era (EraV), and similarly aged non-veteran (NV) U.S. residents who never served in the military (born before 1958). Objective: Investigate the estimated, self-reported prevalence of circulatory disease conditions (CSD) in an aging veteran population. Participant and Methods: We used a validated food frequency questionnaire and were computed and divided into five categories. A Cox-adjusted hazards model was used to estimate hazards ratio (HRs) and 95% confidence intervals (CIs) of overall and specific-cause mortality. The lowest categories were used as references. Results: During 10.6 years of follow up, 4,424 were reported to have died. Participants with higher dietary scores compared with those with lower scores, had a significantly decreased risk of mortality across AHEI, AMED, DASH, and WCRF scores (HR C5 vs C1 = 0.80, 95% CI = 0.70-0.91). Conclusion: These results demonstrate that various indexes of diet quality were inversely associated with overall mortality. This study has a public message, that dietary guidelines designed for the American population may be beneficial for other populations.

THE HEALTHCARE COSTS OF NEIGHBORHOOD SOCIOECONOMIC DEPRIVATION Katherine J. Sapra, Katherine J. Sapra, (Centers for Medicare & Medicaid Services)

Background: Individuals with lower socioeconomic status (SES) have higher healthcare costs and worse health outcomes and may benefit from targeted interventions to improve these outcomes. However, collecting individual SES data is impractical, and claims do not capture these data. As an alternative, we investigate whether neighborhood socioeconomic deprivation, measured from readily available patient address data, predicts healthcare costs for Maryland Medicare beneficiaries. Methods: We evaluate neighborhood socioeconomic deprivation using the area deprivation index (ADI) a validated composite measure of deprivation available for all US census tracts. Higher ADI values indicate greater deprivation. We update the ADI using the most recent (2015) American Community Survey data and revalue for census block groups in Maryland. Beneficiaries are assigned the ADI value of their home address. We evaluate healthcare costs using total cost of care (TCOC) per beneficiary, comprising 2015 Medicare Part A and B expenditures obtained from claims data. TCOC is regressed on ADI quintile and hierarchical condition categories (HCC) score, inclusive of health and demographic factors, in adjusted models. Results: ADI is available for 3,883 block groups in Maryland and is associated with TCOC. ADI is significantly (p-value < 0.05) associated with TCOC. Unadjusted (Q1 $8,742, Q2 $9,376, Q3 $10,068, Q4 $10,950, and Q5 $12,324) and adjusted (Q1 $9,552, Q2 $9,831; Q3 $10,196; Q4 $10,568; Q5 $11,182) TCOC increase with increasing ADI. Among the least healthy beneficiaries (highest HCC quintile), the impact of ADI is most prominent: 27% (p < 0.001) higher TCOC for highest versus lowest ADI quintile. Conclusion: Beneficiaries living in neighborhoods with greater deprivation have greater healthcare costs, even after risk adjustment for individual-level health and demographic factors. Providers may consider using ADI to identify patients for targeted interventions.

RECOVERING FROM SELECTION BIAS IN THE EFFECT OF PLACE ON BIKING WHEN RESTRICTED TO SMARTPHONE USERS Michael D Garber, (Emory University)

Smartphone-generated data are now used for research in many areas, including bicycling for health and transportation. In this study, we used data from a validation study, our goal was to assess, quantify, and recover from potential selection bias in a theoretical scenario in which (1) the aim was to evaluate the effect of a new protected bike lane on the amount of bicycling along a corridor and (2) a site-specific data were restricted to those generated by cyclists who used smartphone apps to record the rides. Methods: We conducted an intercept survey at various locations in Atlanta, GA between June 2016 and April 2017 to ask participants about socio-demographics, biking habits and routes of common rides, and whether they use smartphone apps (e.g. Strava) to record their rides (n = 456). Using results from this study, we estimated parameters for structural models using a proposed directed acyclic graph (DAG) relating the protected bike lane with ridership. We then simulated a dataset using the structural package in R and attempted to recover from the selection bias using inverse-probability-of-selection weighting. Results: In the simulated data (n = 10,000,000), the average causal effect (ACE) is not significantly different from zero. When restricted to app users, the ACE was 0.39761. When restricted to app users, the ACE was 0.39777, representing a very slight selection bias associated with smartphone use. Inverse-probability-of-selection weighting recovered some, but not all, of the bias at 10,000,000 observations.
GENETIC PREDISPOSITION FOR NEURODEVELOPMENTAL DISORDERS AND AUTISTIC SYMPTOMS: THE ROLE OF NEUROMOTOR DEVELOPMENT DURING INFANCY Fadila Serdarevic* Akhgar Ghanezadeh, (New York University School of Medicine)

Impaired infant motor development is a risk indicator for autism. We examined whether neuromotor development during infancy mediates the association between genetic predisposition to neurodevelopmental disorders and childhood autistic symptoms. Neuromotor development (tone, response, and other observations) was assessed during home visits in 1921 infants (2.5 months) from European ancestry. We calculated polygenic risk scores (PRS) for autism spectrum disorder (ASD), attention-deficit/hyperactivity disorder (ADHD), using genome-wide association study (GWAS) summary statistics. Parents rated autistic symptoms in their children age 6. We performed mediation analysis with 99% bias-corrected bootstraps CI, applying 1000 bootstrap samples to identify the indirect effect of ASD- and ADHD-PRS on childhood autistic traits through infant neuromotor development. PRS for ASD was associated with higher scores in overall infant neuromotor development (GWAS P value threshold (PT) <0.5: 0.08, CI 0.03, 0.13, p=0.01), in particular low muscle tone (PT <.5: 0.05, CI 0.2, 0.11, p=0.001). ADHD PRS was associated with less optimal scores (PT <0.1: 0.05, CI 0.01, 0.09, p=0.02). ASD and ADHD PRS were each associated with autistic symptoms. Mediation analysis suggested that 11% (95% CI 0.1, 0.5, p=0.03) of the association between genetic predisposition for autism and autistic symptoms is mediated by overall neuromotor development, in particular low muscle tone. We observed an indirect effect of ADHD-PRG on autistic symptoms through sensory in boys only. Neuromotor assessment in infants with high genetic risk for ASD and ADHD might help identifying vulnerability to early symptoms and be the target for interventions. Future analyses using genetic information on motor development should test if this association is indeed causal.

ASSOCIATION BETWEEN PARTICIPATION IN EXTRACURRICULAR ACTIVITIES AND PERCEIVED RISK OF HARM FROM SMOKING AMONG ADOLESCENTS NSDUH, 2016 Ruchi Bhandari* R. Constance Wiener, (West Virginia University)

Introduction: Perceived risk of harm is inversely associated with substance use behavior. Modifying risk perception in adolescence through school-based activities can be useful in smoking prevention. Purpose: The objective of this study is to identify association between school-based extracurricular activities and perceived degree of risk of harm from smoking daily among adolescents. Methods: Data were obtained from 2016 National Survey on Drug Use and Health (NSDUH) on adolescents aged 12 to <18 years who responded to the question regarding their perception of degree of risk of harm from daily smoking (i.e., slight, moderate, great) for smoking 1 pack of cigarettes daily (outcome variable) and participation in number of school-based extracurricular activities. Ordinal logistic regression model controlled for age, sex, race/ethnicity, income, metropolitan status, income, smoking status, education, and family history of smoking, and potential expression of age. Analysis was adjusted for factors study design, weight, and conducted with SAS® version 9.3. Results: Of the 4,269 participants, 47% were females, approximately half were non-Hispanic white, proportionately divided in age-groups. About 16% had already smoked before the age of 18 years; 17% reported not participating in any extracurricular activity at school, and regarding their perception: 16% reported no slight harm; 20% moderate, and 69% great risk of harm from smoking. In ordinal logistic regression analysis, adolescents who had not participated in any extracurricular activities were more likely to report that they perceived no slight harm from smoking one or more packs of cigarettes daily (Adjusted OR=1.88; 95% CI 1.50-2.34). Conclusion: Participation in structured extracurricular activities at school may help increase risk perception of harm from smoking, and thereby lower the initiation and use of substance use among adolescents.

MATERNAL EXPOSURE TO LEAD AND ITS RELATIONSHIP TO BIRTH OUTCOMES IN SAN FRANCISCO NEIGHBORHOODS Chiromma Okorie* Chierzimo Okorie, (Health and Equity Lab, San Francisco State University)

Background: Preterm birth rates in California are on the rise. This trend is disproportionately displayed in communities of color and low income neighborhoods. In fact, women who live in the Southeast neighborhoods of San Francisco (SF) have the highest rates of premature births, and deliver more babies of low-birth weight. Such babies have a higher risk of mortality and increased risk for negative health later in life. Therefore, every effort must be made to ensure pregnant women live in a healthy environment. However, some women in low-income neighborhoods do not live in adequate housing and may be exposed to environmental toxins. In fact, toxins like lead have been shown to affect fetal development, and maternal exposure to lead may contribute to the high rate of preterm birth outcomes in some SF neighborhoods. Purpose: This study aims to measure the level of lead found in bio-specimens of hair collected in SF neighborhoods with high rates of preterm birth outcomes (i.e., "hotspots"). Approach: Human hair absorbs lead and can be used to measure exposure to toxic at the individual-level. Moreover, hair collected from beauty salons that primarily cater to local residents can be used to measure neighborhood-level exposure. Therefore, hair samples collected from 30 beauty salons where primarily cater to local residents can be used to measure neighborhood-level exposure. Therefore, hair samples collected from 30 beauty salons were used to measure environmental lead exposure. Result: We expect to find some lead in human hair collected from "hotspot" neighborhoods with high rates of preterm birth outcomes in the San Francisco. Conclusion: Evidence of lead exposure in "hotspot" neighborhoods might at least partially explain their higher rate of preterm birth outcomes. This knowledge can then be used to eliminate maternal exposure to lead in these neighborhoods, thereby reducing the number of preterm births and decreasing associated health disparities.

REPORTING EFFECTS ANALYSIS OF WEN BY CHAZ DEAN, INC CLEANSING CONDITIONER: EXAMINATION OF THE FDA ADVERSE EVENT REPORTING SYSTEM Andrew Monnot* Andrew Monnot, (Cardinal ChemRisks)

The Food and Drug Administration (FDA) maintains an adverse event reporting system with data collected from users of various food, beverage, and cosmetic products. Recently, there have been concerns regarding alleged health effects among users of WEN by Chaz Dean (WCD) cleansing conditioner. We evaluated whether users of WCD cleansing conditioners are at risk for hair breakage, and dermatological conditions. The objective of this analysis was to identify temporal trends in reported adverse events specific to WCD cleansing conditioners before and after media coverage of alleged health effects in 2015. Published publicly available data were extracted from the FDA Center for Food Safety and Applied Nutrition (CFSAN) Adverse Event Reporting System (CAERS) from 2004 to 2016. Data were restricted to WCD specific products, and were further limited to potential cleansing conditioner products. A total of 1,086 adverse events were reported among the products that fit the study inclusion criteria. The most prevalent reported adverse events were alopecia, pruritus, skin irritation, and rash. 82.2% of the adverse events were reported to occur between 2012 and 2016. Additionally, based on the availability of company sales records, a subset of adverse event data (2005 to 2015) was analyzed using negative binomial regression. The rate of adverse event reporting after 2014 was statistically significantly higher in comparison to the rate of adverse event reporting before 2014, adjusting for the number of cleansing conditioner units sold per year. Findings suggest the potential for a halo effect, where negative news media may alter reporting behavior due to societal shifts in product-specific risk perception.
DISPARITIES IN THE USE OF SPECIALTY MENTAL HEALTH SERVICES BETWEEN LATINOS, AFRICAN-AMERICANS AND NON-LATINO WHITES IN NEW YORK CITY IN 2013-2014, Annell Ovals* Annell Ovals, (CUNY Graduate School of Public Health and Health Policy)

Racial/ethnic disparities in access to health care in the United States are well documented. As it relates to access to mental health services, while Latinos and African Americans are more likely to experience depression and anxiety, compared to non-Latino Whites, these populations have less access to specialty mental health services and receive poorer quality of care. In this study, we evaluated whether these racial trends in specialty mental health care are also evident in New York City (NYC), a large urban center characterized by unparallelled cultural and ethnic diversity. Data source was the 2013-2014 NYC Health and Nutrition Examination Survey (NYC HANES), which surveyed a probability sample of 1524 NYC adults’ ages 20-97. Specialty mental health care was defined as treatment received by a psychologist, psychiatrist, or any mental health professional in mental health settings. Participants self-identified their race/ethnicity, yielding a sample of 390 Latinos, 493 African Americans, and 513 non-Latino Whites. Weighted logistic regression was used to compare the use of mental health specialty care between these racial/ethnic groups in NYC, with relevant background characteristics adjusted for. Specialty mental health treatment use was reported by 13.1% of Latinos and 12.4% of African Americans, compared to 19.3% of non-Latino Whites (p=0.001). Latinos and African Americans have lower odds of specialty mental health care treatment (OR=0.41, 95%CI:0.20-0.84 and OR=0.29, 95%CI:0.15-0.57). We identified substantial disparities between racial/ethnic groups in their use of specialty mental health services in NYC. While this may partly be due to lower rates of health insurance, higher levels of stigma and a culturally insensitive health care system, further investigation is needed to help better understand and address this gap, as the health, social and economic cost of Latinos and African Americans underutilizing mental health specialty services is substantial.

ARE YOUR JEANS TOO TIGHT? EVIDENCE OF AN ASSOCIATION WITH UNEXPLAINED VULVAR PAIN (VULVODYNIA) Bernard J. Harlow* Bernard J. Harlow (Boston University School of Public Health)

Clinicians are acutely aware that women seen for vulvar pain symptoms have a history of wearing tight fitting clothing. Earlier studies have shown that wearing tight clothing can increase the risk of candidiasis and trichinella infections. Given that both of these factors seem to be more prevalent in women with vulvodynia, we sought to determine whether tight fitting clothing is associated with vulvodynia independent of gynecological infections. A history of wearing tight underwear, tight fitting pants or shorts, and spendy shorts was assessed in 234 women with clinically diagnosed vulvodynia and 234 randomly selected similarly aged controls residing in the Minneapolis-St. Paul Metropolitan area. Women self-reported the frequency of wearing this type of clothing the year before their first onset of vulvar pain and a comparable time period among the frequency-matched controls. No association was seen with wearing either tight underwear or tight fitting spendy shorts. However, wearing tight fitting jeans 4 times per week or more was associated with a 2.9 fold odds of vulvodynia compared to those who never reported wearing tight fitting jeans. After controlling for age, anxiety, history of urinary tract infections, and history of gynecological infections, the association was attenuated but remained strong (OR=2.1, 95%CI 1.1-3.8). We also observed a significant test of trend with a 17% increase in risk with each increasing category of frequency (95%CI 1.0-1.3). Our findings suggest that tight fitting jeans may increase the risk of vulvodynia, perhaps by creating a more suitable environment for genital infections. However, a more thorough mediation analysis will be needed to determine a better understanding of the temporal pathway.

THE IMPACT OF UNCONVENTIONAL NATURAL GAS DEVELOPMENT ON ACUTE MYOCARDIAL INFARCTION HOSPITALIZATIONS AMONG ELDERLY POPULATION: EVIDENCE FROM PENNSYLVANIA Linxi Liu* Linxi Liu, (University of Rochester)

Introduction: Since 2000, unconventional natural gas development (UNGD) has rapidly increased in the United States, especially in Pennsylvania's Marcellus Shale. Community concerns regarding UNGD include the potential health effects of increased UNGD-related air pollution. Reduced air quality is a risk factor for acute myocardial infarctions (AMI). Here, we hypothesize that UNGD could increase AMI risk among the elderly population. Methods: We develop a novel county-level database of AMI hospitalizations, UNGD well locations, and regional sociodemographic information to examine the associations between UNGD and AMI hospitalizations over time. We use a linear model in a difference-in-differences quasi-experimental design to assess changes in AMI hospitalization rates in highly exposed counties (top 15% of drilling activity) to less exposed counties. In sensitivity analyses, we test our results across numerous cutoffs for well density, drilling timing, and sector events. Results: We find that highly exposed counties demonstrate additional 3.35 (95% CI: 0.68-6.02) hospitalizations per 10,000 people. The effect size for other time cutoffs range from 2.68 (95% CI 0.11 to 5.25) to 3.18 (95% CI 0.63 to 5.73). Our estimates are robust to multiple sensitivity analyses. Conclusion: A high density of UNGD wells increases AMI hospitalizations among the elderly population. Further study is needed to replicate this effect and investigate mechanism behind the increasing AMI risk in these areas.

ARE YOUR JEANS TOO TIGHT? EVIDENCE OF AN ASSOCIATION WITH UNEXPLAINED VULVAR PAIN (VULVODYNIA) Bernard J. Harlow* Bernard J. Harlow (Boston University School of Public Health)

Clinicians are acutely aware that women seen for vulvar pain symptoms have a history of wearing tight fitting clothing. Earlier studies have shown that wearing tight clothing can increase the risk of candidiasis and trichinella infections. Given that both of these factors seem to be more prevalent in women with vulvodynia, we sought to determine whether tight fitting clothing is associated with vulvodynia independent of gynecological infections. A history of wearing tight underwear, tight fitting pants or shorts, and spendy shorts was assessed in 234 women with clinically diagnosed vulvodynia and 234 randomly selected similarly aged controls residing in the Minneapolis-St. Paul Metropolitan area. Women self-reported the frequency of wearing this type of clothing the year before their first onset of vulvar pain and a comparable time period among the frequency-matched controls. No association was seen with wearing either tight underwear or tight fitting spendy shorts. However, wearing tight fitting jeans 4 times per week or more was associated with a 2.9 fold odds of vulvodynia compared to those who never reported wearing tight fitting jeans. After controlling for age, anxiety, history of urinary tract infections, and history of gynecological infections, the association was attenuated but remained strong (OR=2.1, 95%CI 1.1-3.8). We also observed a significant test of trend with a 17% increase in risk with each increasing category of frequency (95%CI 1.0-1.3). Our findings suggest that tight fitting jeans may increase the risk of vulvodynia, perhaps by creating a more suitable environment for genital infections. However, a more thorough mediation analysis will be needed to determine a better understanding of the temporal pathway.

THE ROLE OF BENZATHINE PENICILLIN G IN PREDICTING AND PREVENTING ALL-CAUSE ACUTE RESPIRATORY DISEASE IN MILITARY RECRUITS Jacob Bell* Jacob Bell, (University of Florida & Army Public Health Center)

Acute respiratory disease (ARD) is responsible for approximately 2,000 missed training days annually among US military recruits. Since the 1950s, the US military has used benzathine penicillin G (BPG) prophylaxis to prevent streptococcal infections in recruits. After a 12-year manufacturing hiatus, the adenovirus vaccine which had IRRs of 0.42 (95%CI: 0.42-0.84) was re-introduced in 2011. Here, we examine the impact of adenovirus vaccine and BPG prophylaxis on ARD dynamics in military recruits. We fit and cross-validated a random forest model (RF) and a Poisson regression model (PR) to ARD case counts from 23 years of the surveillance years. We find that highly exposed counties demonstrate additional 3.35 (95% CI: 0.68-6.02) hospitalizations per 10,000 people. The effect size for other time cutoffs range from 2.68 (95% CI 0.11 to 5.25) to 3.18 (95% CI 0.63 to 5.73). Our estimates are robust to multiple sensitivity analyses. Conclusion: A high density of UNGD wells increases AMI hospitalizations among the elderly population. Further study is needed to replicate this effect and investigate mechanism behind the increasing AMI risk in these areas.

S/P indicates work done while a student/postdoc
HIV-RELATED KNOWLEDGE, ATTITUDES AND BEHAVIORS AMONG THE GENERAL POPULATION IN A HIGH-RISK COUNTY IN THE UNITED STATES

Candice Collins* Candice Collins, (East Tennessee State University)

Information is lacking on what the general population knows about HIV and what their attitudes are towards the disease and those living with HIV, which may affect the transmission of HIV. The purpose of this study was to assess the HIV-related knowledge, attitudes and behaviors (KAB) among the general population of a high-risk county in Northeast Tennessee. A cross-sectional survey was administered to assess KAB variables. Of the 322 participants, 92.6% had heard of HIV and 43.5% knew that HIV could not be transmitted by mosquito. 82.9% felt that people talked badly about people living with HIV, and 67.8% of participants had never tested for HIV. Participants aged 25-34 were 7.29 times more likely to have a higher level of HIV knowledge than those aged 18-24 (95% CI: 2.04-26.08). Participants with a higher education and income level had significantly lower stigmatizing attitudes than those who had completed high school or below or had an income of <50,000, respectively. Interventions are needed to increase levels of knowledge and decrease stigmatizing attitudes within this high-risk county.

PLASMA METABOLIC REVEAL NOVEL METABOLITES IN EARLY PREGNANCY IN ASSOCIATION WITH GESTATIONAL DIABETES RISK

Cuilin Zhang* Cuilin Zhang, (NICHD, National Institutes of Health)

Background: Although metabolomics may shed light on the etiology of diabetes in pregnancy, prospective studies on their role in gestational diabetes (GDM) etiology are sparse. We aimed to longitudinally examine metabolites (both targeted and non-targeted) and GDM risk in a matched case-control study of 107 GDM and 214 non-GDM women in a multi-racial pregnancy cohort. Methods: GDM diagnosis was based on Carpenter & Coustan Criteria. Twenty-two amino acids were quantified using plasma collected at gestational weeks (GW) 10-14, 15-26, 23-31, and 33-39. In addition, 331 primary metabolites were quantified by GC-TOF mass spectrometry. Adjusted odds ratios (aORs) of GDM related to metabolites were estimated using conditional logistic regression adjusting for GDM risk factors. The present report focuses on findings using plasma in early pregnancy 10-14GW. Results: Alanine levels in GW 10-14 were significantly higher in GDM women than controls (mean: 30.5 vs. 27.6 umol/L) and were positively related to GDM risk; aORs across increasing quartiles were 1.00, 1.69, 2.86, and 3.05 (P for trend=0.02). By contrast, arginine and glycine levels were lower in GDM and were inversely related to GDM risk; aORs across increasing quartiles were 1.00, 0.92, 0.74, and 0.48 (P=0.06) for arginine and 1.00, 0.42, 0.36, and 0.24 (P<0.001) for glycine. In addition, based on non-targeted approach, isocitric acid was positively related to GDM risk; aORs across increasing quartiles were 1.00, 1.50, 1.04, and 2.32 (P=0.002). We also identified two unknown metabolites that were strongly and inversely related to GDM risk (aORs were 1.00, 0.52, 0.18, and 0.11, and 1.00, 0.33, 0.12, and 0.06 respectively; both P for trend <0.001). Conclusion: Our study revealed several novel metabolites that may be implicated in the early pathogenesis of GDM. These findings might provide new insights into GDM etiology.

PHYSICAL EXERTION IMMEDIATELY PRIOR TO EARLY PRETERM DELIVERY: A CASE-CROSSOVER STUDY

Harpreet S Chahal* Harpreet S Chahal, (University of Toronto, Harvard TH Chan School of Public Health)

Background: Investigation of the effects of physical exertion on preterm delivery has yielded mixed results; observational studies on occupational exertion have more consistently documented increased risks, while studies of leisure time activities generally document reduced risks of preterm delivery. The aim of this study was to explore the association between episodes of physical exertion and the transient risk of early preterm delivery. Methods: We conducted a case-crossover study of 722 women interviewed during hospital stay for early preterm delivery (defined as delivery before 34 weeks gestational age) between March 2013 and December 2015 in seven Peruvian hospitals. Eligible participants were identified by reviewing admissions logbooks for the emergency room, labor and delivery, and surgery. Results: The relative risk (RR) of early preterm delivery was 5.8-fold higher (95% confidence interval [CI]: 3.2 - 7.9) in the hour following moderate or heavy physical exertion (exertion causing deep breathing or panting, overheating, and sweating respectively) compared to periods of lower exertion or rest, and returned to baseline in the hours thereafter. Women who reported engaging in moderate or heavy physical exertion more than 3 times per week in the year before pregnancy experienced a 4.3-fold increased risk (95% CI: 2.8, 6.0) with each bout of moderate or heavy physical exertion, as compared with a 15.3-fold risk (95% CI: 9.1, 25.8) among more sedentary women (P<0.001). Moderate or heavy physical exertion was more strongly associated with delivery preceded by premature rupture of membranes (RR=8.4, 95% CI: 5.6 -12.6) as compared with spontaneous early preterm delivery (RR=3.5, 95% CI: 2.1 - 5.9, P<0.01) Conclusions: Within 1 hour of episodes of moderate or heavy physical exertion, there is an increased risk of early preterm delivery, particularly among women with sedentary behavior.

SPATIO-TEMPORAL AND BIG DATA ANALYSIS OF RUBELLA IN CENTRAL CHINA, 2006-2016: GEOGRAPHIC, SEASONAL PATTERNS, AND ESTIMATION OF TRANSMISSIBILITY

ZP Xie* Sheng Li (City University of New York)

Background: Rubella is a mild or asymptomatic viral respiratory infection. Decades of increasing vaccination and public health responses have led to dramatic declines, but rubella remains persistent in China. Understanding the spatiotemporal pattern and its driving factors of rubella are of great public health significance. Big data analysis is a useful tool to handle large size of surveillance data and to inform prevention via classifying the high-risk groups. This study aims to decipher the dynamics of rubella in Henan, the most populous province in China. Methods: Comprehensive individual rubella case data, including epidemiologic links, vaccination, from a fever rash syndrome surveillance system was collected between 2006 and 2016. Social, demographic and economic statistics, weather variables were also collected. First, we performed comprehensive spatial temporal analysis in R. Wavelet analysis was performed to identify the seasonality. Multiple levels of maps and hotspot analysis were developed to identify the region with high risk. A novel Bayesian regression model was developed to assess the impact of spatial and temporal factors. Second, we imputed missing big data analysis to classify the driving factors and high-risk groups. Results and Conclusions: Approximately 20,000 rubella cases were diagnosed from over 40,000 patients with fever rash. Annual patterns of rubella exist at provincial level, but become irregular at local levels. Multiple levels of maps and hotspot analysis show that rubella prevalence decreased throughout the whole region but was persistent particularly in mountainous regions. The Bayesian spatio-temporal model confirmed significant spatial and temporal drivers. Finally, the deep learning algorithm classifies the high-risk groups and identifies the important driving factors such as vaccination.
THE INFLUENCE OF NEIGHBORHOOD CHARACTERISTICS ON SOCIA PARTICIPATION IN CANADIAN AND LATIN AMERICAN OLDER ADULTS: FINDINGS FROM INTERNATIONAL MOBILITY OF AGING STUDY (IMIAS) Afshin Vafaei* Afshin Vafaei, (Lakehead University, Canada)

Background: Participation in social activities tend to decrease in old age and its impact on physical and mental health of older adults is well documented. Perceived neighborhood characteristics may influence the levels of social participation.

Methods: We obtained data of 1721 community-dwelling older adults living in Canada, Brazil, and Colombia from 2014 wave of the International Mobility of Aging Study. Social participation was defined by the frequency of participation in seven activities from the social domain of the validated Life Disability Instrument. Participants also rated three physical and social environment characteristics of their neighborhoods: community barriers, perception of safety, and social capital; all measured via validated scales. Multilevel linear regressions with random intercepts were fit to examine potential associations of interest with accounting for the clustering effects of neighborhoods after adjustment for demographic and health status variables. Intraclass Correlation Coefficient was calculated to quantify variations in the levels of social participation across neighborhoods. Results: In Latin America between-neighborhood differences explained 5% of the variance in the levels of social participation, but the corresponding value in Canada was only 1.5%. In the fully adjusted models none of the measured neighborhood factors were related to social participation in Latin America, and in Canada only social capital was a significant contributor (Beta coefficient=0.17; 95%CI=0.05-0.28). Better physical health and cognition were related to higher social participation in all participants, however, socio-demographic factors of education and income were significant predictors only in Latin America.

Conclusions: Patterns of social participation vary across different settings. In Canada, living in more cohesive neighborhoods enhances social participation whereas in Latin America individual factors are more important.

SEX-SPECIFIC ASSOCIATION BETWEEN ALCOHOL CONSUMPTION AND INCIDENCE OF HYPERTENSION: A SYSTEMATIC REVIEW AND META-ANALYSIS OF COHORT STUDIES Afshin Vafaei* Afshin Vafaei, (Lakehead University, Canada)

Background: While the relationship between heavy alcohol consumption and an increased risk of hypertension is well documented, the sex-specific risk associated with low levels of alcohol intake is unclear. Methods: We searched Medline and Embase for original prospective cohort studies on the association between average alcohol consumption and incidence of hypertension. RRs were pooled with inverse-variance weighting. Results: Twenty-two studies with 36,254 participants (125,907 men; 235,347 women) and 90,160 incident cases of hypertension (32,466 men; 57,734 women) met our inclusion criteria. Pooled results showed that women drinking 1-2 drinks/day (12 grams pure ethanol/standard drink) were 21% less likely to develop hypertension compared to men (RR = 0.79, 95%CI 0.67-0.93). In men, a dose-response association was observed: compared to non-drinkers the relative risk for hypertension was 1.19 (95%CI: 1.07-1.31, I2 = 59%), 1.51 (95%CI: 1.30-1.76) and 1.74 (95%CI: 1.52-2.24) for consumption of 1-2, 3-4, and 5 or more drinks/day, respectively. In women, there was no increased risk for 1-2 drinks/day (RR = 0.94, 95%CI: 0.89-1.01, I2 = 73%), and an increased risk for consumption beyond this level (RR = 1.42, 95%CI: 1.22-1.66 for 3 drinks or more/day). No differences were observed for age, race, and region subgroups; however, analyses had low statistical power. Conclusions: Pooled analysis of data obtained from high-quality cohort studies showed any alcohol consumption increases the risk of hypertension in men. Contrary to earlier meta-analyses, we did not find evidence for a protective effect of alcohol consumption in women. Low consumption of alcohol (1-2 drinks/day) did not show any effect on the occurrence of hypertension in women; however, an increased risk was evident for higher consumption levels.

FACE-TO-FACE AND CYBERBULLYING VICTIMIZATION: MEASUREMENT THROUGH TWO DATA SOURCES Collin Calvert* Collin Calvert, (University of Minnesota)

Background: Traditional face-to-face bullying may propagate to online bullying, but research on this relationship is limited. Our purpose is to estimate the association between face-to-face bullying and cyberbullying victimization. Methods: Bullying victimization data were collected from two sources: a survey administered in the fall and spring 2015, and app-driven weekly surveys. We recruited 167 students from two low middle schools to complete the semester surveys. Indicators of face-to-face bullying and cyberbullying were constructed from survey items measuring frequency of various forms of victimization. A subsample of 75 students equipped their smartphones with an app that collected electronic messages and weekly surveys about online bullying victimization. Two multilevel models estimated the association between face-to-face bullying at baseline and online bullying at follow-up: 1) a logistic model of online bullying, and 2) a Poisson model of the weekly rate of victimization. Results: At baseline, 28.4% (46) experienced face-to-face bullying. At follow-up, 7.3% (11) reported experiencing cyberbullying. Among the smartphone subsample, 26.7% (20) reported face-to-face bullying at baseline while 4.6% (3) reported experiencing cyberbullying at follow-up. Students who reported face-to-face victimization had higher odds of being cyberbullied at follow-up (OR: 4.61; CI: 1.13, 18.89). In the smartphone subsample, students who were bullied face-to-face at baseline had a greater rate of cyberbullying victimization than students who were not bullied face-to-face (IRR: 3.59; CI: 2.00, 6.45). Conclusions: There is an association between face-to-face bullying and cyberbullying. Bullying is not limited to the school environment and may spill into bullying online, with larger audiences of witnesses.

TWO TEST APPLICATIONS OF THE LIST EXPERIMENT TO REDUCE UNDER-REPORTING OF ABORTION: RESULTS FROM MALAWI AND SENEGAL Ruvani Jayaweera* Ruvani Jayaweera, (Ibis Reproductive Health/University of California, Berkeley)

Current methodologies to estimate abortion incidence and prevalence are time-intensive, complex, and often rely on incomplete data. Furthermore, directly asking women about their abortion experience has been found to result in under-reporting. Current methodologies to estimate abortion incidence and prevalence are time-intensive, complex, and often rely on incomplete data. Furthermore, directly asking women about their abortion experience has been found to result in under-reporting. Current methodologies to estimate abortion incidence and prevalence are time-intensive, complex, and often rely on incomplete data. Furthermore, directly asking women about their abortion experience has been found to result in under-reporting. Current methodologies to estimate abortion incidence and prevalence are time-intensive, complex, and often rely on incomplete data. Furthermore, directly asking women about their abortion experience has been found to result in under-reporting. Current methodologies to estimate abortion incidence and prevalence are time-intensive, complex, and often rely on incomplete data. Furthermore, directly asking women about their abortion experience has been found to result in under-reporting. Current methodologies to estimate abortion incidence and prevalence are time-intensive, complex, and often rely on incomplete data. Furthermore, directly asking women about their abortion experience has been found to result in under-reporting.
ANALYSIS OF THE ASSOCIATION BETWEEN VECTOR-BORN DISEASES AND SOCIAL DETERMINANTS IN COLOMBIA THROUGH LOG-GAUSSIAN COX PROCESSES Mabel Carabali* Mabel Carabali, (McGill University)

Dengue is an arboviral infection with highest incidence in tropical and sub-tropical areas. Colombia is Latin America's second most socially unequal country and also suffers an important burden of dengue. Since dengue burden concentrates in low socioeconomic settings, it is important to identify spatial patterns for concentration areas accounting for individual social factors. Although previous studies have used aggregated and area-level data, we considered the critical advantage of using individual level location and socioeconomic data to help identify the role of social determinants of health on dengue distribution, while accounting for spatial autocorrelation. Using routinely collected individual data of 1,703 confirmed cases from the surveillance system in Medellin, Colombia, we estimate the spatial distribution of the individual cases as a function of individual level covariates, such as the patient's health insurance scheme, and other individual socioeconomic covariates. In order to take into account both observed and unobserved variation, we propose a log-Gaussian Cox point process, which is based on a kriging random field that describes the intensity (degree of clustering) of the point pattern and allows us to estimate an underlying spatial surface, pointing out regions of higher and lower intensity of disease. The inference procedure is performed within a Bayesian paradigm, which facilitates calculation of the uncertainty of our estimates. We make use of the package s-INLA to obtain samples from the posterior distribution of the parameters of interest. The application of this method allows the identification of disease clustering, while estimating quantitatively the contribution of social factors, the degree of health inequality, and providing recommendations for decision-making on disease control.

LACK OF BENEFIT FROM STATIN THERAPY: RESULTS FROM A LARGE US HEALTH RESEARCH NETWORK. Seth Kumari* Seth Kumari, (TriNetX, LLC and BU)

Background: Recent studies have questioned the effectiveness of statin therapy for the primary prevention of hypertension/dyslipidemia. The following analysis examined the association between statin and cardiovascular (CV) events using TriNetX, a federated health research network representing over 40M patient lives. Methods: We defined a cohort of US patients aged 65+ with at least one CV event in their electronic medical record (EMR) in 2013. Statin use was defined as at least one medication code for any statin in 2013. CV events were defined as the first ICD-9/10 code for heart failure, ischemic cardiac events or stroke. Exclusion criteria included CV disease, diabetes, or peripheral arterial disease prior to 2013. A stratified analysis and survival function from a life table provided evidence of the relationship between statin use and CV disease. Results: Of the total number patients aged 65+ in 2013 (n=971,099), 17% had at least one statin in their EMR. Statin and non-statin users had a similar mean age (78.6 vs 77.0), while statin users were more likely to be white (81 vs 79%) and male (42 vs 38%). Both groups had comparable levels of cholesterol, HbA1c, and blood pressure at baseline. Compared to non-statin users, statin users had a 22% higher rate of CV events (95% CI 20-24%), after controlling for confounding. Both groups had an 82% probability of being event-free after four years of follow-up, with more CV events occurring earlier in the study period among statin users. Conclusions: Findings align with results from clinical trials and secondary data analyses questioning the benefit of prescribing statins to older adults who are at moderate risk for CV disease and demonstrate the generalizability of these results to real world settings. The trade-off of addressing selection bias versus the “depletion of susceptibles” will be described. Limitations include the use of EMR to define medication use.

QUALITY OF LIFE AMONG WOMEN FOLLOWING PELVIC MESH PROCEDURES: A SYSTEMATIC LITERATURE REVIEW AND META-ANALYSIS Kevin Toole* Kevin Toole, (Cardiothoracic)
A REGRESSION TREE FOR IDENTIFICATION OF RISK FACTORS FOR FEAR OF FALLING IN OLDER ADULTS PARTICIPATING IN THE INTERNATIONAL MOBILITY IN AGING STUDY (IMIAS) Afshin Vafaei* Afshin Vafaei (Lakehead University)

Background: Fear of falling (FOF) in older adults is associated with various physical and mental health outcomes and a threat to healthy aging; however, it is not clear who are at higher risks of FOF. Classification and regression tree (CART) analysis by simultaneous examination of a large number of predictors can quantify values of each predictor and provides a simple algorithm for identification of vulnerable individuals. Methods: We used data from the International Mobility in Aging Study that includes diverse populations of community-dwelling older adults from Canada, Brazil, Colombia, and Tirana. FOF was measured by the validated scales of Fall Efficacy Scale-International in 2016 and potential risk factors for FOF (identified based on relevant literature age, sex, education, self-rated health, comorbidity, body mass index, visual impairment, frailty, cognitive deficit, depression, full history, and mobility disability) were measured in 2014. Using random forest method with 2000 iterations, recursive partitioning with conditional inference tree algorithm was performed to identify FOF risk subgroups. Multiple logistic regression analyses were conducted to estimate the effects of combination of risk factors. Results: CART included 12 end groups differing in risk of FOF with a minimum of two and a maximum of five predictors. The first split in the tree involved impaired physical function respondents with mobility disability had a 32% risk of developing FOF in the 2 years of follow-up, those without mobility disability were further divided into two groups: females aged 70-75 years (risk of 56.3%), and females aged 64-69 years (risk of 45.5%). Other important predictors were education, self-rated health and living with others. Conclusion: This classification tree included different groups based on specific combinations of a maximum of five easily measurable predictors with an emphasis on impaired physical functioning as a risk factor for developing FOF.

PATTERNS OF INITIAL PRESCRIPTION OPIOID USE AND RISK OF MORTALITY Hilary A Aroke, MD MPH* Hilary A Aroke, (University of Rhode Island)

Background: An initial opioid prescription intended for short-term use may lead to chronic opioid use with an associated increased risk of fatal overdose. Objective: To examine the association between the patterns of initial prescription opioid use for noncancer pain and risk of all-cause mortality among insured opioid-naive patients in the U.S. Methods: Using de-identified administrative claims data set (Optum Clininformatics® Data Mart, OphamInsight, Eden Prairie, MN) from 2010 to 2015, we identified opioid-naive (in last 6 months) patients at 18 years not receiving cancer, palliative care, or opioid use disorder treatment. Based on pattern of initial opioid use (<6 months after first prescription), patients were categorized either as daily opioid users if patient had >90 days supply of opioids or as non-daily users. Multivariable Cox regression models were used to estimate the association of the pattern of initial opioid use with all-cause mortality, adjusting for baseline covariates. Results: A total of 322,665 patients were included in the study, of which 3% were daily opioid users; 55% were female; mean age was 51 years; median Charlson comorbidity index was 0.0; and mean daily morphine milligram equivalent was 34.3 mg (95% Cl: 31.7-37.1). Patients were followed up to 5 years (median of 2 years) with a total of 7,146,351 person-years during which 32,550 (1%) died. The crude death rate was 455 deaths per 100,000 person-years. After adjusting for potential confounders, patients who were initial daily users had an increased risk of mortality compared to non-daily users (HR = 2.5; 95% Cl 2.3-2.7). The hazard of mortality attenuated slightly over time (HR = 1.8; 95% Cl: 1.7-1.9 at 5 years). Conclusion: Incident chronic opioid use was associated with an increased risk of mortality that persisted up to 5 years after the initiation of opioid therapy.

SMOKE-FREE LAWS AND DISPARITIES IN SMOKING CESSATION IN THE UNITED STATES, 2003-2015 Andrea R Titus* Andrea R Titus, (University of Michigan)

Significance: Smoke-free laws can reduce the burden of tobacco-related diseases, but few studies have examined the relationship between these laws and disparities in smoking cessation. This study examines whether smoke-free laws are differentially associated with cessation by education, race/ethnicity, age, and gender. Methods: Data from the U.S. Census Bureau and the American Nonsmokers Rights Foundation were merged to calculate the percent of the population within core-based statistical areas (CBSAs) covered by smoke-free laws in the workplace and hospitality sector (restaurants and bars). A smoke-free law was considered present if at least 50% of a CBSA was covered. A four-level variable was used to indicate workplace coverage by a smoke-free law, an individual employer policy (self-reported from survey), both, or neither. The hospitality law was modeled separately. The outcome variable was smoking cessation, defined as data on adult self-report between the ages of 25 and 65 from the Tobacco Use Supplement to the Current Population Survey (2003-2015). Fixed effects logistic regression models were used, with effect modification explored through the inclusion of interaction terms. Results: Smoke-free coverage of workplaces by a law or a combination of a law and an employer policy was associated with higher odds of cessation for individuals ages 40-54. Smoke-free law coverage of hospitality venues was associated with higher odds of cessation among individuals ages 55-65. Within this age range, individuals in the "Other" race/ethnicity category had significantly greater odds of cessation due to smoke-free hospitality laws compared to non-Hispanic Whites and non-Hispanic Blacks. None of the interactions between smoke-free law coverage and education or gender were statistically significant. Conclusion: Age and race/ethnicity appear to modify the relationship between smoke-free law coverage and smoking cessation.

EXAMINING THE "BIRTH WEIGHT PARADOX": DIFFERENCES IN MORTALITY AMONG SMOKING AND NON-SMOKING MOTHERS OF LOW BIRTH WEIGHT INFANTS Maria Sevoyan* Maria Sevoyan, (University of South Carolina)

Several studies from different countries have shown a counterintuitive relationship between mortality in low birthweight (LBW) infants and maternal smoking during pregnancy: mortality among LBW infants born to non-smoking mothers is higher than mortality among those born to smoking mothers. However, little is known about differences in mortality and neonatal characteristics in the exposed and unexposed groups. We analyzed data from two cohorts: 18,081 infant-mother dyads from the UK Millennium Cohort Study and 3,281,994 dyads from the US National Vital Statistics System. Mortal and neonatal characteristics were compared between smoking and non-smoking mothers using Chi-square test. Prevalence of LBW among smokers was twice as much as the prevalence in non-smokers for both countries (UK: 10.6% vs. 5.3%; US: 11.0% vs. 7.7%). Overall, as compared to non-smokers, mothers who smoked during pregnancy were more likely to be young, white, unmarried, less educated, unemployed, and to have had pregnancy complications. These factors are known to be associated with higher LBW risk. However, other important unfavorable factors were more prevalent among non-smokers, namely non-smokers were more likely to have pre-pregnancy diabetes (UK: 4.1% vs. 1.5%; US: 1.3% vs. 1.2%), pre-pregnancy hypertension (US 3.8% vs. 3.0%), eclampsia (US 1.1% vs. 0.7%), and gestational diabetes (US 5.5% vs. 4.1%). Some unfavorable neonatal conditions were more prevalent among infants of non-smokers as compared to smokers including preterm birth (UK: 61.2% vs. 52.7%; US: 64.3% vs. 54.1%) and congenital heart disease (US 0.3% vs. 0.2%). It has been hypothesized that higher prevalence of unfavorable maternal and neonatal factors that are also associated with lower birthweight might explain higher infant mortality among LBW infants born to non-smokers. Future steps following our analysis include quantifying the contributions of each factor to LBW and subsequent mortality among smokers vs. non-smokers.

S/P indicates work done while a student/postdoc
EVALUATION OF ETHNIC DISPARITIES AND THE POTENTIAL MEDIATORS OF CHIKUNGUNYA DISEASE IN FORTALEZA, BRAZIL
Mabel Carabali S/P Mabel Carabali, (McGill University)

Brasil has the highest burden of Chikungunya virus (CHIKV) in the Americas, with more than 300,000 cases yearly. CHIKV has a relatively low risk of death but imposes a highly disabling arthritic and associated long-term complications. We hypothesize that besides biomedical factors, CHIKV’s transmission is affected by specific social determinants. To identify these determinants and their role on CHIKV’s burden in Fortaleza, Ceara, we used the spherical surveillance system to identify drivers of the transmission between 2014-2018. We used multilevel modeling with negative binomial and Poisson links to identify Incidence Rate Ratios (IRR), including random effects to account for spatial neighborhood level and temporal autocorrelations. Social covariates included development index (HDI), ethnicity, education, and other neighborhood characteristics obtained from census data. There were 77,024 confirmed CHIKV cases reported, (649 hospitalized and 158 deaths). The majority of cases were females (47.5%), over 20 years old (77.0%), and non-Whites (58, 886; 75.9%) when a third of the population is white. High HDI was associated with 64% lower incidence of CHIKV (IRR=0.4; 95% CI=0.3-0.5), while the proportion of black cases (IRR=1.6; 95% CI=1.4-1.7) and people over 30 years old (IRR=2.4; 95% CI=2.3-2.6) showed an increased risk of CHIKV infection. Spatial random effects identified a concentration in the central region of the city. Temporal effects showed higher transmissions from March-June of each year with a peak on May (IRR=1.39; 95% CI=1.1-1.71), compared to January. The unadjusted ethnic disparity was 44 excess cases per 1000 (95% Cl=37-51), and adjustment altered this to 38 excess cases per 1000 (95% CI=30-47), showing that ethnic disparities are not driven by socioeconomic status. Conclusion: We believe that policies to improve the conditions of a patient population should be explored further to mitigate the risk of potential mediators such as educational access to health care.

IN EMPLOYEE HEALTH DATA Morgan M Richey Morgan M Richey, (University of North Carolina - Chapel Hill)

Background: Annual influenza vaccination of healthcare workers is an important means to reduce transmission of influenza in the healthcare setting. Our institution required annual influenza vaccination starting in 2010, but exemptions due to medical indications or religious/personal beliefs were permitted. With a long-term goal of increasing vaccination compliance, we have characterized those who were exempted from vaccination since 2010. Methods: 20,861 employee records at a single institution from 1/1/2010 to 1/1/2017 were retrospectively reviewed for vaccination, employment, and demographic information. During this period, declination of influenza vaccination was permitted for the following reasons: allergy to a component of the vaccine, physician note to decline vaccination, personal beliefs. Inconsistent exemption behavior despite a pro-vaccination campaign by institutional leadership. Results: Of these, 457 (2.2%) noted a waiver for religious/personal belief exemption. Inclusion criteria therefore included only employees who had duration of employment of at least 2 years to allow for identification of the exemption pattern. Within the consistent group, 73.8% were female, 60.8% were in positions involving direct patient contact, mean age at initial exemption was 43.1 years old, and mean duration of employment was 6.2 years. Conclusion: We have identified and characterized healthcare workers exhibit inconsistent exemption behavior despite a pro-vaccination campaign by institutional leadership.

CHARACTERIZING FLU VACCINE EXEMPTION BEHAVIOR AMONG HEALTHCARE WORKERS PATTERN RECOGNITION ALGORITHMS IN EMPLOYEE HEALTH DATA Morgan M Richey Morgan M Richey, (University of North Carolina - Chapel Hill)

Background: Annual influenza vaccination of healthcare workers is an important means to reduce transmission of influenza in the healthcare setting. Our institution required annual influenza vaccination starting in 2010, but exemptions due to medical indications or religious/personal beliefs were permitted. With a long-term goal of increasing vaccination compliance, we have characterized those who were exempted from vaccination since 2010. Methods: 20,861 employee records at a single institution from 1/1/2010 to 1/1/2017 were retrospectively reviewed for vaccination, employment, and demographic information. During this period, declination of influenza vaccination was permitted for the following reasons: allergy to a component of the vaccine, physician note to decline vaccination, personal beliefs. Inconsistent exemption behavior despite a pro-vaccination campaign by institutional leadership. Results: Of these, 457 (2.2%) noted a waiver for religious/personal belief exemption. Inclusion criteria therefore included only employees who had duration of employment of at least 2 years to allow for identification of the exemption pattern. Within the consistent group, 73.8% were female, 60.8% were in positions involving direct patient contact, mean age at initial exemption was 43.1 years old, and mean duration of employment was 6.2 years. Conclusion: We have identified and characterized healthcare workers exhibit inconsistent exemption behavior despite a pro-vaccination campaign by institutional leadership.

THE PAIN MANAGEMENT INVENTORY: A LATENT CLASS ANALYSIS OF USE OF NON-PHARMACOLOGICAL THERAPIES FOR PAIN Melvin Donaldson Melvin Donaldson, (University of Minnesota)

We developed and piloted the Pain Management Inventory (PMI), a tool to characterize and complement non-pharmacological pain management approaches commonly used for pain. The primary goal of the present study is to facilitate standardized reporting of non-pharmacological pain management in research. Recent National Guard Veterans from a longitudinal cohort (N=3,483) were invited to participate in a follow-up mailed survey that included the PMI. Respondents indicated whether they used each PMI approach in the past year. We classified each PMI approach into complementary versus conventional and positive versus active. We used latent class analysis to identify similar PMI response patterns and included demographic, pain, and psychological covariates as predictors of latent class membership in the model. We calculated the marginal effects of the covariates on class membership and present them as standardized effect sizes. The survey response rate was 48.1%. The best-fitting latent class model had 6 classes: low-participation (46.7% of respondents, 95% CI [44.3%-49.1%]), exercise users (23.7% [21.6%-25.7%]), psychotherapy users (5.3% [4.2%-6.6%]), passive complementary users (1.9% [1.3%-1.6%]), active complementary users (5.0% [4.0%-6.1%]), and high-participation multi-modal complementality (4.3% [2.8%-5.3%]). Compared to the low-participation class, chronic pain was associated with passive complementarity (difference in RD=0.255 [95% CI 0.167-0.344]), high participation multi-modal complementarity [0.151 (9.087-0.216)], and psychotherapy users [0.105 [0.027-0.183]], but not the active complementary (0.043 [0.249-0.151]) or exercise users class (0.005 [0.046-0.176]). These findings illustrate that adults with chronic pain have high participation in passive complementary therapies and are especially more likely than adults without chronic pain to use multiple modalities. This latent class categorization should be explored further. Future studies will examine the PMI in other patient populations.

IMPROVING THE EFFICACY OF REACTIVE SCREEN-AND-TREAT FOR MALARIAN ELIMINATION IN SOUTHERN ZAMBIA Fiona Bhondoekhan Fiona Bhondoekhan, (Johns Hopkins Bloomberg School of Public Health)

Background: Malari screen-and-treat is a reactive case detection strategy where cases detected at health centers trigger community health workers to screen for secondary malaria cases within a 100m radius of the case’s house using PfHRP2 RDTs. This study extended the screening radius to 250m to assess if secondary case identification can be improved using environmental features that characterize the immediate surroundings of a household. Methods: Participants enrolled from January 12, 2015 to July 26, 2017 completed surveys to capture demographic and household-level characteristics. Homes were stratified into malaria-positive and negative secondary houses based on resident’ RDT and PCR results. Number of animal bites within 100m radius, elevation difference and distance between houses, and distance to nearest stream, main road, and stream within 1km were measured using ArcGIS. Logistic regression assessed the association between environmental risk factors and the odds of a secondary house having a malaria-positive resident. Results: 165 of 4,202 individuals were malaria-positive. Household stratification revealed 48 positive and 45 positive secondary houses. There was a nonsignificant trend for positive secondary houses to be at lower elevation (mean SD: 46.4m; 21.1m) (p=0.5) and further from the main road (0.327m; 0.725m) (p=0.2), but significantly closer to streams (42.4m; 31.6m) (p=0.006), with category-1 streams at most common nearest stream. Negative secondary houses were 12.7m (p=0.2) closer to index houses. Distance to nearest animal-pen was similar for all secondary houses, with a mean of one pet within 100m (p=0.9). Logistic regression revealed no significant associations. Marginal significance was observed for nearest stream-type, where the adjusted relative odds of a positive secondary house was 2.6 for category-3 streams compared to category-1 streams (p=0.007). Conclusion: Screening houses along streams may be a more efficient reactive screen-and-treat strategy.
ESTIMATING THE LONG-RUN RELATIONSHIPS BETWEEN STATE CIGARETTE TAXES AND LIFE EXPECTANCY Emilie Bruzelius* Emilie Bruzelius, (Department of Epidemiology, Mailman School of Public Health, Columbia University)

A large body of literature suggests that tobacco control legislation—including fiscal measures such as excise sales taxes—reduces tobacco smoking, and that tobacco smoking confers such high risk of mortality that it may be plausibly related to large-scale variations in life expectancy. At the same time, there remains active debate regarding the appropriate methodology for estimating the accumulating impact of tobacco tax on life expectancy over time. The addictive nature of nicotine means that a tax increase may not immediately induce individuals to quit, and there may be a lengthy induction period between policy exposure increase and eventual cessation. Moreover, unlike discrete policy interventions, which are attributable to differences in differences or synthetic control analysis, cigarette taxes are not only continuous, but also increase incrementally over multiple years—complicating the clear separation of pre- and post-policy periods. To overcome these concerns, we borrow from the macroeconomic literature, using a multilevel dynamic panel regression model to examine the relationship between state cigarette tax increases and county-level life expectancy to test the hypothesis that increases in state cigarette excise taxes are positively associated with increases in life expectancy at the county level. We additionally examine whether the relationship between cigarette taxes and life expectancy varies by the sex, income, and rural/urban composition of a county, and whether it is mediated by changes to smoking prevalence. Data on estimated life expectancy at birth for all U.S. counties across the period 1996 to 2012 by sex was merged to state cigarette excise tax rates by year. A multilevel dynamic panel regression model with fixed effects for county was used to assess relations between tax rates and life expectancy, separately estimating short-run and longer-run associations. We found that for every $1 dollar increase in cigarette tax per pack, county life expectancy increased over the long run.

RACIAL/ETHNIC DISCRIMINATION AND SLEEP DURATION/DIFFICULTIES AMONG WHITE, BLACK AND LATINA WOMEN: FINDINGS FROM THE SISTER STUDY Symielle Gaston* Symielle A. Gaston, (Epidemiology Branch, National Institute of Environmental Health Sciences)

Introduction: Few studies have examined the relationship between discrimination and sleep measures in a diverse sample of women. Methods: To investigate racial/ethnic discrimination and sleep in white, black, and Latina women, we used telephone interview data collected from the Sister Study participants (2003-2012) who did not take sleep medications and reported on everyday (e.g., treated as less intelligent/honest) and major (e.g., unfair mortgage lending) racial/ethnic discrimination. Self-reported measures were short sleep duration (50% college educated, 50% black, 42% Latina), black women most frequently reported everyday and major discrimination (57% and 41% vs. 19% and 14% [white] and 15% and 6.6% [Latina]) as well as habitual short sleep (44% vs. 18% [white] and 28% [Latina]). Sleep debt was higher among black and Latina women (both 38% vs. 29% [white]). Each additional everyday discrimination event was associated with a higher prevalence of short sleep among black women (PR=1.11 [1.04-1.19]) and sleep debt among Latina women (PR=1.16 [1.02-1.31]). Associations between increasing numbers of major discrimination events and short sleep were seen for all race/ethnic groups, while (PR=1.39 [95% CI 1.18-1.64]) Latina (PR=1.34 [1.05-1.71]), and black (PR=1.10 [1.03-1.19]). Discrimination was not associated with mapping or insomnia symptoms. Conclusion: Racial/ethnic discrimination remains common among higher SES racial/ethnic minorities, and associations between discrimination and sleep varied by race/ethnicity.

LIVER ENZYMES MIGHT NOT BE ASSOCIATED WITH ADIPOSIT: A MENDELIAN RANDOMIZATION STUDY Junxi Liu* Junxi Liu, (The University of Hong Kong)

Poorer liver function is associated with higher risk of diabetes in Mendelian Randomization (MR) studies. Observationally, obesity is also associated with poorer liver function. However, whether poorer liver function causes obesity thereby contributing to diabetes is unclear. We associated the association of liver function with adiposity observationally in a unique population with little socio-economic patterning of adiposity and using two-sample MR. In the population-representative “Children of 1997” birth cohort, adjusted linear regression was used to assess the association with alanine transaminase (ALT) and alkaline phosphatase (ALP) at 11 years with body mass index (BMI). Using MR, genetic variants predicting ALT, ALP and gamma glutamyltransferase (GGT) were applied to genome-wide association studies (GWAS) of BMI to obtain unconfounded estimates using inverse-variance weighting. Observationally, higher ALT was associated with higher BMI (0.11 kg/m2, 95% confidence interval CI 0.10 to 0.12). Higher ALP was associated with lower BMI (-0.07 kg/m2, 95% CI -0.02 to -0.012). Using MR, genetically higher ALT was associated with lower BMI (-0.09 standard deviation SD per 100% change in concentration, 95% CI: -0.18 to 0.01). However, genetically predicted ALP and GGT were not clearly associated with BMI. Poorer liver function might not cause obesity, but on the contrary higher ALT might reduce BMI. Whether ALT contributes to diabetes by reducing the muscle mass requires investigation.
HAS ALTERNATIVE TOBACCO PRODUCT USE INFLUENCED FUTURE CIGARETTE SMOKING INTENTION AMONG CIGARETTE-NAIVE ADOLESCENTS OVER TIME? Natalie Levy* Natalie Levy, (Columbia University Department of Epidemiology)

Aims: Among cigarette-naive adolescents, research has shown a positive effect between using alternative tobacco products (ATP) and intention to initiate cigarette smoking. From 2011 to 2016, the use of ATP increased among adolescents; however, cigarette smoking among adolescents has decreased over this same time period. In this study, we explored contemporaneous trends in adolescent ATP use and intention to smoke cigarettes in a nationally representative U.S. sample.

Methods: We used data from the 2011 - 2015 U.S. National Youth Tobacco Survey.

Our analysis was limited to 71,101 cigarette-naive student aged 9 to 19. We hypothesized that an increasing trend in ATP use would result in an increasing trend in intention to smoke cigarettes (ISC) over time. Weighted logistic regression including time as a fixed effect and the linear function in R were used to predict the overall prevalence over time and prevalence stratified by sex: 1) ATP use, 2) intention to smoke cigarettes, 3) intention to smoke cigarettes given ATP use.

Results: ATP use increased from 2.87% [95% confidence interval 2.36% - 3.50%] in 2011 to 6.24% [5.62% - 6.93%] in 2015 (p-trend<0.05). The prevalence of ISC declined slightly from 1.70% [1.39% - 2.01%] in 2011 to 0.88% [0.70% - 1.09%] in 2013 (p-trend<0.05) and then remained stable until 2015. The likelihood of ISC was consistently higher in ATP users that non-users in each year, and the prevalence of ISC among ATP users did not change between 2011 and 2015. Among males using ATP, there was a decrease in the prevalence of ISC while among females using ATP, there was a slight increase in the prevalence of ISC. Discussion: There were no increasing trend in ISC among cigarette-naive ATP users despite an increasing trend in ATP and an increased likelihood of ISC in each survey year among ATP users. Our findings might be explained by differences in the social dynamics of drug use by sex. Funding: CONACYT and Colciencias doctorate scholarships, and RO1DA037866.

OPIATE AGONIST THERAPY AND RISK OF HEPATITIS C VIREMIA INFECTION: DOES PERCEIVED DOSAGE ADEQUACY MATTER? FINDINGS FROM A 13-YEAR LONGITUDINAL STUDY OF PEOPLE WHO INJECT DRUGS IN MONTREAL, CANADA Andrea Adelina Artenie* Andrea Adelina Artenie, (Université de Montréal, Montreal, Canada)

Background: High dose opiate agonist therapy (OAT) is considered key in reducing risk of hepatitis C virus (HCV) infection among people who inject drugs (PWID), as it targets cessation of illicit opioid use. Yet, cessation may not be associated with reducing HCV infection risk among PWID. Methods: A prospective cohort study of initially HCV-uninfected PWID in Montreal (2004-17). Participants were provided blood samples for HCV testing and filled a behavioral questionnaire at 6 or 3-month intervals. Current OAT enrollment, actual dose (mg) and perceived dose adequacy (adequate/too low/too high) were self-reported at each visit. Time-dependent Cox regression analyses were fit adjusting for age, gender, injection duration and type(s) of opioid(s) injected. Results: Of 513 eligible participants (median age: 34.1; 80.6% male), 168 acquired HCV over 1509.6 person-years (py) of follow-up (HCV incidence: 11.1/100 py) 95% CI 9.5-12.9). For the 1509.321 total study visits during which participants reported OAT, dose was perceived adequate in 75.3%, too low in 20.9% and too high in 5.8%. Compared to those not on OAT, PWID who were on OAT and perceived their dose as adequate were at least likely to become HCV infected (aHR: 0.60; 95% CI 0.39-0.92), but not those who perceived it too low (aHR: 0.89; 0.55-1.45) or too high (aHR: 0.85; 0.42-2.37). Conclusions: Compared to those not on OAT, PWID who were on OAT and perceived their dose as adequate were less likely to become HCV infected despite being as likely to report injection drug use. Findings emphasize the need for flexible approaches to OAT dosage in achieving HCV prevention.

THE GENDER DIFFERENCES IN THE RELATIONSHIP BETWEEN MENTAL HEALTH STATUS, HYPERTENSION, AND EMERGENCY ROOM VISITS IN THE U.S. Sylvia S. Rozario* Sylvia Rozario, (Virginia Commonwealth University)

Background: Hypertension (HTN) is the most important risk factor for cardiovascular mortality; however, cardiovascular mortality rate is higher in women compared to men. Moreover, poor mental health status is more prevalent in women and may be related to higher probability of poor HTN outcomes; thus may increase ER visits in women compared to men. This study aims to find gender differences in the association between mental health status and HTN and the combined effect of mental health status and HTN on ER visits in the U.S.

Methods: Household component of the 2014 Medical Expenditure Panel Survey was analyzed (Male: n=10,952; Female: n=12,745). Kessler scale for mental health (MH) status was administered. Stabilized inverse probability ratio weights (IPWR; by age, gender, education, marital status, and family history of psychiatric disorders/suicide) were constructed to identify the pre-diastolic systolic blood pressure (SBP) or diastolic blood pressure (DBP) thresholds for defining MH status coupled with HTN.

Results: Of 513 eligible participants (median age: 34.1; 80.6% male), 168 acquired HCV over 1509.6 person-years (py) of follow-up (HCV incidence: 11.1/100 py) 95% CI 9.5-12.9). For the 1509.321 total study visits during which participants reported OAT, dose was perceived adequate in 75.3%, too low in 20.9% and too high in 5.8%. Compared to those not on OAT, PWID who were on OAT and perceived their dose as adequate were at least likely to become HCV infected (aHR: 0.60; 95% CI 0.39-0.92), but not those who perceived it too low (aHR: 0.89; 0.55-1.45) or too high (aHR: 0.85; 0.42-2.37). Conclusions: Compared to those not on OAT, PWID who were on OAT and perceived their dose as adequate were less likely to become HCV infected despite being as likely to report injection drug use. Findings emphasize the need for flexible approaches to OAT dosage in achieving HCV prevention.

LONGITUDINAL COURSE OF DISASTER-RELATED MAJOR DEPRESSIVE DISORDER AMONG A PROSPECTIVE SAMPLE OF ADULT CHILEAN NATURAL DISASTER SURVIVORS Christina Griffin* Christine Griffin, (University of Central Arkansas)

The aims of this study is to prospectively investigate the role that pre-existing psychiatric disorders play in developing major depressive disorder (MDD) after a disaster among a cohort of Chilean adults. Data from a prospective 5-wave longitudinal cohort (years 2003-2011) of Chilean adults from 10 primary care health centers were used (N=1,708). At baseline (2003), participants completed the Composite International Diagnostic Interview (CIDI), a comprehensive psychiatric diagnostic instrument. In 2010, the sixth most powerful earthquake (the 2010 earthquake) occurred in the southernmost region of Chile. One year later (2011) the depressive disorder module of the CIDI was administered. Stabilized inverse probability ratio weights (IPWR; by age, gender, education, marital status, and family history of psychiatric disorders/suicide) were constructed to identify the pre-diastolic systolic blood pressure (SBP) or diastolic blood pressure (DBP) thresholds for defining MH status coupled with HTN.

Conclusions: Compared to those not on OAT, PWID who were on OAT and perceived their dose as adequate were less likely to become HCV infected despite being as likely to report injection drug use. Findings emphasize the need for flexible approaches to OAT dosage in achieving HCV prevention.

S/P indicates work done while a student/postdoc
GENERALIZABILITY OF ARAB AMERICAN HEALTH OUTCOMES: RESULTS FROM A POPULATION-BASED SURVEY IN CALIFORNIA

Nadia N. Abuzeid
(Boston College William F. Connell School of Nursing)

Introduction: On January 26, 2018 the U.S. Census Bureau decided not to incorporate a Middle East and North African (MENA) identifier on the 2020 Census making the study of Arab American (AA) health outcomes difficult. A number of strategies have been used to identify AAs from databases including surname algorithms, identifying place of birth, and using Arabic language as a marker for heritage. Little work has been done to understand the generalizability of inferences from each of these strategies. Methods: Using data from the 2003-2016 California Health Interview Survey (CHIS) we examined differences in prevalence of self-reported chronic diseases and social determinants among AAs identified by place of birth, parents' place of birth, and language spoken at home. We compared estimates for results for non-Hispanic Whites in CHIS and other population-based surveys. Results: AAs identified by parents’ country of birth have lower overweight and obesity (63.2 vs. 62.6%), unemployment (25.7 vs. 35.6%), poverty (6.2 vs. 17.2%), and hypertension (11.4 vs. 17.5%) prevalence than those born in an Arabic speaking country suggesting disparities across immigration generation. AAs identified by Arabic language use are living in poverty (16.2 vs. 6.2%) and have higher diabetes prevalence (8.7 vs. 8.1%) compared to those with a parent born in an Arabic speaking country. Self-reported hypertension (11.4% vs. 47.6%) and hypercholesterolemia prevalence (3.4% vs. 6.4%) among AAs is consistently lower than in non-Hispanic Whites in CHIS (20.6% and 8.2%, respectively) and lower than data on AAs from the National Health Interview Survey. Conclusions: The methods used to identify AA populations from hospital, state, or national databases may not be generalizable to the wider AA community in the United States. Understanding the needs of and identifying solutions for this population relies on our ability to identify AAs properly. Without the MENA identifier on the 2020 Census, AAs remain a difficult population to identify.

COMPLIANCE WITH RECOMMENDED TREATMENT FOR SURVIVORS OF SEXUAL ASSAULT SEEN AT EMERGENCY DEPARTMENTS, 2002-2015

Elizabeth Lottery, Elizabeth Lottery, (Division of Epidemiology, Department of Family Medicine and Population Health, Virginia Commonwealth University)

Background: Survivors of sexual assault have low levels of follow-up with providers. Treatment for sexually transmitted diseases (STDs), hepatitis B vaccine, and emergency contraception is generally recommended at the initial health care visit. However, the level of provider adherence to treatment guidelines is unknown. Objective: To evaluate compliance with recommendations for treating survivors of sexual assault during emergency department visits. Methods: Data from the 2002-2015 National Hospital Ambulatory Medical Care Survey (NHAMCS) were analyzed. Sexual assault was determined using reaction for visit, diagnosis, and cause of injury codes (rape, sexual abuse, or adult sexual abuse). STD Treatment Guidelines were issued in 1998, 2002, 2006, and 2010. Compliance was measured against the Guidelines in effect for each survey year and included recommended antibiotic treatment for chlamydia, gonorrhea, bacterial vaginosis, and trichomoniasis; hepatitis B vaccine; and provision of emergency contraception. Race/ethnicity (white, other), region (northeast, midwest, west, south), and age were tested for association with increased compliance. Results: Of the 453,354 emergency department visits over the fourteen-year period, 487 were for sexual assault and 420 (86.2%) of the sexual assault visits were made by women. Nineteen (3.9%) visits resulted in full compliance with the STD treatment recommendations. Hepatitis B vaccine was given in 7 (1.4%) visits and emergency contraception was provided in fourteen (3.3%) of the visits by women. No visits resulted in full compliance with the CDC Guidelines. Age was significantly associated with receipt of emergency contraception (OR 1.14, 95% CI 1.044-1.257). Conclusion: This study demonstrates that survivors of sexual assault may not be receiving clinically appropriate preventive care. Additional guidance to health care professionals should be considered to improve health care management of sexual assault survivors.

ALL-CAUSE MORTALITY IN BREAST CANCER SURVIVORS COMPARED TO CANCER-FREE WOMEN: RESULTS FROM A COMMUNITY-BASED COHORT

LATE BREAKER

Cindy A. Ramn, (Department of Epidemiology, Johns Hopkins Bloomberg School of Public Health, Baltimore, Maryland)

Background: Most studies on mortality in breast cancer (BC) survivors have been conducted among cases only. Therefore our understanding of the impact of BC and its treatment compared to other chronic diseases on long-term survival is limited. Methods: We compared all-cause mortality in 628 women with early stage BC and 3340 age-matched women without BC (i.e., cancer-free) in CLUE II, a prospective community-based cohort over 20 years of follow-up. We calculated multivariable-adjusted hazard ratios (HRs) for all-cause mortality using Cox proportional hazards regression models that were stratified by tumor characteristics, age, and time since diagnosis. Results: After a median follow-up of 10.4 years, 916 deaths were identified (217 in survivors, 699 in cancer-free). The leading causes of death among women with BC were cancer (41%) and cardiovascular disease (CVD) (20%) compared to CVD (29%) and cancer (17%) among women without BC. Overall BC survivors had a higher hazard of death compared to cancer-free women (HR=1.79, 95% CI=1.3-2.39) that elevated hazard remained irrespective of stage and estrogen receptor status, and persisted 15 years after diagnosis. All-cause mortality remained elevated at a steady rate among survivors diagnosed at age <70 years compared to cancer-free women of similar age (p-interaction=0.28). However in survivors diagnosed at age ≥70 years, all-cause mortality increased over time compared to their cancer-free peers (p-interaction=0.005). CVD deaths were proportionally higher in survivors diagnosed at age ≥70 years compared to those <70 years. Conclusions: Our results suggest that BC survivors' have higher long-term mortality compared to the general population, supporting the need for continued surveillance. Elderly survivors may also need additional preventive strategies, particularly for CVD, to reduce mortality.
CONCURRENT RELATIONSHIP OF OBJECTIVELY MEASURED PHYSICAL ACTIVITY AND CARDIORESPIRATORY FITNESS ON TWO DIFFERENT MEASURES OF OBESITY IN US. ADULTS Peter D. Hart

Background: Few population-based studies have examined the relationship between physical activity (PA) and cardiorespiratory fitness (CRF) on the growing health problem of obesity. The purpose of this study was to examine the concurrent relationship of PA and CRF on two different measures of obesity. Methods: This study used data from adults 20-99 years of age participating in the 2003-2004 National Health and Nutrition Examination Survey (NHANES). CRF (mL/kg/min) was objectively determined using submaximal treadmill and measures were categorized into low or high groups using the median. CRF results were obtained using an accelerometer. Results: Participants in the high CRF group had significantly (p<.05) greater MVP across all obesity groupings. In BMI obese, neither BMI nor WC were significantly different between CRF groups. However, WC and BMI were significantly (p<.05) lower in the high CRF group. Among adults with low CRF, those with low MVP were more than twice as likely to be obese than those with high MVP using BMI (OR=2.48, 95% CI 1.23-5.01) and WC (OR=2.06, 95% CI 1.29-3.29). Among adults with high CRF, no MVP and obesity relationship was seen. Conclusion: Results from this study indicate that PA is only related to obesity when CRF is low. Furthermore, high CRF may protect less physically active adults from both overall and abdominal obesity.

S/P indicates work done while a student/postdoc
ASSOCIATIONS OF SEROVALENT CHLAMYDIA AND HERPES WITH 5-YEAR INCIDENCE OF UTERINE FIBROIDS

Kristen Moore, National Institute of Environmental Health Sciences

Background. For decades reproductive tract infections (RTIs) have been hypothesized to play a role in uterine fibroid development. Previous studies using self-reported history of RTIs had inconsistent findings. Our recent studies took the next step and investigated this hypothesis using serology, an immunological measure of past exposure, and prevalent fibroid data. We focused on herpes simplex virus type 2 (HSV-2) and genital Chlamydia trachomatis (gCT) because prior self-report data suggested a possible association with fibroids, and serology for HSV-2 and gCT is much more sensitive than self-report. The findings for prevalent fibroids were null for HSV-2, but an unexpected protective association was seen for gCT. We now follow-up the prior analysis using prospective data on cumulative incidence of fibroids over a 5-year follow-up. Methods. We used data from a prospective fibroid study that conducted ultrasound examinations to systematically screen for fibroids every 20 months. Participants were African American women ages 23-35. Age- and multivariable-adjusted binomial regression was used to estimate RRs for the cumulative incidence of fibroids by baseline gCT and HSV-2 status. Results. Of 1300 eligible participants with no fibroids at baseline, 1.27% had incident fibroids. There was no significant risk of fibroids for those HSV-2 seronegative (multivariable-adjusted RR 0.92, 95% CI 0.75, 1.13) or gCT seropositive (multivariable-adjusted RR 0.91 95% CI 0.74, 1.12). Results were similar for sensitivity analyses designed to exclude women with factors found to be protective of fibroids, or those with a higher risk of IHD. Whether kynurenine could be a new target of intervention in IHD via diet or otherwise, should be investigated.

TREATMENT FOR DEPRESSION AND ISCHEMIC HEART DISEASES: A MENDELIAN RANDOMIZATION STUDY

Mengyu Li, School of Public Health, Li Ka Shing Faculty of Medicine, The University of Hong Kong

Background. Observationally, depression is positively associated with ischemic heart disease (IHD) and selective serotonin reuptake inhibitors (SSRIs), a commonly used antidepressant, have been associated with a lower risk of IHD. However, such associations are open to confounding by indication, socioeconomic position and underlying health status. We used Mendelian Randomization to obtain less confounded estimates of the association of serotonin and physiologically-related factors (tryptophan, kynurenine and dopamine sulfate) with IHD. Methods. We used principal components analysis to construct genetic instruments from fine mapped genetic variants for serotonin transporter, tryptophan, kynurenine and dopamine sulfate metabolites. We used inverse-variance weighting to obtain the association of genetically instrumented serotonin and tryptophan with IHD in the UK Biobank SOFT CAD case (n=7001) control (n=264785) study. Results. Serotonin and tryptophan were not clearly associated with IHD (OR 0.69, 95% CI 0.25 to 1.81) and kynurenine was positively associated with IHD (OR 2.29, 95% CI 1.53 to 3.43), but dopamine sulfate was unrelated to IHD (OR 0.99, 95% CI 0.69 to 1.41). Conclusion. Kynurenine, which predicts depressive symptoms, is associated with a higher risk of IHD. Whether kynurenine could be a new target of intervention in IHD via diet or otherwise, should be investigated.

ASSOCIATION OF SUGAR-SWEETENED BEVERAGES CONSUMPTION WITH OBESITY: EVIDENCE FROM THE “CHILDREN OF 1997” BIRTH COHORT Ting Zhang, School of Public Health, The University of Hong Kong

Background. Observationally, sugar-sweetened beverages (SSBs) consumption is associated with greater adiposity in Western children. Whether this association is causal or the result of confounding is unknown. We examined the association of SSBs consumption with subsequent adiposity in the non-Western setting of Hong Kong. We used self-report for SSBs consumption and obesity. We also estimated the effect of sucrose (main ingredient of SSBs) and childhood body mass index (BMI) on obesity at 12-18 years using generalized estimating equations in a population-representative Chinese birth cohort “Children of 1997” (n = 3,628). We also examined the effect of genetically predicted sucrose on childhood BMI using Mendelian Randomization based on a genome wide association study of human blood metabolites (n = 1,900) and the Early Growth Genetics Consortium (n = 35,668). Results Compared to no consumption of SSBs consumption, 1-2 times/week (OR 1.89, 95% CI 1.22, 2.93) and 6-7 times/week (OR 2.33, 95% CI 1.28, 4.20), but not daily consumption (OR 0.92, 95% CI 0.33, 2.40) were positively associated with overweight at 12-18 years adjusted for sex, birth order, maternal age and birthplace, parental education and occupation, household income, main caregiver, general health status, and physical activity. SSBs consumption was not associated with BMI z-score or obesity. Mendelian Randomization showed no association between genetically predicted sucrose and childhood BMI (OR 1.00, 95% CI 0.92-1.10 for MR-Egger estimates). Conclusion. In Hong Kong Chinese children with low birth weight or in the lowest quartile of SSBs consumption and obesity, SSBs consumption was only related to overweight but not obesity. Mendelian Randomization suggests that the association between genetically predicted sucrose and childhood BMI may not be causal.
HUMAN PAPILLOMAVIRUS VACCINE EFFECTIVENESS AGAINST INCIDENT GENITAL WARTS AMONG FEMALE HEALTH-PLAN ENROLLEES, UNITED STATES Megan Schuler & Megan Schuler. (RAND Corporation)

We examined the effectiveness of human papillomavirus vaccination by dose number and spacing against incident genital warts in a cohort of 64,517 female health-plan enrollees in the United States during 2006-2012. Eligible recipients were classified into groups by regimens: 0, 1, 2 (<6 months apart), 2 (6 months apart), or 3 doses. They were followed until a genital wart diagnosis, loss to follow-up, or the end of the study. Proportionality score weights were used to balance baseline differences across groups. To account for latent genital warts before vaccination, we applied 6- and 15-month buffer periods from last and first vaccine dose, respectively. Incidence rates and hazard ratios were calculated using Poisson regression and Cox models. The proportionality score-weighted incidence rate per 10,000 person-years was 762 among unvaccinated participants. Using 6- and 12-month buffer periods, respectively, incidence rates were 477 and 257 per 1 dose, 760 and 577 for the 2-dose (<6-month interval) regimen, 313 and 194 for the 2-dose (6-month interval) regimen, and 199 and 162 among 3-dose vaccinees; vaccine effectiveness was 68% and 76% for the 2-dose (6-month interval) regimen and 77% and 80% in 3-dose vaccinees compared with unvaccinated participants. Vaccine effectiveness was not significant among vaccinees receiving 1-dose and 2-dose (<6-month interval) regimens compared with unvaccinated participants. Our findings contribute to a better understanding of the real-world effectiveness of HPV vaccination.

DO LONGITUDINAL DYNAMICS OF DRUG USE MATTER? TRAJECTORIES OF COCAINE INJECTION OVER A 5 YEAR PERIOD AND RISK OF HEPATITIS C VIRUS INFECTION AMONG PEOPLE WHO INJECT DRUGS IN A LARGE, URBAN SETTING Andrea Adelina Artenie & Andrea Adelina Artenie. (Université de Montréal, Montreal, Canada)

Background: Relative to other drugs, recent cocaine injection has been linked with one of the highest risks of hepatitis C virus (HCV) infection among people who inject drugs (PWID). Yet, single-point assessments are often not reflective of longitudinal dynamics of drug use. The aims of this study were to characterize cocaine injection trajectories over a 5-year period in a sample of PWID and to compare HCV infection risks across trajectory groups. Method: In a prospective cohort study of initially HCV-uninfected PWID in Montreal (2011-16), participants provided blood samples for HCV testing and filled a behavioral questionnaire at 3-month intervals. Cocaine injection in the past three months (yes/no) was self-reported at each visit. Follow-up time started at study entry and ended at the time of HCV infection or last follow-up visit, whichever came first. Temporal trajectories of cocaine injection were estimated using group-based trajectory modelling, adjusted for age, gender and duration of injection. HCV incidence rates were calculated using the person-time method, and 95% CI estimated based on the Poisson distribution. Results: 360 PWID were included and contributed 3782 observation periods during follow-up (mean age at baseline 40.1; 81.8% male). Four temporal trajectories of cocaine injection were identified: sustained high (SH: 30.2%), sustained low (SL: 38.3%), decreasing (D: 22.0%) and variable (V: 9.5%). The HCV incidence rate was highest in the V group (20.1 per 100 person-years (py)), followed by the D (14.5 py), SL (12.9 py), and SH (9.8 py). Conclusions: Stable patterns of cocaine injection over time, whether high or low, were associated with similar risks of HCV infection, whereas a variable pattern was linked to the greatest risk. Long-term trajectories of drug use assist in more accurate identification of individuals with the highest risk of HCV infection.

SUBJECTIVE AND OBJECTIVE SOCIOECONOMIC DISADVANTAGE IN CHILDHOOD AND INCIDENT DEPRESSION IN ADULTHOOD AMONG MIDDLE- TO OLDER-AGED WOMEN IN THE SISTER STUDY Amanda M. Sirinak & Amanda M. Sirinak. (University of Wisconsin-Milwaukee)

Objective: Life socioeconomic disadvantage (SD) has been linked to later life depression in a growing number of studies. Understanding the relative impact of objective versus subjective childhood SD on depression onset in adulthood, and whether these associations are independent of later life socioeconomic factors remains, however, limited. Methods: We examined the association between objective (i.e., highest level of household education at age 13) and subjective (i.e., family income relative to others) measures of childhood SD in childhood and self-reported clinical depression diagnoses among 47,765 women in the prospective Sister Study cohort who were free of depression as of age 30 (mean follow-up = 23.9 ± 9.9 years since age 30). We used Cox proportional hazard models with age as time scale to estimate the hazard ratio (HR) and 95% CI for the association between each measure of childhood SD and incident depression, adjusting for women's mother's age at time of birth, household composition at age 13 (two-parent, single-parent or other), race/ethnicity (non-Hispanic Black, Hispanic or Other) birth cohort and educational attainment (HE). Results: A total of 8246 (17.3%) women reported incident diagnosis with clinical depression (mean age of onset 45.0 ± 8.8 years). Women who reported being poor (versus well-off) or experiencing food insecurity in childhood had 1.26 (95% CI: 1.11, 1.42) and 1.36 (95% CI: 1.27, 1.46) times higher hazard rate of depression, respectively. In contrast, there was no association between highest level of household education at age 13 (HE) and depression onset in adulthood (HR = 0.97, 95% CI: 0.91, 1.03). Conclusions: Our findings suggest that perceived SD experienced in childhood may be a more important predictor of depression onset in mid-to-late adulthood than objective measures of childhood SD among U.S. women independent of educational attainment.

INVESTIGATING THE INTERGENERATIONAL CYCLE OF OBESITY AND DISPARITIES: RATIONALE AND DESIGN OF A MULTIGENERATIONAL AGENT BASED MODEL Jamie Boine-Heinonen & Jamie Boine-Heinonen. (Oregon Health & Science University)

Disparities in childhood and adult obesity persist and are widening over time. Obesity disparities could be transmitted from one generation to the next through biological programming, socioeconomic, or environmental processes that interact dynamically over time. We present the design rationale of an agent based model (ABM) that simulates the development of obesity within life cycles across multiple generations. The ABM is composed of age (individuals) who age, grow, and reproduce over time. Agent attributes, processes, and parameters were determined based upon a multidisciplinary review of the evidence on determinants of obesity throughout the life course, including developmental programming through maternal obesity, socioeconomic and environmental influences, and random variation. Agent attributes include age, height, and weight, socioeconomic status (SES), location within a healthy or obesogenic environment is a function of their SES, SES and obesity are dynamically related. Female agents reproductive age and offspring, which grows according to the function of maternal obesity-related characteristic and environmental factors. Subsequent generations proceed in a similar fashion. The model will be used to investigate the contributions of biological, social, and environmental processes to intergenerational disparities. This knowledge is needed to inform public health policy for the mitigation of the intergenerational cycle of health disparities.

S/P indicates work done while a student/postdoc.
NEIGHBORHOOD DEPRIVATION, DISPLACEMENT AND SELF-REPORTED HEALTH AMONG WORLD TRADE CENTER HEALTH REGISTRY ENROLLEES—NEW YORK METROPOLITAN AREA, 2003–2016 Aldo Cross*, Aldo Cross, (New York City Department of Health and Mental Hygiene)

When neighborhoods gentrify, long-term residents are often displaced, sometimes to disadvantaged neighborhoods. Few quantitative studies assess the relationship between displacement and health. With data for 54,586 enrollees who participated in two or more data collection waves for the World Trade Center Health Registry, a longitudinal study of persons present in lower Manhattan on September 11, 2001, we examined associations between displacement and self-rated health status. Using a composite measure of neighborhood disadvantage based on population data we categorized all 156 New York metropolitan area Public Use Microdata Areas (PUMAs) as gentrifying, nondriven, deprived, or declining. Enrollee's address history during 2004–2016 was summarized into categories including displaced (ever moved from gentrifying or nondriven PUMAs to deprived or declining PUMAs), never displaced (moved in another pattern in [n = 855]), nondisplaced (moved in another pattern [n = 22,362]) and nonmovers (never moved [n = 28,586]). Using logistic regression with generalized estimating equations, we modeled the odds of reporting fair or poor health at any data collection wave by movement category, controlling for sex, race, age, and ever lived in public housing. Compared with nonmovers and movers who were nondisplaced, the displaced were more likely to be female (50% of displaced vs 41% of nondisplaced and 37% of nonmovers, p < 0.01) aged 25–44 years (60% of displaced, 56% of nondisplaced and 43% of nonmovers, p < 0.01) and nonwhite (59% of displaced, 34% of nondisplaced and 32% of nonmovers, p < 0.01). Those displaced had higher odds of reporting fair or poor health, compared with those who were nondisplaced (OR = 1.03, 95% CI 0.99, 1.07) and nonmovers (OR = 1.12, 95% CI 1.06, 1.19). Displacement was associated with worse self-rated health, although displacement reasons should be explored further.

HIV RISK IN PARTNERS OF MIGRANTS AND NON-MIGRANTS IN RAKAI, UGANDA: AN OBSERVATIONAL COHORT STUDY Jennifer Botelho*, Jennifer Botelho, (Department of Epidemiology, Johns Hopkins Bloomberg School of Public Health, Baltimore, Maryland, USA)

Background: Migration status has been linked to a higher burden of untreated HIV infection throughout sub-Saharan Africa. In Rakai District, Uganda, we have previously shown that migrants have an increased risk of HIV acquisition during the first two years following migration into a new community. However, little is known about in-migrants' sexual partners. Here, we characterized the migrants' partner pool and examined their risk for pairing with an untreated HIV-positive partner.

Methods: From 1998 through 2016, we continuously surveyed 30 communities in Rakai District, Uganda in part of the Rakai Community Cohort Study (RCCS). In this open population-based cohort study, participants ages 15 through 49 reported on their most recent sexual partner via questionnaires. We compared characteristics of partners of recent in-migrants and residents, stratified by gender. Within a subset of known couples (both members participating in the RCCS), we used log-binomial regression to model the risk of partnership with an untreated HIV-positive partner before and after the introduction and scale-up of antiretroviral therapy (ART) among HIV-negative in-migrants with HIV-positive residents. Results: In total, 29,441 participants reported on 116,759 partners. Within both genders, in-migrant's partners were younger and less likely to be married partners compared to residents' partners. Among 7,558 known couples (through 42,280 observations), we observed a trend of associative mixing by migration status. HIV-negative in-migrant males (RR = 1.82, 95% CI: 1.44-2.27) and females (RR = 1.62, 95% CI: 1.37-1.91) were more likely to partner with untreated HIV-positive individuals compared to residents irrespective of ART availability. Conclusion: In-migrants are more likely to engage in high-risk partnerships with untreated HIV-positive individuals. These findings highlight the need for HIV prevention programs that capture in-migrants promptly following relocation.

THE ROLE OF PERCEIVED SOCIAL SUPPORT IN THE RELATIONSHIP BETWEEN MATERNAL RACE AND POSTPARTUM VISIT NON-ATTENDANCE Tamala Gooden*, Tamala Gooden, (Virginia Commonwealth University School of Medicine)

Background: Postpartum visit (PPV) non-attendance is higher in some sociodemographic subgroups; yet, the role of social factors is unexplored. The purpose of this study is to determine if the racial disparity in PPV non-attendance in a study of women with uncomplicated births is mediated by perceived social support. Methods: Data from a randomized controlled trial assessing the effectiveness of shortened time to PPV (3-4 weeks) compared to usual care (6-8 weeks) was analyzed. We assessed maternal race/ethnicity (non-Hispanic (NH) Black vs other) as the exposure, and PPV non-attendance as the outcome. High or low perceived social support during pregnancy was measured at delivery by the Intercultural Support Evaluation List. Inverse probability weighted marginal structural models were applied to estimate the counterfactual racial disparity in PPV non-attendance with social support as a mediator, adjusting for education (high school vs college), income ($20,000 vs >$20,000), and marital status (single vs married) as mediator-outcome and exposure-outcome confounders. Analyses were conducted in strata of intervention groups. Results: Overall, 364 women enrolled in the study—180 were assigned to receive PPV at 3-4 weeks (intervention), and 181 to PPV at 6-8 weeks (usual care). Of the 94 women that did not attend their PPV, 76% were NH Black. Accounting for social support as a mediator attenuated the relationship between maternal race and PPV non-attendance from a total effect of 8.9 (OR 95% CI 3.4-23.1) to a controlled direct effect of 1.7 (OR 95% CI 0.4-6.9) in the intervention group. A similar attenuation was observed in the usual care group. Conclusion: Perceived social support partially explains the racial disparity in PPV non-attendance in this study. As modifications to social determinants of health, interventions to improve social support during pregnancy may positively influence maternal postpartum health seeking behavior and reduce health disparities.

LONG-TERM MENTAL HEALTH OUTCOMES FOLLOWING MODERATE TO SEVERE TRAUMATIC BRAIN INJURY: A SYSTEMATIC REVIEW, Mirinda Gormley*, Mirinda Gormley, (Virginia Commonwealth University)

Objective: Changes in mental health can be significant following a serious injury, yet few studies investigate the psychological outcomes following moderate to severe traumatic brain injury (mTBI) beyond 12 months. This review explores the long-term psychological outcomes for patients with mTBI. Data Sources: Original studies published through September 16th, 2016 from the databases of PubMed, PsycINFO, and CINAHL. Study Selection: Peer-reviewed articles were eligible if outcomes were reported after 12 months and study population met three criteria: (1) sample size ≥ 60; (2) ≥ 16 years at injury; (3) ≥ 50% diagnosed with mTBI. Data Extraction: Two reviewers independently extracted data on study objectives, designs, psychological outcomes, and participants' demographics and injury characteristics. Study size, participation, and attrition rates were extracted for quality assessment. Data Synthesis: Of 13 eligible articles, 2 (15%) had follow-up of 12 months, 3 (23%) between 24 years, and 8 (61%) had ≥ 10 years. Of these, 7 (54%) listed the primary outcome as being within the psychological domain. The prevalence of depression, anxiety, post-traumatic stress disorder (PTSD) and emotional and cognitive problems were often associated with an increased likelihood of cognitive/behavioral disturbances and maladaptive coping. Conclusions: Understanding the prevalence of psychiatric syndromes in the mTBI population is critical to informing the development of rehabilitation and treatment programs, and the quality of research in this domain is concerning. Future research is necessary to identify long-term psychological outcomes for patients living with mTBI.
PROSTATE CANCER PROGRESSION AMONG MEN WITH BIOCHEMICAL RECURRENT PROSTATE CANCER: A SIMULATION STUDY
Corinne Joshi*, Corinne E. Joshi, (Johns Hopkins Bloomberg School of Public Health)

Background: 500,000 US men have biochemical recurrent prostate cancer (BCR), which has variable prognosis and no standard treatment. Weight loss among men with BCR may delay cancer progression and improve overall health. We sought to design a randomized clinical trial to test weight loss as a first-line therapy for men with BCR. We were unable to find estimates of progression among the full spectrum of men with BCR to determine our required sample size. We conducted a simulation study to examine the progression frequency among men with BCR in a 12 month period. Methods: We generated 1,000 replicate cohorts from 2,190 men surgically treated at Johns Hopkins Hospital, who developed BCR, had ≥3 follow-up PSA values, and received no treatment post-surgery treatment. Mean age was 59, 56% had Gleason pattern 7, 49% had T3 stage, mean follow-up time was 10.9 years, and mean number of PSA values was 8.3. Progression was defined using Prostate Cancer Clinical Trials Working Group criteria of PSA increase ≥25% and ≥2 ng/mL above nadir or detection of metastatic disease. For each replicate cohort, starting PSA value was randomly selected for each man. Each man was eligible for follow-up if his starting PSA value was ≥2 ng/mL and he had ≥3 subsequent PSA values to allow PSA increase calculation. Eligible men were followed for progression for 12 months. We calculated the frequency of progression in each of the 1,000 cohorts, and reported average progression frequency for all cohorts, and 5th and 95th percentiles observed. Results: 73.3% (5th: 70.7; 95th: 75.9%) of men with BCR experienced prostate cancer progression at 12 months. Men with a slower doubling time during observation (>12 months) 50.8% (5th: 46.5; 95th: 55.4%) experienced progression. Conclusions: Prostate cancer progression is common among a simulated clinical population of men with BCR. These findings inform planning for clinical trials designed to test interventions for the full spectrum of men with BCR.

THE IMPACT OF POSTPARTUM CARE VISIT ATTENDANCE ON MATERNAL SMOKING BEHAVIOR
Timothy Disease*, Timothy Disease, (Virginia Commonwealth University)

Introduction: Maternal postpartum smoking is a major public health concern. Despite a significant decrease in the prevalence of smoking in the US population, the prevalence of smoking in women after pregnancy has seen a less remarkable decline. The postpartum care visit (PPCV) offers an excellent opportunity for healthcare providers to educate and counsel women on smoking cessation during the postpartum period and prevent relapse in women who quit during pregnancy. This study aims to examine the impact of PPCV attendance on maternal postpartum smoking.

Methods: We used publicly-available data on state-level counts of publicly-funded reproductive health clinics and CDC data on STI rates. We calculated the frequency of progression in each of the 1,000 cohorts, and reported average progression frequency for all cohorts, and 5th and 95th percentiles observed. Results: About 90% of women attended their PPCV, and 9.5% continued smoking from pregnancy into the postpartum period (aRR=0.71, 95% CI=0.63-0.79) and smoking recidivism (aRR=0.67, 95% CI=0.56-0.79). Conclusions: This study demonstrates that PPCV attendance reduces the risk of maternal postpartum smoking.

THE IMPACT OF SLEEP PROBLEMS ON FUNCTIONAL LIMITATIONS IN ADULTS WITH ASTHMA: A POPULATION STUDY
Zheng Li*, Zheng Li, (Valparaiso University)

Objective: This study aimed to investigate the associations among asthma attack, sleep problems, and functional limitations in adults with asthma. Method: We used 2016 U.S. National Health Interview Survey (NHIS) data to examine the effect of asthma attack and sleep problems on functional limitations including depression, difficulty walking, difficulty remembering/concentrating, and difficulty self-easing. Results: Of adults with asthma (n=2,806), 1,271 (45.5%) had at least one asthma attack in the last 12 months, and 318 (11.3%) had at least one visit to an emergency room or urgent care due to asthma. Multivariate analyses showed that at least one asthma attack was significantly associated with poor sleep quality, including having difficulty falling asleep, having difficulty staying asleep, having woken up not feeling well-rested, and use of sleep medication (all P < 0.05). Multivariate analyses showed that people reporting having at least one asthma attack, as well as sleep problems are more likely to be depressed, have difficulty walking/standing, have difficulty remembering/concentrating, and have difficulty self-easing after controlling for age, gender, race/ethnicity, education, and type of insurance (all P < 0.05). Conclusion: Poorly controlled asthma was associated with more sleep problems and functional limitations. To improve functional status, clinicians need to address sleep problems associated with asthma attack/exacerbation for adults with asthma.
PREDICTORS AND TRAJECTORY OF POST-CONCUSSIVE SYMPTOMS 12-MONTHS POST-DEPLOYMENT IN SOLDIERS WITH AND WITHOUT MTBI Hamid Ferdosi* Hamid Ferdosi, (Defense Health Agency)

Background: While it is believed that symptoms related to deployment-related mild traumatic brain injuries (mTBI) will improve within a few days or weeks in most cases, some service members may continue to experience troubling residual symptoms. In the present study, we report on symptom prevalence and trajectories extended to one year follow-ups. Methods: This prospective, longitudinal study enrolled active duty Service Members returning from OEF and OIF who were screened for mTBI within a few days of return. Differences in post concussive symptoms between those with deployment related mTBI (n=557) and without mTBI (n=1000) were assessed using the Neurobehavioral Symptom Inventory. Mixed effects models using a missing at random (MAR) approach for missing data were used to evaluate the role of mTBI and other factors on the trajectory of symptoms. Results: A total of 1567 soldiers participated in baseline interviews between 2009 and 2014, of whom 1162 completed at least one follow-up interview. Severe/Very severe symptoms were reported by 48% of mTBI cases and 21% of controls at baseline. Overall, at all time-points, TBI cases were almost twice as likely to report symptoms (adj OR=1.7, 95%CI 1.51-1.93, p <0.0001) compared to controls. Three of the four most prevalent baseline symptoms were associated with mTBI at all time points (sleep problems OR=2.19; forgetfulness OR=2.56; and irritability OR=2.73). Headache was more common in cases than controls at increasing prevalence of headaches in controls. Clinicians in this cohort of recently deployed service members, the majority of those who had sustained an extended to one year follow-up. Symptoms also were reported by a large minority of those who did not sustain a mTBI.

ASSOCIATIONS OF LONG-TERM AIR POLLUTION EXPOSURE WITH PREVALENT HYPERTENSION AND BLOOD PRESSURE AND EFFECT MODIFICATION BY OBESITY AND ETHNICITY: RESULTS FROM COMPASS, Siya Tasnim*, Siya Tasnim, (University of Chicago)

Previous studies evaluating associations between air pollution with hypertension and blood pressure have had mixed results. Moreover, little information exists regarding the effect of interaction of obesity and ethnicity with long-term air pollution exposure on blood pressure and hypertension. The aim of this study is to assess the associations of long-term air pollution exposure with hypertension and blood pressure and investigate effect modifications in these associations by obesity and ethnicity. We are examining the association between long-term (2, 5 and 10 year moving average) air pollutant exposures, prevalent hypertension and blood pressure in 5000 adults enrolled in the Chicago Multiethnic Prevention And Surveillance Study (COMPASS) so far. The target is to recruit 10,000 participants in the initial wave. Exposures to particles with an aerodynamic diameter <10 μm (PM10), aerodynamic diameter <2.5 μm (PM2.5) and nitrogen dioxide (NO2) were obtained from spatiotemporal models. We are using logistic regression accounting for repeated measures to evaluate the association between long-term average PM2.5 and self-reported hypertension and linear regression to evaluate the associations between air pollutants and systolic, diastolic pressures. Models are adjusted for a number of potential confounders: demographic, health and socioeconomic covariates. Effect modification by obesity and ethnicity will be investigated. We are analyzing the data now and results of the enrolled participants will be reported in the conference.

WHY WE SHOULD BE MINDFUL OF LEFT TRUNCATION AND LEFT CENSORING IN MILITARY COHORT STUDIES Kathryn Taylor* Kathryn Taylor, (US Army Research Institute of Environmental Medicine, Harvard T.H. Chan School of Public Health, Department of Environmental Health)

In military occupational cohort studies, when selecting the population to study, it is imperative to consider the potential for left truncation and left censoring of meaningful data. The analysis presented here demonstrates a real-life scenario where different accounting of truncation and censoring led to different estimation of effects. We analyzed the hypothesis that cognitive performance as measured by the Armed Forces Qualification Test (AFQT) was associated with mild traumatic brain injury (mTBI) risk between 2002 and 2007. Utilizing data from the Total Army Injury and Health Outcomes Database to analyze medical encounter data on Active Duty (AD) Army personnel, the first cohort analyzed prevalent hires, of everyone who was on AD in the Army between the 2002 and 2007, including those who entered AD prior to 2002 (n=725,637). The second cohort analyzed incident hires, or Soldiers who entered into the Army between 2002 and 2007 (n=35,602). Multivariate logistic regression models were run to estimate the odds ratios (ORs) for the relationship between AFQT scores and mTBI during the study time period. AFQT category 1 (highest scores) was set as the reference category. The prevalent hires dataset, it was determined that lower AFQT score categories were associated with significantly increased odds of having a mTBI (Category 2 OR=2.008 (1.329, 3.035); Category 3 OR=2.503 (1.665, 3.763); Category 4 OR=4.044 (2.559, 6.854)). Meaning those who performed worse on the AFQT had a greater odds of experiencing a mTBI. However, these results were attenuated when compared to incident hires (Category 2 OR=3.994 (0.977, 16.330); Category 3 OR=4.470 (1.103, 18.114); Category 4 OR=4.522 (0.750, 27.283)). The results of this analysis demonstrate a shifting of the effects of AFQT performance on odds of mTBI when risk is evaluated using prevalent hires. Left truncation and left censoring must be considered when analyzing military occupational cohorts to ensure accurate representation of the associations. 

CURRENT BEHAVIORAL, SOCIOECONOMIC AND DEMOGRAPHIC DETERMINANTS OF LIFETIME HIV TESTING AMONG AFRICAN AMERICANS IN THE SOUTH Kemi Ogunsina* Kemi Ogunsina, (University of Miami)

Background: HIV diagnosis rates are higher in the Southern region of the United States (US), as 44% of people living with HIV are in the Southern states. African Americans experience a higher burden of this disease, contributing 44% of HIV diagnoses in 2016. Pretesting testing among African Americans is pivotal in reducing HIV-related health disparity. Here, we explore the current predictors of HIV testing among African Americans (AA) living in the South. Methods: A total of 16,093 AA men and women aged 18 to 80 years from nine states with the highest HIV incidence in the South are included in this analysis. We utilize data from the 2016 Behavioral Risk Factor Surveillance System (BRFSS) to conduct a logistic regression analysis, reporting (AOR) and unadjusted odds ratios (OR), and 95% confidence intervals (CI) for the association between behavioral, sociodemographic factors and self-reported HIV testing. All analysis was conducted using SAS University Edition. Results: Respondents who reported ever receiving HIV test made up 39.7% of the total, among which majority were age 25 to 44 years old (47.2%), with total household income less than $35,000 (52.7%). In addition, risky sexual behavior was reported by 10.8%. Lower odds of testing were observed among retirees, students and homemakers (AOR 0.63; 95% CI 0.45-0.88) than employed respondents. Also, respondents residing in Texas than in Georgia (AOR 0.53; 95% CI 0.31-0.90). Higher odds of testing were observed among those with income ≥ $75,000 (AOR 2.00; 95% CI 1.30-3.10), and among respondents living in Florida than in Georgia (AOR 1.81; 95% CI 1.71-2.80). Conclusion: Our findings suggest that activities to increase HIV testing should focus on individuals who are retired, homemakers and students or who earn less than $35,000. These individuals are at higher risk of not testing for HIV and may be more likely to contribute to the number of new infections.

S/P indicates work done while a student/postdoc.
RACE AND GENDER SPECIFIC LIFESTYLE BEHAVIORS AMONG US ADULTS WITH A HISTORY OF KIDNEY DISEASE: RESULTS FROM A NATIONALLY REPRESENTATIVE SAMPLE
Dr. Anusha Yarava* Dr. Anusha Yarava, (Kent State University)

ABSTRACT Background: Chronic kidney disease (CKD) can be exacerbated by unhealthy lifestyle behaviors (e.g. lack of physical activity, smoking, drinking, and improper diet patterns). Several studies have well documented gender and racial disparities in lifestyle behaviors in other populations. However, modifiable lifestyle behaviors with respect to gender and race in a large community sample of adults with a history of CKD have not been studied yet. This study examines gender and racial differences in unhealthy lifestyle behaviors and their relationship with sociodemographic factors among adults with CKD. Methods: We investigated the differences in the race and gender specific lifestyle behaviors among the adults with the history of chronic kidney disease using Behavioral Risk Factor Surveillance System (BRFSS) data. Our analysis included subjects (n = 67,842) who were followed retrospectively from 2011 - 2015. We analyzed the data using multiple logistic regression method to predict the association between socio demographic factors and unhealthy lifestyle behaviors. We also performed stratified analysis based on gender and race to know the disparities among the lifestyle behaviors. Results: Gender and Race specific differences were found among sociodemographic factors in predicting the unhealthy lifestyle behaviors. These disparities were found among Age, BMI, Health Plan, Primary care provider and Marital status in association with four different unhealthy lifestyle behaviors. Among these, BMI was found to be significant predictor of Physical Activity, Heavy and Binge drinking, whereas lack of access to health in terms of health plan or through primary care provider were found to be significant predictor of Smoking. Conclusion: Using a nationally representative sample, this study is the first to identify gender and race specific sociodemographic factors that are associated with modifiable lifestyle behaviors among adults with kidney disease.

NUTRITION DURING PREGNANCY: FINDINGS FROM THE NICHD FETAL GROWTH STUDIES - SINGLETON COHORT
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Maternal diet both before and during pregnancy plays a pivotal role in optimizing maternal and newborn health. Yet, existing research lacks longitudinal data that comprehensively describe maternal diets. Our study aim was to examine diet before and during pregnancy across 4 racial/ethnic groups in a prospective cohort of US women. As part of the NICHD Fetal Growth Studies-Singletons (2009-2013), we studied 1,482 healthy, non-obese women with no major pre-pregnancy chronic disease. To assess peri-conception and first trimester diet, women completed a 145-item self-administered Food Frequency Questionnaire at enrollment (8-13 weeks gestation). Next, they completed automated 24-hour dietary recall at 4 gestational intervals: 16-22, 24-29, 30-33, and 34-37 weeks. We examined, across trimesters, unadjusted variations in median (interquartile range (IQR)) caloric intake and energy-adjusted nutrient compositions by 4 self-identified racial/ethnic groups - White, Black, Hispanic, Asian. During peri-conception and first trimester, median (IQR) caloric intake was 1,976 (1,450-2,747) kcal/day, comprised of 15 (13-18)% protein, 32 (28-37)% fat, 52 (47-58)% carbohydrates, and a glycemic load (GL) of 122 (88-179). Consumption levels varied significantly by race/ethnicity: daily caloric intake was highest among Blacks and lowest among Whites (2,317 vs. 1,773 kcal; p<0.001) with differences driven primarily by refined carbohydrates (GL: 158 vs. 109). At 16-22 weeks, caloric intake was 1,924 (1,304-4,499) kcal/day, comprised of 16 (19-13)% protein, 33 (38-27)% fat and 51 (68-45)% carbohydrates. Total energy intake was highest among Blacks and lowest among Asians (2,153 vs. 1,792 kcal/day; p<0.001) due to disparities in fat and protein intake: 34% vs. 30% and 14% vs. 18%, respectively. Compared to 16-22 weeks, maternal diet was similar across the 3 subsequent assessments. In sum, racial/ethnic disparities in diet quantity and composition require further investigation to assess impact on perinatal outcomes.

S/P indicates work done while a student/postdoc