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SOCIETY FOR PEDIATRIC AND PERINATAL EPIDEMIOLOGIC RESEARCH

reproduction | pregnancy | fetal development | child | adolescent health

27th Annual Meeting
Seattle, Washington

June 23-24, 2014

SOCIETY FOR PEDIATRIC AND PERINATAL EPIDEMIOLOGIC RESEARCH
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2013-2014

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2014 AWARD WINNERS

The Society wishes to extend our congratulations and best wishes to this year's award winners!

<u>Student Prize Paper: Winner</u>
"The risk of fetal death with preeclampsia"
Quaker E. Harmon MD, PhD
Epidemiology Branch, NIEHS, NIH, DHHS, Research Triangle Park NC, USA

<u>Heinz Berendes International Travel Award</u>
"Does late childbearing increase the risk for behavioural problems in children?
A longitudinal cohort study"
Jessica Tearne BA, PhD candidate
Telethon Institute for Child Health Research, West Perth, Australia

<u>Mentoring Award</u>
K.S. Joseph, MD, PhD
Institution Department of Obstetrics & Gynaecology and School of Population and Public
Health, University of British Columbia, Canada

<u>Rising Star Award</u>
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Development, National Institutes of Health, USA

<u>President's Award</u>
Germaine M. Buck Louis, PhD
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ACKNOWLEDGEMENTS

We also wish to acknowledge our Society's journal:

Paediatric and Perinatal Epidemiology, published by Wiley-Blackwell, is an international, peer reviewed journal that crosses the boundaries between epidemiologists, paediatricians, developmental psychologists, environmental specialists, obstetricians, child health specialists and genetic epidemiologists. Its main focus is to ensure that the most important paediatric, reproductive, obstetric and perinatal studies reach those researchers and clinicians for whom the results are especially relevant. It publishes original research articles commentaries, book reviews, study designs, detailed methodologies and review articles.

Society for Pediatric and Perinatal Epidemiologic Research

27th Annual Meeting

June 23-24th, 2014 - Seattle, Washington

Program

Monday, June 23rd, 2014

1:00 – 3:00 pm   **Executive Committee Meeting**
Glacier Peak

2:30 – 5:30 pm   **Advanced Methods Workshop** (separate registration required)
Fifth Avenue

Simulation Methods in Epidemiologic Research and Learning
Matthew Fox (Boston University) and Kelly Getz (Children's Hospital of Philadelphia)

Creating Risk Prediction Models in Perinatal Epidemiology
Jennifer Hutcheon (University of British Columbia) and Laura Schummers (Harvard University)

4:30 – 7:30 pm   **Registration**
Grand Foyer

6:00 – 7:00 pm   **Presentation: Congenital anomalies among the crests of the Northwest Aboriginal peoples, Judith Hall, MD**
Fifth Avenue

7:00 – 8:30 pm   **Welcome Reception and Poster Session A**
Grand Ballroom 3

Poster tours will be available at 7:45

Behavior..**A1-A17**
Preeclampsia/Hypertension/Diabetes **A18-A36**
IUGR/Preterm Delivery **A37-A46**
Gynecological Outcomes **A47-A55**
Infertility..**A56-A69**
Microbial **A70-A76**
Obesity **A77-A94**
Abortion...**A95-A99**
Later Life...**A100-A107**
Heinz Berendes International Travel Award…A108

6:30 – 8:10 am   **Continental breakfast**
Grand Ballroom 3 and Foyer

7:00 –10:00 am   **Registration**
Foyer

7:00 – 8:00 am   **Round Table Discussions: by ticket only (sign up at registration)**

Round Table 1. Fetal growth restriction: Katie Laughon- *Baker (Mezzanine)*

Round Table 2. Twinning: Judy Hall- *Stuart (Mezzanine)*

Round Table 3. Pre-eclampsia: Hilary Gammill- *Adams (Mezzanine)*

Round Table 4 Neurodevelopmental Outcomes: Brent Collett- *St Helens (Mezzanine)*

Round Table 5. The placenta: Claudia Holzman: *Blakeley- (San Juan)*

8:10 – 8:15 am   **Welcome Remarks:** Martha Werler, President
Grand Ballroom 1

8:15 – 9:30 am   **Plenary Session I – Counting Time Matters**
Moderator: Kelly Getz
Grand Ballroom 1

Successive time-to-pregnancy among women experiencing hCG pregnancy loss
Katherine Sapra

Circadian Rhythm of Placental Abruption Onset
Miguel Angel Luque Fernandez

Comparing models in timing of miscarriage risk with self-reported vitamin supplementation and smoking during early pregnancy
Sudeshna Mukherjee

Left truncation as a potential explanation for the protective effect of maternal smoking on preeclampsia
Sarka Lisonkova

Maternal low birthweight and recurrent preterm birth of offspring
Izumi Chihara

9:30 – 10:00 am   **Morning Break**
Grand Ballroom 3

10:00 – 11:15 am **Plenary Session II – Behaviors Matter**
Grand Ballroom 1

Moderator: Sarah Tinker

The Impact of an Exercise Intervention on Physical Activity during Pregnancy: The Behaviors Affecting Baby and You (B.A.B.Y.) Study
Marquis Hawkins

Association of childhood physical and sexual abuse with intimate partner violence, poor general health and depressive symptoms among pregnant women
Yasmin Barrios

Randomized clinical trial of preconception low dose aspirin use and pregnancy rate: the EAGeR Trial (2006-2012)
Enrique Schisterman

Preterm birth in the context of increasing income inequality in the United States
Maeve Wallace

Fruit and vegetable intake, pesticide residue status, and semen parameters among subfertile men.
Yu-Han Chiu

11:15 – 11:30 am **Award Presentations**

Mentoring Award – presented by: Sonia Herenandez-Diaz, President-Elect
    Awardee: K.S. Joseph

Rising Star Award – presented by: Sonia Herenandez-Diaz, President-Elect
    Awardee: Sunni L.Mumford

Heinz Berendes Travel Award – presented by: Robert Platt
    Awardee: Jessica Tearne

President's Award – presented by: Martha Werler, President
    Awardee: Germaine M. Buck Louis

11:30 am – noon **Student Prize Paper –** presented by: Sonia Herenandez-Diaz, President-Elect

The Risk of Fetal Death with Preecalmpsia
Quaker Harmon

Noon – 1:30 pm   **Lunch and Poster Session B**
Grand Ballroom 3

Poster tours will be available at 12:45

Breastfeeding **B1-B3**
Childhood Outcomes.. **B4-B26**
Descriptive **B27-B57**
Envirnonmental Exposures **B58-B69**
Labor/Delivery **B70-B80**
Methods.. **B81-B95**
Social Factors.. **B96-B109**
Heinz Berendes International Travel Award.. A108

1:30 – 2:00 pm   **SPER Keynote Address** – Judith Hall, MD
Epigenetics – for epidemiologists or where nature meets nurture
Grand Ballroom 1

2:00 – 3:15 pm   **PlenarySession III – Meditation on Mediation Matters**
Moderator: Robert Platt
Grand Ballroom 1

Labor Complications, Birth Depression, and Signs of Neonatal Encephalopathy in the Asphyxial Pathway to Cerebral Palsy among Term Births: An application of G-estimation in A Matched Case-Control Study
Qing Li

The role of maternal exposure to antiretroviral therapy as a mediator for the effect of HIV on birth outcomes
Kelesitse Phiri

Is the risk for neural tube defects from clomiphene and assisted reproductive technologies mediated through multiple births?
Corey Benedum

Serum leptin measured in early pregnancy is higher in women with preeclampsia compared to normotensive pregnant controls
Brandie Taylor

Do the causes of infertility play a role in the etiology of preterm birth?
Carmen Messerlian

3:15 – 3:45 pm   **Afternoon Break**
Grand Ballroom 1

3:45 – 5:00 pm **Plenary Session IV – Childhood Matters**
Moderator: Emily Harville
Grand Ballroom 1

Periconceptual and pregnancy folic acid supplementation and child allergic disease â€" evidence from the Danish National Birth Cohort
Ekaterina Maslova

A prospective study of N-3 and N-6 polyunsaturated fatty acids and weight gain in school-age children
Wei Perng

Neurobehavioral scores at 5 weeks in relation to autistic traits at 4 and 5 years
Katherine Bowers

Early life determinants of child cognitive and psychomotor development: RHEA Mother-child cohort in Crete, Greece
Leda Chatzi

The association between trajectories of gestational weight gain and child IQ at 5 years of age
Stefanie Hinkle

5:00 – 5:05 pm **Closing Remarks –** Martha Werler, President

5:05 – 6:30 pm **Society business meeting**
Grand Ballroom 1

Poster Session A

Monday, June 23th
7:00 – 8:30 pm

A1

SLEEP QUALITY AND PREGNANCY OUTCOME. M Klebanoff* (The Ohio State University, Columbus) R Oza-Frank (The Ohio State University, Columbus) S Keim (The Ohio State University, Columbus) C Lynch (The Ohio State University, Columbus)

Background: Poor quality sleep has been associated with increased risk of pregnancy complications. We assessed risk factors for poor quality sleep and the association between sleep quality and pregnancy outcome. Methods: High-risk pregnant women (n=264) in the Ohio Perinatal Research Network Perinatal Research Repository completed the Pittsburgh Sleep Quality Inventory (PSQI) at enrollment and each trimester; scores >5 represented poor quality sleep. Statistical significance was assessed by linear and logistic regression with GEE. Results: 67% of scores were elevated. Mean score was higher among smokers (8.6 vs 7.2, p=0.007), among white (8.8) vs black (7.4, p=0.006) and other (6.5, p=0.02) women, and with decreasing age (-.02/year, p=0.07). Mean score did not vary significantly by trimester (7.9 1st , 7.3 2nd, 8.1 3rd), by education (7.7 >HS, 7.8 HS, 7.9 5 were similar. Associations between PSQI and pregnancy outcomes were then restricted to scores before the 3rd trimester to minimize reverse causation. Mean 1st and 2nd trimester PSQI was similar between women delivering preterm or term (7.8 vs 7.4, p=0.53), women with and without GDM (7.4 vs 7.9, p=0.57), and women with and without hypertensive disorders (7.2 vs 7.8, p=0.43). Conclusion: Poor quality sleep was common, but 1st and 2nd trimester sleep quality was not associated with outcome.

A2

DIFFERENCES IN RISK FACTORS FOR INCIDENT VERSUS RECURRENT PRETERM DELIVERY. *Grantz KL, Hinkle SN, Mendola P, Sjaarda LA, Leishear K, Albert PS (Eunice Kennedy Shriver National Institute of Child Health and Human Development, NIH, Bethesda, MD, USA)

Risk factors for preterm delivery (PTD) have been described, but whether risk factors for recurrent versus incident PTD differ is less understood. We assessed whether known risk factors were different in women with versus without prior PTD using medical records of the first and second singleton deliveries in 27,077 Utah women (2002-2010). Longitudinal transition models with modified Poisson regression calculated adjusted relative risks (aRR), with multiplicative interactions between each PTD risk factor and prior PTD status to explore whether the significance of a particular risk factor varied between incident and recurrent PTD < 37 weeks. PTD occurred in 2,097 (7.7%) of first pregnancies. In second pregnancies, 1,913 (7.1%) delivered preterm, of which 1,374 (5.5%) occurred among 24,980 women without prior PTD (incident) and 539 (25.7%) among 2,097 women with prior PTD (recurrent). Significant differences in risk patterns between second pregnancy incident and recurrent preterm delivery were observed for smoking (P=0.01), alcohol consumption (P=0.005), chronic hypertension (P=0.02), and interpregnancy interval < 12 months (P=0.04). Incident PTD risk was increased in association with smoking (aRR 1.97; 95%CI 1.54-2.51) as was hypertension (aRR=1.52; 95% CI 1.10-2.09) and short pregnancy interval (aRR=1.33; 95% CI 1.15-1.54) but these factors did not increase risk for recurrent PTD. Drinking alcohol was associated with increased risk for recurrent PTD (aRR= 2.32; 95% CI, 1.50-3.60) but not incident PTD (aRR= 1.01; 95% CI, 0.69-1.46). Risks associated with weight, insurance, and other chronic conditions were similar. Risk patterns for incident and recurrent PTD differed somewhat with respect to modifiable factors.

A3

VITAMIN D SUPPLEMENTATION IN PREGNANCY ON NEONATAL OUTCOMES: A SYSTEMATIC REVIEW. SQ Wei* (University of Montreal, Montreal), WD Fraser (University of Sherbrooke)

Background: Vitamin D deficiency or insufficiency is common in pregnant women. Low maternal vitamin D status has been associated with low birth weight or small for gestational age (SGA). Vitamin D supplementation during pregnancy might protect adverse neonatal outcomes. OBJECTIVE: To determine the effect of vitamin D supplementation during pregnancy on newborn anthropometric measures (birthweight, length, head circumference). STUDY DESIGN: We searched electronic databases of the literature in PubMed, the Cochrane Library and clinicaltrial.gov up to January, 2014 using the following keywords: 'vitamin D' and 'supplementation' and 'pregnancy'. A systematic review and meta-analysis was conducted on randomized clinical trials (RCTs) that reported vitamin D supplementation during pregnancy and neonatal outcomes including birth weight, birth length, head circumference, low birth weight or small-for-gestational age (SGA). RESULTS: Eight RCTs met the inclusion criteria. Data from the above 8 trials involving 1169 women found that women who received vitamin D supplements during pregnancy had a higher mean birth weight (g) (mean difference 146.48, 95% CI 83.67 to 209.30), larger body length (cm) (mean difference 0.98, 95% CI 0.66 to 1.30), larger head circumference (cm) (mean difference 0.59, 95% CI 0.42 to 0.76). There were less frequently had a baby with a birth weight below 2500 grams in women with vitamin D supplementation than those women receiving standard care or placebo (RR 0.38, 95% CI 0.21 to 0.66). Only one study reported on SGA, but the sample size was too small (n=110) to detect an effect on the risk of SGA. CONCLUSION: Vitamin D supplementation during pregnancy may increase baby's birthweight. However, the trials included were small. These finding support the need for a single larger trial with enough power to validate this effect. KEYWORDS: Vitamin D, pregnancy, neonatal outcome

A4

HORMONAL CONTRACEPTIVE USE BEFORE AND AFTER CONCEPTION IN RELATION TO PRETERM BIRTH AND SMALL FOR GESTATIONAL AGE. Jensen ET*, Daniels JL, Stürmer T, Robinson WR, Williams CJ, Vejrup K, Magnus P, Longnecker MP (National Institute of Environmental Health Sciences; Research Triangle Park, North Carolina, UNC Gillings School of Global Public Health)

Exposure to hormonally-active agents during pregnancy may affect the duration of gestation and fetal growth. The relation of periconceptional hormonal contraception use during pregnancy to these outcomes, however, has not been examined in detail, and may provide insight into the biologic plausibility that non-contraceptive hormonally-active agents affect outcomes at birth. We evaluated use of hormonal contraceptives before and after conception in relation to preterm birth and small for gestational age. We linked the Norwegian National Prescription Registry to data from a pregnancy cohort, the Norwegian Mother and Child Study (MOBA) (n=44,734). We characterized prescription records of hormonal contraception use by type (combination oral, progestin-only oral, vaginal ring, transdermal, and injectable) and specific progestin component. Exposure was characterized by estimated date of last use relative to conception (either 12 to > 4, 4 to > 1, or 1 to > 0 months before, or 0 to12 weeks after). We observed a positive association between use of a combination oral contraceptive and preterm birth for all exposure periods (e.g., adjusted OR: 1.21, 95% CI: 1.04, 1.41 for last use 12 to >4 months before conception); specifically, combination contraceptives containing the progestin norethisterone were consistently related to increased risk of preterm birth. Other types of hormonal contraception were generally not associated with preterm birth; none were positively associated with small for gestational age. Hormonal contraceptive use -- before and in early pregnancy – was associated with preterm birth depending on the specific formulation. Further study is needed before clinical implications are fully understood.

A5

OXIDATIVE STRESS PROGRAMS APPETITE? ZC Luo*, JF Bilodeau, E Levy, AM Nuyt, P Julien, WD Fraser (*Department of Obstetrics and Gynecology, CHU Sainte-Justine, University of Montreal, Montreal, Canada)

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

A6

THE EFFECTS OF INTERACTION BETWEEN MATERNAL SMOKING AND HOUSEHOLD INCOME ON BIRTH WEIGHT IN JAPAN. Suzuki K*, Yamagata Z, and Tsuji I (University of Yamanashi, Chuo, Japan)

Maternal smoking during pregnancy is associated with low birth weight. Moreover, it has been recently suggested that socioeconomic status (SES) indicators like household income might be associated with birth weight. However, only a few studies have examined the effect of the interaction between these factors on birth weight. We aimed to clarify these effects of this interaction by using data from a national birth cohort study in Japan. The Longitudinal Survey of Babies Born in the 21st Century is a large national cohort study in Japan. Data from the study were linked with those from the vital statistics records of birth registration. A total of 47,015 respondents participated in the first survey. Of these, 35,228 singleton babies, whose records did not show any missing data related to sex, birth order, gestational period, parent nationality, maternal age, and household income, were analyzed. We conducted a multiple linear regression analysis. Adjusted mean birth weight was compared between smoking and non-smoking mothers, using the least square means method. Results showed that among non-smoking mothers, adjusted mean birth weight was significantly higher in the lowest quartile income group (3067 g) than in the highest quartile income group (3049 g, p = 0.003). However, among smoking mothers, the adjusted mean birth weight was lower in the lowest income quartile group (3004 g) than in the highest income quartile group (3025 g, p = 0.3). Thus, these results suggest that the effects of an unfavorable environment on an infant may be more pronounced in lower-SES communities.

A7

**MATERNAL UNDERWEIGHT, A LARGE SOCIAL CONCERN AS BAD AS
MATERNAL SMOKING, IN JAPAN**. N Morisaki* (National Center for Child Health and
Development, Setagayaku, Tokyo, and the University of Tokyo, Bunkyoku, Tokyo), K Takeda
(National Center for Child Health and Development, Setagayaku, Tokyo)

Background: Increase in preterm birth and low birth weight (birth weight<2500g) is a serious
issue in Japan. Method: Using cross-sectional data from a multi-level sample of children born in
Japan during 1994-2010 and alive at study, we investigated the association between maternal
BMI, smoking, and age with birth weight and risk of preterm birth in 16238 singletons. Results:
5.2% children were preterm, average birth weight was 3031 grams. Mothers were 18.9%
underweight (BMI<18.5), 8.0% overweight (BMI>25), 5.1 % smokers, 11.7% over 35 years old,
and 1.3% below 20 years old at delivery.   In multivariate logistic regression adjusting for
maternal characteristics, smoking [adjusted odds ratio (aOR) 1.41(1.10-1.81)], BMI<18.5 [aOR
1.40 (1.10; 1.76)], BMI>25 [aOR 1.37 (1.17; 1.85)], age<20[aOR 2.40 (1.38; 4.18)], age>35
[aOR 1.62 (1.27; 2.09)], were all risk factors for preterm birth. Similarly in multivariate linear
regression, maternal smoking [102g (92, 112)], lower BMI [20.3g (18.5, 22.1)/ unit) and higher
age [20.2g (8.3, 32.1)/10years] were all risk factors for smaller fetal growth.   Furthermore,
through standardization, we estimated that eliminating maternal smoking, or if all underweight
mothers gained 2 kg each, preterm birth would decrease by 3% each, and average birth weight
would increase by 14g and 26g. Combination of both interventions would decrease preterm birth
by 6%, and increase average birth weight by 35 grams. Conclusion: In our current situation with
many underweight mothers, advocating to increase pre-pregnancy weight may be as effective as
advocating to ban maternal smoking, to reduce preterm birth and increase average birth weight in
Japan.

A8

MATERNAL VITAMIN D STATUS IN PREGNANCY AND FETAL GROWTH: A THREE-COHORT STUDY. Tian Y*, Holzman C, Siega-Riz AM, Williams MA, Dole N, Enquobahrie D (Michigan State University, East Lansing, MI)

In response to inconsistent findings, we investigated associations between maternal 25-hydroxyvitamin D (25(OH)D) levels and fetal growth, including potential effect modification by race. Data from 2,566 pregnant women were combined in a nested case-control study (preterm and term) sampled from three cohorts: the Omega study, the Pregnancy, Infection and Nutrition (PIN) study, and the Pregnancy Outcomes and Community Health (POUCH) study. Maternal serum 25(OH)D levels, measured once (range 4-29 weeks; 80% 14-26 weeks), was analyzed as continuous and categorical variables: severe deficiency (<12 ng/ml); deficiency (12-19 ng/ml); and sufficiency ($\geq$20 ng/ml) (referent). Fetal growth was modeled as sex-and gestational age-specific birth weight Z-score (BWz) and small for gestational age (SGA) with a <10th percentile cut-point. Bivariate and multi-covariate models (adjusting for education, age, season, parity, BMI, smoking) assessed 25(OH)D levels in relation to two measures of fetal growth, BWz (linear regression) and SGA (logistic regression). Among African-American women, BWz increased by 0.016 (SE=0.004, $p<0.001$) per 1 ng/ml increase in 25(OH)D levels; this association was not observed in Non-Hispanic White women. Severe deficiency of 25(OH)D during pregnancy was present in 24% of African-Americans and was associated with SGA (adjusted OR=1.72; 95% CI 0.97, 3.05). Too few Non-Hispanic White women had severe deficiency of 25(OH)D (1.4%) to adequately assess relations with SGA. We conclude that serum 25(OH)D levels of <12 ng/ml during pregnancy is more common in African-American women compared with Non-Hispanic White women, and these low 25(OH)D levels are associated with delivery of an SGA infant among African-Americans.

A9

PRE-PREGNANCY AND EARLY PREGNANCY LEISURE TIME PHYSICAL ACTIVITY AND FETAL GROWTH IN THE OMEGA STUDY. Badon SE*, Wander PL, Qiu C, Miller R, Williams MA, Enquobahrie DA (University of Washington, Seattle WA)

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

A10

RANDOMIZED CLINICAL TRIAL OF PRECONCEPTION LOW DOSE ASPIRIN USE AND PREGNANCY LOSS: EAGER (EFFECTS OF ASPIRIN IN GESTATION AND REPRODUCTION) TRIAL. Mumford SL*, Schisterman EF, Lesher L, Faraggi D, Wactawski-Wende J, Townsend J, Lynch AM, Perkins NJ, Galai N, Silver RM (Eunice Kennedy Shriver National Institute of Child Health and Human Development, Bethesda, MD)

Low dose aspirin (LDA) initiated post-conception is commonly prescribed to prevent pregnancy loss despite its unproven efficacy. As preconception LDA may affect endometrial vascularization and placentation, post-conception LDA initiation may miss the critical window for intervention. This multi-site prospective block-randomized double-blind placebo-controlled trial sought to determine whether preconception LDA (81 mg/day) treatment decreases pregnancy loss rates in women with 1-2 prior losses. Women aged 18-40 actively trying to conceive were stratified as: 1) restricted: women with 1 documented loss <20 weeks gestational age (GA) during the past year, or 2) general: women with 1-2 prior losses regardless of GA or time since loss. Randomization was stratified by site and restricted/general strata. Participants were treated/followed for ≤6 menstrual cycles or if they conceived, throughout pregnancy with treatment discontinued at 36 wks GA. An intent-to-treat approach with sensitivity analysis for compliance was used to estimate effects.1228 women were randomized: 615 LDA and 613 placebo. 1078 (87.8%) women completed the trial and 792 women had a hCG detected pregnancy (64.4%). Overall there were 133 clinical losses (12.6% LDA vs. 11.8% placebo, p=0.7) and 56 chemical losses (5.4% LDA vs. 4.9% placebo, p=0.7). There were no differences observed by eligibility strata, specifically in the restricted strata (n=492), clinical pregnancy loss rates were 12.3% LDA vs. 11.1% placebo (p=0.7), and in the general strata (n=586), 12.8% LDA vs. 12.4% placebo (p=0.9). Daily LDA initiated preconception was not associated with clinical or chemical pregnancy losses among women with a history of 1-2 prior losses.

A11

ORAL CORTICOSTEROID USE DURING PREGNANCY AND RISK FOR PRETERM BIRTH: A PROSPECTIVE COHORT STUDY. Palmsten K*, Johnson DL, Luo Y, Torres CL, Chambers CD (The University of California, San Diego, La Jolla, CA)

Risk of preterm birth is elevated among pregnant women who use oral corticosteroids (OCSs); however, it is unclear whether the association is due to the medication itself or whether it reflects confounding. We evaluated the association using prospectively collected data from the Organization of Teratology Information Specialists Autoimmune Disease Study (2004-present). The 941 women included in this analysis enrolled before 20 weeks' gestation, had rheumatoid arthritis, psoriasis/psoriatic arthritis, ankylosing spondylitis or Crohn's Disease, and had live births. Women were classified as exposed to OCSs only, disease modifying antirheumatic drugs (DMARDs) only, or both OCSs and DMARDs in the 16 weeks before delivery, or as unexposed to these medications throughout pregnancy. We estimated relative risks (RR) and 95% confidence intervals for preterm birth using modified Poisson regression. The risk for preterm birth was 11.2% among unexposed women. Compared to unexposed women, the unadjusted RR for preterm birth among women exposed to OCSs was 1.7 (0.8-3.6), and 1.1 (0.6-1.9) for DMARD and 2.2 (1.3-4.0) for OCS and DMARD exposure. After adjusting for potential confounders including maternal age, race/ethnicity, body mass index, twin pregnancy, parity, prior preterm birth, comorbidities, smoking, and alcohol use, the RRs were attenuated to 1.3 (0.6-2.8) for OCSs, 1.0 (0.6-1.9) for DMARDs, and 1.8 (0.9-3.3) for DMARDs and OCSs. The increased risk for preterm birth among women with autoimmune disease who use OCSs is partially explained by confounding. These associations may be attenuated further after adjusting for disease severity/activity, and preterm birth subtypes should be considered in future investigations.

A12

PREGNANCY INTENDEDNESS AND TIMING: IS THERE AN ASSOCIATION WITH MATERNAL BEHAVIORS AND PREGNANCY OUTCOMES? Wright, CE* and Kernic, MA (University of Washington, WA)

Prior analyses of data from the National Survey of Family Growth (NSFG) found an association between pregnancy intendedness and the extent of pregnancy mistiming with selected birth outcomes and maternal behaviors; however, these analyses did not adjust for potentially confounding maternal demographic characteristics. We sought to examine whether an association between pregnancy intendeness/timing, pregnancy outcomes and maternal behaviors persists after adjustment for maternal characteristics. A subsample of singleton live births (n=12,466) was selected from the 2006-2010 NSFG. Pregnancies were divided into four intendedness categories: wanted, moderately (<= 24 months) mistimed, seriously (>24 months) mistimed, and unwanted. Logistic regression was used to assess the association between pregnancy intendedness, birth outcomes (preterm birth, low birthweight), and maternal behaviors (any breastfeeding, initiation of prenatal care at or before 8 weeks' gestation). Analyses were adjusted for maternal age, education, race/ethnicity, marital status, and income as a percentage of poverty. After adjustment for maternal characteristics, neither low birthweight nor preterm birth demonstrated an association with category of pregnancy intendedness. An association between unwanted pregnancy and lower breastfeeding rates persisted after adjustment for confounders, however, as did associations between lower rates of early prenatal care with moderately mistimed, seriously mistimed, and unwanted pregnancy (all $p<0.05$). We conclude that associations between pregnancy intendedness and birth outcomes in NSFG data appear to be largely explained by differences in maternal characteristics across categories of pregnancy intendedness. In contrast, pregnancy intendedness appears to have an association with breastfeeding and early initiation of prenatal care that is independent of maternal characteristics.

A13

MATERNAL FOLIC ACID AND MULTIVITAMIN SUPPLEMENTATION AND OFFSPRING RISK OF FACIAL CLEFTS: A POPULATION-BASED STUDY. T Gildestad* (University of Bergen, Norway), T Bjørge, RM Nilsen, RT Lie, SE Vollset, N Øyen

In Norway, the prevalence of facial clefts is about 2.2 per 1000 live and stillbirth after 16 weeks of gestation, which is one of the highest prevalence levels in Europe. We investigated the association between maternal folic acid and multivitamin supplementation and the risk of facial clefts in all live births and stillbirths in Norway. Among 713,502 live births and stillbirths recorded in the population-based Medical Birth Registry of Norway during 1999-2010, 1,327 infants were affected by facial clefts. 468 infants were born with cleft palate without cleft lip and 859 infants with cleft lip with or without cleft palate. Odds ratios adjusted for parental educational level, parental age, marital status, parity, and family income were calculated by logistic regression models. Folic acid or multivitamin supplement use both before and during pregnancy was reported for 16.0% and 11.2% of the women, respectively. Supplement use was generally more frequent among women with a higher educational level, older age, lower parity, who were married or cohabiting, and women who did not smoke at the time of pregnancy. Folic acid supplements both before and during pregnancy was associated with reduced risk of cleft lip with or without cleft palate (adjusted odds ratio 0.88, 95% confidence interval: 0.72, 1.08). For multivitamin supplement use, the association was somewhat stronger (adjusted odds ratio 0.76, 95% confidence interval: 0.60, 0.97). For cleft palate alone, the adjusted odds ratio was 0.88 (95% confidence interval: 0.67, 1.15) for folic acid, and 0.89 (95% confidence interval: 0.66, 1.20) for multivitamins.

A14

**FOLID ACID SUPPLEMENTATION AND RISK OF CONGENITAL HEART
DEFECTS**. Leirgul E*, Gildestad T, Fomina T, Brodwall K, Greve G, Vollset SE, Nilsen RM,
Tell GS, Øyen N (Department of Global Public Health and Primary Care, University of Bergen,
Bergen, Norway)

Background Studies from Canada and Europe have shown a decreasing birth prevalence of
congenital heart defects (CHD), which have partly been explained by folic acid food fortification
and periconceptional folic acid supplements. The aim of this study was to investigate the
association between folic acid supplements and the risk of CHD. Methods CHD diagnoses
among live births and stillbirths in Norway, 1999-2009, were ascertained from national health
registries and clinical databases. Information on periconceptional vitamin supplements was
retrieved from the Medical Birth Registry of Norway. In the analyses, we excluded multiple
births, births with chromosomal disorders or extracardial defects, from in vitro fertilization, and
with maternal CHD, epilepsy, or diabetes. Logistic regression was used to estimate odds ratios
(OR) with 95% confidence intervals (CI). Analyses were adjusted for year of birth, maternal age,
and family income. Results Among 575,555 births, 5,379 were identified with CHD. In 15.6%,
folic acid supplements had been used before pregnancy; in 26.7% during pregnancy only.
Multivitamins only were used in 7.1%. In 50.6%, no supplement had been used. Prevalences of
CHD, and specifically conotruncal defects were not different among exposed or non-exposed for
supplement use, except for an increased risk of septal defects in children whose mothers had
taken folic acid supplements before and/or during pregnancy (OR 1.13, CI 1.05-1.22, p=0.001)
Conclusions Periconceptional folic acid supplements are not associated with a reduced risk of
congenital heart defects in the newborn; however, the unexpected association with an increased
risk of septal defects warrants further investigation.

A15

PARITY AND MATERNAL AGE MODIFY THE EFFECT OF LIPID-BASED NUTRIENT SUPPLEMENTS (LNS) ON MATERNAL ANTHROPOMETRIC INDICATORS IN LATE PREGNANCY AMONG RURAL BANGLADESHI WOMEN.
Susana L. Matias* (University of California, Davis, CA), Camila M. Chaparro, Malay K. Mridha, Stephen A. Vosti, Kassandra Harding, Rina R. Paul, Sohrab Hussain, Louise T. Day, Stacy L. Saha, Kathryn G. Dewey

Maternal undernutrition and low birth weight are prevalent in Bangladesh. In the Rang-Din Nutrition Study, a cluster-randomized effectiveness trial ongoing in Bangladesh, pregnant women received either iron & folic acid (IFA) or lipid-based nutrient supplement (LNS, 20 g/d, 118 kcal). Women (n=4011) were enrolled at 13.1 ± 3.4 wk gestation, were 22.0 ± 5.0 y old and had 6.7 ± 2.8 y of education; 40% were nulliparous, and 30% were underweight (body mass index < 18.5 kg/m2). At 36 wk gestation, women attended a follow up examination at local antenatal clinics (n=2937), where their weight and mid-upper arm circumference (MUAC) were measured. We conducted cluster-adjusted data analyses, following a pre-defined statistical analysis plan, and found no significant differences by treatment group in these outcomes in the full sample. However, among women > 25 y, MUAC was higher in the LNS vs. the IFA group (Mean [95% CI]: 24.9 [24.7-25.1] vs. 24.5 [24.4-24.7] cm, p=0.0007; respectively), whereas there was no difference in the younger age subgroups (p=0.81-0.95). Among multiparous women > 25 y, those in the LNS group gained more weight per week than their counterparts in the IFA group (Mean [95% CI]: 0.63 [0.59-0.67] vs. 0.56 [0.54-0.59] lb, p=0.0094; respectively), whereas no differences were seen in the other parity/age subgroups (p=0.16-0.78). In rural Bangladesh, LNS increased maternal MUAC and weight gain per week during pregnancy among women > 25 y, although the latter was evident only among multiparous women. Future analyses will determine the association between these and birth outcomes.

A16

DETERMINANTS OF SELF-REPORTED FREQUENCY OF SEXUAL INTERCOURSE IN WOMEN. Lynch CD*, Boothman EL, and Prasad MR Division of Maternal Fetal Medicine, Department of Obstetrics & Gynecology, The Ohio State University College of Medicine

We examined the determinants of coital frequency using data from a cross-sectional study of a sample of gravidas seen in our obstetrics clinics from July 2012 to March 2013. Women ages 18-44 and their partners completed brief questionnaires about their lifestyle, health, and reproductive history. Logistic regression was used to estimate the adjusted odds of having fertility-focused intercourse, which was defined as reporting having intercourse daily, several times a week, or several times a month with timing in mind. Among the 128 women included in the study, 55.1% were white, 35.4% were black, and 12 (9.5%) were of other races (mostly Asian). The median age was 28 (range = 18-40). Among these women, 82.4% indicated that their pregnancy was planned. When women were asked how often they were having sex with their partner when they got pregnant, 18.7% responded daily, 42.2% said several times per week, 21.1% replied several times a month with no particular attention to timing, 14.1% said several times a month with timing in mind, and 3.9% said rarely. While black women reported daily intercourse more frequently than white and other women (33.3% vs 11.4% and 8.3%, p<0.01), we found no statistically significant differences in the odds of fertility focused intercourse by race, prepregnancy body mass index, marital status, smoking status, educational attainment or pregnancy planning status. Given that all women in this study were pregnant when completing the questionnaire, the frequency of sexual intercourse that we report likely over-represents the frequency in the general population.

A17

PRECONCEPTION LOW DOSE ASPIRIN AND ADVERSE EVENTS: FINDINGS FROM THE EAGER (EFFECTS OF ASPIRIN IN GESTATION AND REPRODUCTION) RANDOMIZED TRIAL. Ahrens KA*, Silver RM, Perkins NJ, Galai N, Lesher LL, Faraggi D, Wactawski-Wende J, Townsend JM, Lynch AM, Mumford SL, Schisterman EF (Division of Intramural Population Health Research, NICHD, NIH, Bethesda, MD).

Our objective was to evaluate adverse events associated with low dose aspirin (LDA) initiated prior to conception. Secondary analysis of the EAGeR trial, a multi-center, block-randomized, double-blind, placebo-controlled trial of 1228 US women conducted in 2006-2012. Women 18-40 years old with a history of 1-2 pregnancy losses trying to conceive were eligible. Participants were randomized by study center and eligibility stratum to either daily LDA (81 mg, n=615) or placebo (n=613) and were followed for ≤6 menstrual cycles or through gestation if they became pregnant. Urgent care visits and possible aspirin-related symptoms were assessed at each study follow-up using a standardized interview. In addition, all adverse events were captured prospectively using case report forms. Approximately 76% (n=903) of randomized participants reported at least one symptom during follow-up, with gastrointestinal discomfort (62%, n=755) and unusual bleeding (33%, n=410) most commonly reported. For each of the assessed symptoms, the proportion of women with ≥1 report was similar between treatment arms (all P≥.13), as was the proportion with ≥1 urgent care visit (P=.41). A total of 378 adverse events were reported by 240 women; adverse events were similar by treatment arm (all P≥.21), except for bleeding (LDA 5.7% vs. placebo 2.0%, P<.01). Preconception LDA was not significantly associated with systematically assessed possible aspirin-related symptoms. Aspirin was associated with an increased risk of reported bleeding; however, pregnancy losses between treatment arms did not differ (P=.78). Although rare but serious adverse events cannot be excluded, preconception LDA is well-tolerated in most pregnancies.

A18

IS THE RECURRENCE RISK OF GESTATIONAL DIABETES MODIFIABLE BY THE TRIMESTER AT WHICH PRENATAL CARE STARTED? Darios Getahun, Morgan Peltier, Tefera Gemzu, Vicki Chiu, Michael J. Fassett

Objective: Gestational diabetes (GDM) often recurs in future pregnancies. Whether this recurrence risk varies by the trimester in which prenatal care started is unclear. This is important because, unlike race/ethnicity and age, timing of prenatal care is potentially modifiable. Therefore, we examined how the recurrence risk of GDM on successive pregnancies may differ by the timing of prenatal care initiation. Study Design: We conducted a retrospective cohort study of 1st two (n=95,749) and 1st three (n=21,193) consecutive singleton pregnancies using the 1991-2012 Kaiser Permanente Southern California longitudinally-linked Perinatal Services System, Hospital Inpatient and outpatient encounter records. ICD-9 codes 648.8 identified GDM. Adjusted odds ratios (ORs) were used to estimate the magnitude of association. Results: Overall incidence of GDM was 7.9%. A second pregnancy following a first pregnancy complicated by GDM was at 17.2-fold increased risk of GDM (95% confidence interval [CI] 16.2-18.1). Compared with women whose 1st two successive pregnancies were not complicated by GDM, the recurrence risk for those women initiated care in their first, second, and third trimester of 2nd pregnancy were 17.0 (95% CI 16.1-18.0), 18.5 (95% CI 14.9-23.0), and 26.0 (95% CI 14.5-46.8), respectively. Two pregnancies with GDM were associated with 51.4-fold increased risk of recurrence in the 3rd pregnancy when care began in the first trimester. Risk is even higher when care is delayed to the second (OR 68.0, 95% CI 31.1-148.6) and third (OR 75.6, 95% CI 21.2-270.6) trimester. Conclusion: Our results suggest that the recurrence risk of GDM is modified by the trimester at which prenatal care started. This suggests that interventions to modify patient behaviors early in pregnancy may greatly reduce the risk of GDM.

A19

EFFECTS OF SMOKING AND PREECLAMPSIA ON BIRTH WEIGHT FOR GESTATIONAL AGE. Spracklen CN, MS*, Ryckman KK, PhD, Harland KK, MPH, PhD, Saftlas AF, MPH, PhD (University of Iowa College of Public Health, Iowa City, IA, USA)

An increasing amount of epidemiological evidence suggests that women who smoke during pregnancy and subsequently develop preeclampsia have poorer outcomes than nonsmoking women who develop preeclampsia. In the present study, we examine the combined effects of smoking and preeclampsia on birth weight and conducted a z-score analysis in a population-based, case-control study population in Iowa. Nulliparous women were sampled from birth records, interviewed by telephone, and underwent rigorous medical chart reviews to verify diagnoses of preeclampsia (n=238), gestational hypertension (n=219), and normal blood pressure (n=342) during pregnancy. Birth weight and gestational age were obtained from obstetric records; smoking data were self-reported by month of pregnancy. Fetal growth was assessed as z-score of birth weight for gestational age (BWGA) using United States birth data as the population reference. Multivariate linear regression analysis was used to examine the association of maternal smoking and preeclampsia with BWGA z-score. Our results showed that the mean BWGA z-scores for non-smoking and smoking preeclamptic women were -0.12 (95% CI -0.24-0.00) and -0.63 (-1.02, -0.23), respectively. BWGA z-scores were significantly lower among preeclamptics and women who smoked any time during pregnancy ($\beta=-0.33$, $p=<0.0001$ and $\beta=-0.25$, $p=0.05$) compared to normotensive and non-smoking women, respectively. Babies born to gestational hypertensives were comparable in size to babies of normotensive women ($\beta=0.08$, $p=0.31$). There was no interaction between smoking with preeclampsia or gestational hypertension on fetal growth. Our findings indicate that smoking during pregnancy and preeclampsia have independent effects on BWGA z-score; however, we did not find a multiplicative interactive effect.

A20

PARENTAL DEPRESSION AND HYPERTENSIVE DISORDERS OF PREGNANCY.
Männistö TI*, Kajantie E, Kaaja R, Eriksson J, Laivuori H, Gissler M, Pouta A, Vääräsmäki M (National Institute for Health and Welfare, Oulu, Finland)

Background: Maternal depression may increase risk of preeclampsia, but if paternal depression or depression in both parents increases this risk is unknown. Methods: The FinnGeDi study included all singleton births without maternal unspecified or pre-existing hypertension but with known father during 2009 in Finland (N=56,449). Maternal diagnoses of gestational hypertension (N=1908; 3.4%), preeclampsia (N=1,480; 2.6%), superimposed preeclampsia (N=247; 0.4%), and eclampsia (N=36, 0.1%) were collected from Medical Birth Registry and Hospital Discharge Registry (including all recorded diagnoses of hospital in- and outpatient visits). Parental depression data were obtained from Hospital Discharge Registry. Multinomial logistic regression estimated the odds ratios (ORs) and 95% confidence intervals (95%CIs) of hypertensive disorders associated with parental depression, adjusting for maternal age, socioeconomic and marital status. Odds of eclampsia were separately estimated due to small numbers. Sensitivity analyses were done restricting data to non-smoking, normal weight mothers. Results: Maternal depression (N=3,359; 6.0%) and paternal depression (N=1,146; 2.0%) increased odds of preeclampsia (OR=1.24, 95%CI=1.01-1.51 and OR=1.40, 95%CI=1.03-1.92 for maternal and paternal depression, respectively). Maternal depression also increased odds of eclampsia (OR=2.91, 95%CI=1.19-7.09). Maternal depression associated with non-significant odds of gestational hypertension (OR=1.20, 95%CI=1.00-1.44), and paternal depression associated non-significantly with superimposed preeclampsia (OR=1.94, 95%CI=0.99-3.80). Depression in both parents was rare (N=258, 0.5%) and did not associate with odds of hypertensive disorders of pregnancy. All results were similar among non-smoking, normal weight mothers. Conclusions: Depression in mothers and fathers was associated with increased risk of preeclampsia and might also increase risk of other hypertensive disorders of pregnancy.

A21

DIFFERENTIAL CHANGES IN CIRCULATING LONG CHAIN POLYUNSATURATED FATTY ACIDS IN THE 3RD TRIMESTER OF PREGNANCY IN GESTATIONAL DIABETIC VERSUS NON-DIABETIC WOMEN. Zhao JP*, Levy E, Shatenstein B, Julien P, Fraser WD, Nuyt AM, Luo ZC Sainte-Justine University Hospital Reserch Center, Montreal, QC, Canada

Background: In normal pregnancy, absolute circulating concentrations of long-chain polyunsaturated fatty acids (LC-PUFA) plasma phospholipids especially docosahexaenoic acid (DHA, 22:6n-3) rise, whereas relative concentrations (as % of total fatty acids) of DHA decline during pregnancy. It is unknown whether there are differential changes in the plasma LCPUFA profile in gestational diabetic vs. non-diabetic women. Objective: To assess changes in circulating levels of LC-PUFAs in the third trimester of pregnancy in gestational diabetic vs. non-diabetic women. Design: In a prospective singleton pregnancy cohort, plasma fatty acids were measured twice during pregnancy (24-28 and 32-35 weeks) in 24 gestational diabetic and 116 non-diabetic women. Usual dietary nutrient intakes were estimated by a validated, semi-quantitative food frequency questionnaire at 24-28 weeks of gestation. Results: Absolute plasma concentrations (μmol/L) rose by 8.1% for DHA and 12.8% for 22:4n-6 between 24-28 and 32-35 weeks gestation (all $p<0.01$) in non-diabetic women, whereas there were no significant changes in gestational diabetic women. Absolute concentrations of 22:5n-3 declined by 14.5% ($P = 0.04$) in gestational diabetic women, whereas there was no significant change in non-diabetic women. Relative plasma concentrations of DHA declined in both gestational diabetic and non-diabetic women. Dietary intakes of LCPUFA, DHA and other fatty acids were comparable between the two groups ($P > 0.3$). Conclusions: Gestational diabetes is associated with altered circulating LC-PUFAs profile in the third trimester of pregnancy. The normal increase in absolute DHA concentrations is compromised in gestational diabetes, suggesting impaired DHA mobilization or synthesis.

A22

HYPERTENSIVE DISORDERS IN PREGNANCY AND CARDIOVASCULAR RISK FACTOR DEVELOPMENT. Stuart JJ*, James-Todd TM, Missmer SA, Rimm EB, Spiegelman D, Lividoti Hibert EN, Rich-Edwards JW (Harvard School of Public Health, Boston, MA)

Background: To identify potential targets for cardiovascular screening among women with a history of gestational hypertension (GHTN) or preeclampsia, we examined the association between hypertensive disorders in pregnancy (HDP) and post-pregnancy risk factor development in the Nurses' Health Study II (NHSII) cohort. Methods: Parous NHSII participants free of cardiovascular disease and risk factors of interest at baseline, based on 1989 questionnaire, comprised the study sample (n=61,254). Lifetime pregnancy experience was retrospectively reported in 2009 and used to assign and date HDP. Women were followed for self-reported physician-diagnosed hypertension (HTN), type 2 diabetes (T2DM), and hypercholesterolemia from first birth (regardless of HDP) through 2009. We used Cox proportional hazards models to estimate hazard ratios (HR) and 95% confidence intervals (CI), adjusting for age, race/ethnicity, family history, parental education, and pre-pregnancy smoking, physical activity, and body mass index. Results: Relative to women with a normotensive first birth, those with a history of preeclampsia (7.3%) or GHTN (4.3%) had an increased risk of hypertension (HR=1.9,CI:1.8-2.0;HR=2.3,CI:2.2-2.4), T2DM (HR=1.9,CI:1.7-2.1;HR=1.9,CI:1.7-2.2), and hypercholesterolemia (HR=1.2,CI:1.1-1.3;HR=1.3,CI:1.2-1.4), respectively. This increased relative risk of HTN was strongest within the 5 years following first birth—preeclamptics had a 5.1-fold increased risk (CI:4.2-6.3) while women with GHTN had a 7.0-fold increased risk (CI:5.5-8.8). Over 42 years of maximum follow-up, there were 146/1000 excess cases of HTN among preeclamptics and 209/1000 among women with GHTN. Conclusion: Women with HDP have an increased risk for HTN, T2DM, and hypercholesterolemia that persists for several decades. These women may benefit from lifestyle intervention to reduce cardiovascular risk.

A23

A PREGNANCY AND POSTPARTUM LIFESTYLE INTERVENTION IN WOMEN WITH GESTATIONAL DIABETES IMPROVES FASTING GLUCOSE LEVELS. Ehrlich SF*, Hedderson MM, Feng J, Crites Y, Quesenberry CP, Ferrara A.(Kaiser Permanente Northern California, Oakland)

Lifestyle intervention initiated shortly after the diagnosis of gestational diabetes (GDM) and continued postpartum may improve glucose metabolism. The DEBI (Diet Exercise and Breastfeeding Intervention) randomized trial tested a lifestyle intervention for weight management for women with GDM against usual care within Kaiser Permanente Northern California (n= 96 women randomized to the intervention, n= 101 to usual care). The intervention started in pregnancy, with the aim of reducing excessive pregnancy weight gain, and continued postpartum, promoting weight loss through the reduction of dietary fat, increasing physical activity and breastfeeding. To estimate the intervention's effect on fasting plasma glucose (FPG; mg/dl) levels postpartum, analyses were conducted among 81 women in the intervention (84%) and 90 in usual care (89%) with data on FPG at baseline (pregnancy) and at 6 weeks and 12 months postpartum. A linear mixed effects model adjusted for pregnancy FPG, age and race-ethnicity estimated the condition difference in the mean change in FPG from pregnancy to 6 weeks and 12 months postpartum. No condition difference was detected at 6 weeks postpartum [condition difference (95% CI) in mean change in FPG: 1.0 (-1.7, 3.7), P= 0.47]. At 12 months postpartum, the intervention was significantly associated with an attenuated increase in FPG as compared to usual care [condition difference (95% CI) in mean change in FPG: -3.8 (-7.1, -0.4), P= 0.03]. These findings suggest that a lifestyle intervention promoting prenatal and postpartum weight management improves late postpartum glycaemia and may reduce the risk of diabetes in this high risk population.

A24

A PROSPECTIVE STUDY OF VITAMIN D AND GESTATIONAL DIABETES MELLITUS IN ETHNICALLY DIVERSE WOMEN. Nobles C*, Markenson G, Chasan-Taber L (UMass Amherst, MA 01003)

Gestational diabetes mellitus (GDM) is a common complication of pregnancy associated with poor maternal and infant outcomes. Low levels of vitamin D (VTD) have been implicated as a potential risk factor for GDM in some observational studies, but not in others. Recent review articles have called for consideration of confounding variables such as race/ethnicity and adiposity. We evaluated the relationship between VTD, GDM, and impaired glucose tolerance (IGT) among a diverse population of 228 high-risk women in the Behaviors Affecting Baby and You (B.A.B.Y.) Study, a randomized trial of exercise and GDM. Serum concentrations of 25-hydroxyvitamin D [25(OH)D] were measured using the DiaSorin Liaison assay at 15.1 ± 4.8 weeks gestation. Almost two-thirds of participants were Hispanic (57.9%) and 61% were obese (BMI$\geq$30 kg/m2). Thirty-one participants (13.6%) were diagnosed with GDM and 13 (5.7%) with IGT. Twenty-one percent of participants were VTD deficient (<20 ng/mL) and 31.1% were insufficient (20-<30 ng/mL). Obese women (β=-3.4, SE=1.62, p=0.04) and Hispanic women (β=-5.3, SE=1.6, p<0.01) had significantly lower mean VTD levels as compared to non-obese and non-Hispanic women respectively. After adjusting for age, pre-pregnancy BMI, ethnicity, gestational age at blood draw, and study arm, VTD deficiency was not significantly associated with GDM (OR=0.40, 95% CI 0.10-1.60) or IGT (OR=1.66, 95% CI 0.32-8.53). Similarly, there were no significant associations between VTD insufficiency and GDM (OR=0.95, 95% CI 0.36-2.48) or IGT (OR=1.01, 95% CI 0.20-5.04). In this high-risk diverse population, we did not observe statistically significant associations between VTD deficiency and insufficiency and risk of glucose abnormalities.

A25

PRECONCEPTION IRON INTAKE AND GESTATIONAL DIABETES MELLITUS.
Anne Marie Darling*(Boston University, Boston, MA), Allen A. Mitchell, (Boston University, Boston, MA), Martha M. Werler(Boston University, Boston, MA)

BACKGROUND: Heme iron intake has consistently been associated with an increased risk for Type 2 diabetes mellitus, but the relationship between iron intake and gestational diabetes mellitus (GDM) has not been investigated thoroughly. Our objective was to assess the impact of preconceptional heme and non-heme iron on GDM in the Boston University Slone Epidemiology Birth Defects Study. METHODS: This retrospective cohort analysis included 7,229 participants enrolled in the BDS between 1998-2008 who gave birth to non-malformed infants and were free of pre-existing diabetes. Information on diet, gestational diabetes diagnoses, and other covariates was collected through structured interviews conducted within 6 months of delivery. Calorie-adjusted and multivariable odds ratios and 95% confidence intervals (95% CIs) were calculated using logistic regression models. RESULTS: After adjustment for confounders, preconceptional dietary heme iron was associated with elevated odds of GDM among those in the highest tertile of intake compared to the lowest tertile [multivariable OR: 1.43; 95% CI 0.96-2.15]. Preconceptional dietary non-heme iron was conversely associated with decreased odds of GDM among those in the highest tertile of intake compared to the lowest [multivariable OR: 0.71; 95% CI 0.47-1.96]. Women who consumed supplemental iron during preconception and pregnancy also had decreased odds of GDM [multivariable OR: 0.77; 95% CI 0.59-1.00]. CONCLUSION: Our data support a positive association between preconceptional heme iron intake and GDM and an inverse association between preconceptional non-heme iron intake from foods and supplements.

A26

PREPREGNANCY PREDICTED VITAMIN D STATUS AND THE RISK OF GESTATIONAL DIABETES MELLITUS: A PROSPECTIVE COHORT STUDY. Bao W*, Song Y, Tobias DK, Hu FB, Olsen SF, Chavarro JE, Zhang C (Epidemiology Branch, Division of Intramural Population Health Research, Eunice Kennedy Shriver National Institute of Child Health and Human Development, National Institutes of Health, Rockville, MD)

Vitamin D insufficiency is common in pregnant women and a large proportion of women have vitamin D insufficiency before becoming pregnant. Although emerging evidence supports a pivotal role of vitamin D in regulating glucose homeostasis, the relation of prepregnancy vitamin D status with gestational diabetes mellitus (GDM) etiology is uncertain. We prospectively examined the association between prepregnancy vitamin D status and risk of GDM in the Nurses' Health Study II cohort (1991-2001), including 15,202 women who were free of prior GDM or prepregnancy chronic disease. To assess prepregnancy vitamin D status, we computed a predicted 25-hydroxyvitamin D (25(OH)D) scores using previously validated regression models that included major determinants of vitamin D status (race/ethnicity, ultraviolet B flux, physical activity, body mass index, vitamin D intake, and alcohol consumption). We estimated relative risks (RRs) and 95% confidence intervals (CIs) using log-binomial models with generalized estimating equations. During 10 years of follow-up, we documented 861 incident GDM cases among 21,323 singleton pregnancies. After adjusting for age, parity, family history of diabetes, smoking, alternative healthy eating index, and waist circumference, the RRs (95% CIs) across increasing quartile of prepregnancy predicted 25(OH)D score was 0.92 (0.71-1.19), 0.58 (0.43-0.79), 0.57 (0.41-0.80) (P for linear trend < 0.001). The significant association of predicted 25(OH)D score with risk of GDM was not modified by other risk factors of GDM, such as age, parity, and family history of diabetes. In conclusion, prepregnancy predicted vitamin D status was inversely and strongly associated with the risk of incident GDM.

A27

A PROSPECTIVE COHORT STUDY OF PREPREGNANCY POTATO CONSUMPTION AND THE RISK OF GESTATIONAL DIABETES: POTATOES, FRIEND OR FOE? Bao W*, Tobias DK, Hu FB, Zhang C (Epidemiology Branch, Division of Intramural Population Health Research, Eunice Kennedy Shriver National Institute of Child Health and Human Development, National Institutes of Health, Rockville, MD)

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

A28

MATERNAL FOLATE STATUS AND RISK OF PREECLAMPSIA. SQ Wei* (University of Montreal), AM Nuyt, ZC Luo, F Audibert, P Julien,WD Fraser

Background Low folate levels are associated with birth defects, including neural tube defects. Conversely, high folate concentrations may be associated with adverse outcomes, including increased risk of cancer. Whether folate status in pregnancy affects the risk of preeclampsia (PE) remains controversial. Objective To evaluate plasma folate levels at early and late second trimester and the risk of PE. Method This was a prospective cohort study from 17 urban obstetric hospitals in Canada. Pregnant women who were participants in a trial of vitamin C and E supplementation for the prevention of PE (INTAPP). Canadian participants who consented to participate in a biobank with plasma specimens available at the baseline visit were included (n=697). Maternal plasma folate levels were measured at 12-18 and 24-26 weeks of gestation by electrochemiluminescence method on Elecsys-2010 system. Results More than 96% of the participants took folic acid or multivitamins at 12-18 weeks gestation, 35% showed high folate concentrations ($\geq$45.4 nmol/l, maximal detectable level). Median maternal folate concentrations at 12-18 weeks were significantly higher in patients who subsequently developed PE compared with those who did not [median (inter-quartile range): 45.4 (33.45-5.40) versus 35.9 (28.9-45.4) nmol/l, $P = 0.02$]. After adjusting potential confounding factors, pregnant women whose folate level >75 percentile at 12-18 weeks gestation experienced a 2-fold increased risk of PE (aOR 2.25, 95% confidence interval 1.00-5.04), while the association was not statistically significant for maternal 25(OH)D level at 24-26 weeks of gestation. High folate concentrations are evident in pregnant women in this Canadian cohort. High maternal plasma folate levels in early pregnancy are associated with an increased risk of PE.

A29

CHANGES IN THE PREVALENCE OF GESTATIONAL DIABETES MELLITUS AND ASSOCIATED MATERNAL AND NEONATAL OUTCOMES AFTER ADOPTION OF NEW INTERNATIONAL DIAGNOSTIC CRITERIA: A POPULATION-BASED STUDY.

Kinniburgh BA*, Hutcheon JA, Joseph KS, Lee L (Perinatal Services BC, Vancouver, BC)

In October 2010, British Columbia adopted the International Association of Diabetes and Pregnancy Study Group (IADPSG) criteria for diagnosing gestational diabetes (GDM). We carried out a population-based study to assess whether outcomes among GDM-affected pregnancies changed after the IADPSG criteria were adopted. We hypothesized that the less stringent IADPSG diagnostic criteria would increase the prevalence of GDM, but that morbidity may be lower as women with milder disease would be identified. Our population was drawn from the BC Perinatal Data Registry. Deliveries discharged between 4/1/2008-3/31/2010 formed the baseline epoch; deliveries from 4/1/2011-3/31/2013 formed the comparison epoch. We restricted our analyses to singleton deliveries to residents of BC at or beyond 20 weeks' gestation without pre-existing diabetes mellitus (n=170,800). Chi-Square tests and logistic regression were used to assess the change across epochs. The prevalence of GDM increased significantly from 8.2% in 2008-2010 to 10.3% in 2011-2013 (odds ratio 1.29, 95% CI 1.24-1.34, $p<0.0001$); adjustment for changes in age, parity, and pre-pregnancy BMI did not alter these results. The rate of spontaneous preterm delivery (5.15% to 6.36%, odds ratio 1.25, 95% CI 1.06-1.47, $p=0.007$) and exclusive breastfeeding (51.5% to 55.4%, odds ratio 1.17, 95% CI 1.08-1.26, $p<0.0001$) increased significantly among GDM-affected pregnancies. There were no significant changes in the rates of induction, cesarean delivery, iatrogenic preterm delivery, macrosomia, large for gestational age, stillbirth, birth injury, or neonatal hypoglycemia. New diagnostic criteria produced a significant increase in the GDM prevalence, but few changes in maternal or neonatal outcomes were observed.

A30

SEVERE MATERNAL MORBIDITY ASSOCIATED WITH EARLY- AND LATE-ONSET PREECLAMPSIA. Lisonkova S*, Sabr Y, Mayer C, Joseph KS (University of British Columbia, British Columbia, Canada)

BACKGROUND: Preeclampsia has been increasingly recognised as two different conditions: early- and late-onset disease (onset at <34 vs >=34 weeks gestation). OBJECTIVE: To examine severe maternal morbidity following early- vs late-onset preeclampsia. STUDY DESIGN: The study included all singleton deliveries in Washington state, USA, 2000-2008 (N=670120). Preeclampsia onset was determined from hospital records linked to birth certificates. Logistic regression was used to obtain adjusted odds ratios (AOR) and 95% confidence intervals (95% CI). RESULTS: The preeclampsia rate was 3.02%; rates of early- and late-onset disease were 0.35% and 2.72%, respectively. Women with early- vs late-onset preeclampsia had higher rates of maternal death (4.2 vs 1.1 per 10,000 deliveries, respectively). The rate of maternal morbidity (excluding obstetric trauma) was 14.8 per 100 deliveries in the early-onset group (AOR 2.22, 95% CI 1.96-2.51), 11.7 per 100 deliveries in the late-onset group (AOR 1.80, 95% CI 1.71-1.89) and approximately 6 per 100 deliveries in women without preeclampsia. Women with early-onset preeclampsia had higher rates of cardiomyopathy (AOR 15.0, 95% CI 3.52-63.7), acute renal failure (AOR 32.1 95% CI 15.8-64.9), acute hepatic failure (AOR 7.03, 95% CI 3.73-13.2) and other morbidity. Rates of blood transfusion were significantly increased among women with early-onset preeclampsia (AOR 9.33, 95% CI 7.51-11.5) and also those with late-onset disease (AOR 4.21, 95% CI 3.72-4.76). CONCLUSION: Preeclampsia substantially increases rates of cardiovascular, respiratory, central nervous system, renal, hepatic, and other maternal morbidity, and women with early- onset disease have significantly higher rates of specific maternal morbidity.

A31

PREECLAMPSIA RISK IN ASSOCIATION WITH MATERNAL ANTIOXIDANT LEVELS IN MID-PREGNANCY. Cohen JM*, Kramer MS, Platt RP, Basso O, Kahn SR (McGill University, Montreal, Canada)

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

A32

SIMULATED APPLICATION OF A PREDICTION MODEL TO GUIDE INTERVENTION FOR GESTATIONAL HYPERTENSION AND MILD PREECLAMPSIA AT TERM. Thomas Bernardes* (University of Groningen, NL); Karin van der Tuuk (University of Groningen, NL); Paul P. van den Berg (University of Groningen, NL); M.G. van Pampus (University of Groningen, NL); Ben W. Mol(University of Amsterdam, NL); Ronald P. Stolk (University of Groningen, NL); Henk Groen (University of Groningen, NL).

• Objective: The HYPITAT trial showed that induction of labor (IL) prevented complications compared to expectant management (EM) in women with gestational hypertension (GH) or mild preeclampsia (PE) at term. However, IL may not always be the optimal treatment. To guide interventions in these women we constructed a prediction model for maternal morbidity and simulated its application. • Methods: The prediction model was developed with data from the HYPITAT trial, in which 756 women with a singleton pregnancy at 36–41 weeks, and GH or PE were allocated to IL (n=377) or EM (n=379). Model-based treatment recommendation was determined for various cut-off values of the predicted probability for severe maternal morbidity. Impact was evaluated by comparing maternal morbidity rates when the model suggestion coincided with the actual conduct to when it did not. • Results: Model AUC was 0.71 (95% CI:0.69-0.73) and 0.69 (95% CI:0.67-0.71) after bootstrapping. For the evaluation of the consequences of the model application we used a conservative cut-off of 13.5% (97.5% sensitivity, 12.9% specificity) for the probability of severe morbidity. When the model recommendation coincided with the clinical conduct maternal morbidity occurred in 25% of cases and in 34.6% when it did not (difference 9.6%;95% CI:4.2%-15.0%). The IL morbidity rate was 23.3% (difference 1.7%;95% CI:-4.1%-7.5%). • Conclusion: Our results suggest that our prediction model can help guide treatment. For women with a low risk of severe morbidity expectant management may be conducted without increase of severe maternal morbidity rates when compared to induction of labor.

A33

HOSPITAL DIFFERENCES IN SPECIAL CARE NURSERY UTILIZATION FOR NEWBORNS OF MOTHERS WITH GESTATIONAL DIABETES. Danilack VA*, Muri JH, Savitz DA, Caldwell DL, Wood CL (National Perinatal Information Center / Quality Analytic Services, Providence, RI)

While newborns of mothers with gestational diabetes (GDM) are at increased risk for complications, healthy newborns sometimes receive increased surveillance that may not be necessary. This often includes intensive and/or intermediate neonatal care, collectively referred to as special care nursery (SCN) use. We studied the relationship between hospital characteristics and SCN use among GDM deliveries at 44 United States member hospitals of the National Perinatal Information Center, from 2007-2011. To study healthy newborns with presumed discretion in SCN use, we restricted the sample to 43,444 singleton newborns of mothers with GDM, who had AP-DRG severity subclass 1 (minor complications) or 2 (moderate complications), and were not preterm or low birthweight. Among eligible newborns, 6% received special care during the newborn hospitalization. Adjusting for other hospital characteristics, SCN use was highest in the Midwest and lowest in the South, and was related to smaller hospital size, with adjusted odds ratios for SCN use (aOR) 1.2 to 1.5 for the three smallest hospital size categories compared to the largest. SCN use was also more common at academic teaching hospitals (aOR 1.3) and hospitals with large Medicaid populations (aOR 1.4). However, after incorporating a random effects measure for hospital, aORs were attenuated for all covariates. Unexplained hospital-level variation in SCN use of healthy newborns of mothers with GDM suggests hospitals may be spending more resources than necessary to care for these newborns and that more research is needed to understand the reasons for the variation in care between hospitals.

A34

A SYSTEMATIC REVIEW OF ANTIOXIDANT LEVELS ACROSS PREGNANCY AND RISKS OF PREECLAMPSIA AND OF SMALL FOR GESTATIONAL AGE BIRTH.

Cohen JM*, Beddaoui M, Kramer MS, Platt RW, Basso O, Kahn SR (McGill University, Montreal, Canada)

Background: Antioxidant levels may be risk factors for preeclampsia (PE) and small for gestational age (SGA) birth. Studies have reported that oxidative stress markers are higher in women with preeclampsia and with recent SGA birth. Oxidative stress may result from inadequate supply of antioxidant defenses. Objectives: Conduct a systematic review of observational studies to assess associations of maternal plasma antioxidant levels with preeclampsia and SGA birth. Methods: We searched databases from 1970-2013 using terms for exposures (antioxidants, e.g. ascorbic acid, lycopene) and outcomes (preeclampsia, SGA). We excluded studies that did not assess one of these outcomes or did not define the outcome, and those that did not provide gestational age at blood sampling or obtained samples >48 hours after delivery. Results: 1,858 unique records were retrieved through searches of nine databases including PubMed and Embase. After screening titles and abstracts, we retained 132 articles for full-text screen and eligibility assessment. Seven studies were not published in English and will require translation. Among the 125 remaining studies, 65 were selected for inclusion (55 PE, seven SGA, three both). Biomarkers assessed included vitamins A (12 PE, six SGA), C (32 PE, three SGA), E (43 PE, eight SGA), and other carotenoids. Sixty-one studies measured maternal plasma levels in the third trimester, and 15 sampled before the third trimester. Conclusions: A large number of published studies have assessed the associations of antioxidant levels with preeclampsia or SGA birth. Forest plots, funnel plots, meta-analyses, assessment of heterogeneity, and sensitivity analyses will be presented.

A35

INCREASED EFFECTS OF PRE-PREGNANCY DIABETES AND MULTI-FETAL PREGNANCIES ON BIRTH PREVALENCE OF CONGENITAL ANOMALIES FROM 2002-03 THROUGH 2010-11. S Liu*, G Ray, J Rouleau, JA Leon, KS Joseph, Sauve R (Public Health Agency of Canada, Ottawa, ON)

Objective: To examine the impact of pre-pregnancy diabetes mellitus (DM) and multi-fetal pregnancies on the population prevalence of congenital anomalies (CA) in Canada. Methods: We completed a population-based study of all liveborn infants weighing ≥ 500 grams and/or at a gestational age ≥ 22 weeks, and who delivered in a Canadian hospital between 2002 and 2011. Pre-pregnancy DM was defined by ICD-10 diagnosis codes captured in the Canadian Institute for Health Information Discharge Abstract Database. The primary outcomes - total congenital anomalies and congenital heart defects were expressed as a population attributable risk percent (PAR%). Results: 107,246 infants were diagnosed with any CA at birth (41.9 per 1000). The overall PAR% for any CA was 0.8% for DM and 1.0% for a multi-fetal pregnancy. The birth prevalence of all CAs declined from 48.8 in 2002-2003 to 41.7 per 1000 in 2010-2011, while the corresponding PAR% increased between periods from 0.6% (95% confidence interval CI 0.4 to 0.7) to 1.1% (95% CI 0.9 to 1.3) for DM, and from 0.7% (95% CI 0.5 to 0.9) to 1.2% (95% CI 1.0 to 1.4) for multi-fetal pregnancies, respectively. For CAs, the corresponding PAR% increased from 2.3% (95% CI 1.8 to 2.9) to 4.0% (95% CI 3.3 to 4.7) for DM, and from 2.3% (95% CI 1.7 to 3.0) to 2.8% (95% CI 2.2 to 3.5) for multi-fetal pregnancies. Conclusion: Despite a relative decline in the prevalence of CAs in Canada, more CAs appear to be arising from pre-pregnancy DM and multi-fetal pregnancies.

A36

A PROSPECTIVE STUDY OF SERUM CONCENTRATIONS OF RETINOL BINDING PROTEIN 4 AND THE RISK OF GESTATIONAL DIABETES. Cuilin Zhang*, Wei Bao, Pauline Mendola, Edwina Yeung (NICHD, National Institutes of Health, Bethesda, MD)

BACKGROUND Retinol-binding protein 4 (RBP4) may play an important role in the origin of insulin resistance. Few prospective data are available on the association between maternal RBP4 and gestational diabetes (GDM) and available findings are inconsistent. We prospectively investigated the association. METHODS We measured serum RBP4 using longitudinal samples collected during pregnancy among 92 GDM cases and 160 non-GDM controls in the Calcium for Preeclampsia Prevention trial. GDM was determined by two step approach, 50 g glucose challenge test and 100g 3hour oral glucose tolerance test. We estimated odds ratios (OR) and 95% confidence intervals (CI) for the risk of GDM by logistic regression. RESULTS GDM was diagnosed on average at gestational week 29. Mean serum RBP4 at baseline (gestational age on average 15 weeks) was significantly higher among GDM cases compared with controls (25.4.1 vs. 22.1 µg/ml; p-value <0.0001). Higher RBP4 concentrations were related to greater GDM risk, although the association was not linear. After the adjustment for maternal age, race, body mass index, insurance status, gestational week at blood collection, marital status, current smoking, and clinical sites, OR (95% CI) across increasing tertiles of RBP4 concentrations were 1.00 (reference), 3.38 (1.43, 7.96), and 2.64 (1.07-6.49). CONCLUSION: Overall, there is suggestive evidence of a positive association of early pregnancy elevated RBP4 concentration with increased GDM risk.

A37

PLACENTAL WEIGHT AND SMALL FOR GESTATIONAL AGE: A WITHIN-SIBLINGS FIXED-EFFECT VARIANCE COMPONENT ANALYSIS. Miguel Angel Luque-Fernandez*, Cande V. Ananth, Unnur Valdimarsdottir, Anne Eskild, Vincent Jaddoe, Paul Albert, Michael Schomaker, Patrick McElduff, Daniel A. Enquobahrie, Bizu Gelaye, Michelle A. Williams (Department of Epidemiology, Harvard School of Public Health, Boston, MA, 02215)

Background: Large placentas relative to offspring size have been described as an adaptive response to fetal hypoxia in small for gestational age (SGA) infants. We examined the effect of placental ratio (PR), defined as the ratio of birthweight and placental weight, on the risk of SGA after adjusting for measured and unmeasured confounders. Methods: We completed a within-siblings analysis using data from the US National Collaborative Perinatal Project. We controlled for unmeasured confounding due to maternal time-invariant covariates, as each mother serves as her own control. However, because within-siblings comparisons remain susceptible to confounding by unmeasured time-varying covariates, we used directed acyclic graphs to guide our analytical strategy and multiple longitudinal imputation strategies for missing data. We used fixed-effects variance component analyses to estimate the effect of PR on the risk of SGA. Results: 1,803 women enrolled at their first pregnancy that resulted in 3,949 singleton term infants (1,502 two, 259 three and 42 four-siblings). We found that maternal iron deficiency anemia and placental choriodecidual necrosis, both factors leading to uteroplacental hypoxia, were inversely associated with placental weight. Overall, an infant with a PR$\leq$7 had a 50% higher odds (odds ratio 1.50, 95%CI:1.02-2.00) of SGA than their siblings with PR's ranging between 7 and 9. Conclusions: Regardless of maternal genetic and environmental unmeasured time-invariant risk factors and within-siblings measured characteristics, a PR$\leq$7 is associated with a higher risk of SGA infants. The PR, in addition to others ultrasonographic markers, may be used as a sign of adverse intrauterine environment.

A38

BIOLOGICAL DETERMINANTS OF SPONTANEOUS LATE PRETERM AND EARLY TERM BIRTH. HK Brown*, KN Speechley, J Macnab, R Natale, MK Campbell (The University of Western Ontario, London, Canada).

Most studies examining causes of spontaneous preterm birth have focused on very preterm birth (<34 weeks gestation). The aim of this study was to examine the association between biological determinants of preterm birth (infection and inflammation, placental ischemia and other hypoxia, and other biological determinants) and spontaneous late preterm (34-36 weeks) and early term (37-38 weeks) birth. This was a retrospective cohort study. The sample included singleton births, delivered at 34-41 weeks to London-Middlesex (Canada) mothers between 2002 and 2011 (N=17,678). Data were obtained from a city-wide perinatal database. Multivariable multinomial logistic regression was used to determine the association between biological determinants of preterm birth and spontaneous late preterm and early term birth (vs. full term birth). After controlling for covariates, there were associations between infection and inflammation and late preterm birth (adjusted odds ratio [aOR]=2.07, 95% CI 1.65, 2.60); between placental ischemia and other hypoxia and late preterm (aOR=2.21, 95% CI 1.88, 2.61) and early term (aOR=1.25, 95% CI 1.13, 1.39) birth; and between other biological determinants of preterm birth (pre-existing and gestational diabetes, polyhydramnios, oligohydramnios) and late preterm (aOR=3.61, 95% CI 2.77, 4.69) and early term (aOR=2.52, 95% CI 2.12, 3.00) birth. Our findings demonstrate the multifactorial aetiology of spontaneous late preterm and early term birth and, importantly, show that delivery following spontaneous labour even close to full term is often a result of pathological processes. Because these biological determinants of preterm birth contribute to an adverse intrauterine environment, they have important implications for foetal and neonatal health.

A39

BLOOD SPOT ADIPONECTIN AND INFANT BIRTH SIZE. EH Yeung* (Epidemiology Branch, DIPHR, NICHD, NIH, Bethesda, MD), A McLain, N Anderson, D Lawrence, N Boghossian, C Druschel, E Bell

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

A40

LIFETIME BURDEN OF CARDIOVASCULAR HEALTH AND BIRTH OUTCOMES: A VITAL RECORDS LINKAGE ANALYSIS WITH THE BOGALUSA HEART STUDY.
EW Harville,* M Jacobs, M Wallace, W Chen, L Myers (Tulane University, New Orleans, LA)

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

A41

PREGNANCY OUTCOMES MAY BE AFFECTED BY LIFETIME HEALTH. EW Harville,* L Myers, M Jacobs, ME Wallace, W Chen (*Tulane University, New Orleans, LA)

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

A42

A STUDY ON GEOGRAPHICAL DIFFERENCE OF LOW BIRTH WEIGHT RATE IN JAPAN.

Kana Serizawa* (Graduate School of Human Sciences, Waseda University,Saitama) Atsushi Ogihara (Faculty of Human Sciences, Waseda University, Saitama)

The low birth weight (LBW) rate in Japan has been increasing in recent years. LBW is at increased risk of a number of diseases later in life. However, it was not clear why some areas have higher LBW rate and others do not. We therefore conducted geographical and spatial charactaristic distribution of LBW rate in Japan. We picked rate of LBW weighing 2500g or less in 1975, 1992, and 2009 from prefecture index data by Ministry of Health. We first visualised the LBW rate on a map by colouring it, and then we calculated the increasing rate in 1975 and 2009 by prefecture. As a result, it was found that the top five prefectures with high LBW rate in 1975 were Okinawa, Saga, Miyazaki, Kumamoto, and Kochi, in order. They are all in Kyushu/Okinawa region. It was Okinawa, Fukuoka, Shizuoka, Tochigi, and Kagoshima in 1992, and Yamanashi, Okinawa, Shimane, Kagoshima, and Miyazaki in 2009, also in order. Yamanashi had the highest increasing rate of LBW rate (206.58%) from 1975 to 2009, followed by Nagano(193.85%), Shimane(188.83%), Aomori(187.22%), and Tochigi(183.07%). The LBW rate in 1975 was generally higher in the south, and lower in the North. In 1992, it was relatively high in north west mainland Honsyu, and it went back to show higher rate in the south and lower in the north in 2009. One thing that is possibly common among prefectures with higher increasing rate of LBW rate from 1975 to 2009 was rich parental care resources that they have.

A43

THE CONTRIBUTION OF MATERNAL BIRTH COHORT TO TERM SMALL FOR GESTATIONAL AGE IN THE U.S. 1989-2010: AN AGE, PERIOD, AND COHORT ANALYSIS. Claire Margerison-Zilko* (Michigan State University, East Lansing, MI)

Background. After decades of steady increase, mean birthweight in the U.S. declined throughout the 1990s and early 2000s, a trend not fully explained by length of gestation, medical practice, demographics, or maternal behaviors. We hypothesized that secular changes in health or social factors affecting women across their lifecourse may have contributed to this unexplained trend. We examined maternal birth cohort as a proxy measure of lifecourse determinants of fetal growth. Methods. We used the age, period, and cohort (APC) intrinsic estimator (IE) approach to estimate the contribution of maternal birth cohort (independent of maternal age and period of birth) to small for gestational age, overall and among term births, in the U.S. from 1989-2010. We conducted analyses separately among foreign- and U.S.-born Hispanic, non-Hispanic black (NHB), and non-Hispanic white (NHW) mothers. Results. Our data demonstrate a U-shaped relationship between maternal birth cohort and SGA among NHB women only. After accounting for maternal age and period of birth, risk of SGA among NHB women born in 1950 was 21.1%, declining to 15.9% in 1970. However, risk increased among cohorts born after 1970, reaching 19.6 by the 1986 birth cohort. Conclusions. Findings suggest that NHB women born after 1970 have experienced increasing risk of SGA. However, the finding that risk of SGA declined across NHB maternal birth cohorts from 1950-1970 suggests the potential to reverse this trend. These results illustrate the need for more research on health and social factors across the pre-pregnancy lifecourse that may contribute to risk of SGA.

A44

PREDICTORS OF EARLY STUNTING IN BOLIVIAN INFANTS (0-6 MONTHS). Burke RM (Rollins School of Public Health, Emory University, Atlanta, GA), Rebolledo PA, Garber MD, Heritage R, Quispe M, Revollo R, Leon JL

Childhood malnutrition, particularly stunting (low length-for-age), can have long-term adverse effects like impaired cognitive function, increased risk of chronic disease, decreased economic potential, and increased risk of maternal mortality. Bolivia, a lower-middle-income country, has one of the highest prevalence of infant malnutrition in the Americas: an estimated 9.5% of infants (0-6 months) are moderately to severely stunted. The purpose of this study was to identify predictors of moderate-to-severe stunting (length-for-age Z score <-2) among urban and peri-urban Bolivian infants 0-6 months of age. Convenience sampling at outpatient well-child visits was used to recruit 185 mother-infant pairs in El Alto, Bolivia, from June to October, 2011. Researchers collected anthropometric data from mothers (height, weight) and infants (length, weight, head circumference) at two visits (4 to 6 weeks apart) as well as baseline socio-demographic, clinical, and perinatal characteristics. Multivariable logistic regression with stepwise elimination was used to identify predictors of being stunted at both visits. The prevalence of being stunted at both visits was 15.7%. Breastfeeding (OR:0.29 95%CI[0.1-0.81]), preterm birth (OR: 10.25 95% CI[3.26-32.23]), small-for-gestational age (OR:6.67 95% CI[2.21-20.18]), and inter-birth spacing of less than 24 months (OR:7.21 95% CI[2.08-24.94]) were significantly associated with stunting in this study population. Although this study was limited in its small sample size (leading to large standard deviations), its results were consistent with prior literature identifying preterm birth and small-for-gestational age (SGA) as predictors of childhood stunting. Further research targeting preterm birth and SGA may thus also have a role in preventing childhood stunting.

A45

EFFECTS OF UNINTENTIONAL INJURY DURING PREGNANCY ON PRETERM GESTATION AND NEONATAL MORTALITY. S Liu*, B Olga, MS Kramer (Public Health Agency of Canada, Ottawa, ON)

Objective: To explore the mechanism underlying the lower risk of mortality and morbidity among preterm infants born to women at increased risk. Methods: We carried out a population-based cohort study of 2,540,380 hospital deliveries in Canada between 2002 and 2011. Women with unintentional injury (n =1207) were identified using ICD-10 codes to assess the impact on the gestation and maternal outcomes, and the associations with neonatal non-traumatic intracranial haemorrhage (ICH), respiratory distress syndrome (RDS), assisted ventilation, intensive care unit (ICU), and death using logistic regression after adjustment for maternal age, parity, and medical conditions. Results: Unintentional injury was significantly associated with maternal death, stillbirth, and the duration of gestation. The earlier in gestation the injury occurred, the higher the risk of a preterm birth (p for trend <0.001), with an adjusted odds ratio [aOR] increasing from 2.1 (95% confidence interval [CI] 1.7-2.6) at 35-36 weeks to 6.2 (95% CI 3.6-10.8) at 20-24 weeks' gestation. For preterm infants born to injured women, aORs of ICH, RDS, and neonatal death were, respectively, 2.0 (95% CI 1.2-3.5), 2.3 (95% CI 1.7-3.2), and 2.8 (95% CI 1.7-4.9) despite their favourable fetal growth (z-score 0.157 vs. 0.075, p<0.01), and despite adjustment for their earlier gestational age. Conclusion: Our findings suggest that the suboptimal intrauterine environment underlying nonacute (i.e., noninjury) causes of preterm birth lowers the risk of neonatal mortality and morbidity among most preterm infants.

A46

THE IMPACT OF MATERNAL FACTORS ON THE ASSOCIATION BETWEEN APPARENT TEMPERATURE AND PRETERM DELIVERY. Basu, R, Chen, H, Li, DK, Avalos, LA* (Kaiser Permanente Northern California, Division of Research, Oakland, CA)

The association between temperature and mortality has been well documented. Less research has focused on temperature and adverse birth outcomes such as preterm delivery (PTD), and even less has examined maternal factors (demographic characteristics, socioeconomic status, behavioral factors and medical conditions) that may modify the association. To assess these relationships, a time-stratified case-crossover analysis was conducted. Using data from Kaiser Permanente Northern California (KPNC), 14,535 women who had a PTD between January 1, 1995 and December 31, 2009 were identified. Data from KPNC's electronic medical records were combined with meteorologic monitoring data based within 20 kilometers of each mother's residential zip code. Overall, every 10°F increase in weekly average (lag06) apparent temperature (a combination of temperature and humidity) was associated with an 8.84% increase (95% CI: 3.92%, 13.99%) in PTD risk. Preliminary analyses suggest several maternal modifying factors. A stronger association emerged for smokers with a 19.36% increased PTD risk (95% CI: 2.60, 38.86%) associated with every 10°F increase in weekly average apparent temperature compared to 7.81%(95% CI 2.69, 13.18) for non-smokers. Additionally, the association was stronger for women with a depression diagnosis during pregnancy with a 17.35% increased PTD risk compared to 7.95% for women without a depression diagnosis. Other modifying factors include race/ethnicity, Medicaid status, maternal age, infant sex, and pre-existing hypertension and diabetes. These findings suggest that increased temperature may have an adverse impact on pregnant women and women with certain demographics, behaviors during pregnancy, or medical conditions could be especially vulnerable.

A47

ASSOCIATION BETWEEN CHORIOAMNIONITIS AND UTERINE LEIOMYOMA IN SUCCESSIVE PREGNANCIES IN RELATION TO MATERNAL RACE. Darios Getahun, Michael J. Fassett, Morgan Peltier, Tefera Gezmu, Deborah A. Wing

Objective: The aim of this study is to examine the association between chorioamnionitis and incidence of uterine leiomyoma in successive pregnancies based on maternal race/ethnicity. Study Design: We conducted a retrospective cohort study of 1st two (n=95,749) and 1st three (n=21,193) consecutive singleton pregnancies using the 1991-2012 Kaiser Permanente Southern California longitudinally-linked Perinatal Services System, Hospital Inpatient and Outpatient encounter records. The study was restricted to women without uterine leiomyoma in the first pregnancy. ICD-9 codes identified the chorioamnionitis and uterine leiomyoma. Adjusted relative risks (RR) quantified the risks. Results: Overall incidence of uterine leiomyoma was 2.3%. A second pregnancy following a first pregnancy complicated by chorioamnionitis was at 1.43-fold increased risk of leiomyoma (95% confidence interval [CI] 1.23-1.66). Race-specific analysis revealed that compared with women whose 1st pregnancies was not complicated by chorioamnionitis, a significantly increased risk of leiomyoma was observed for Black women (RR 3.12, 95% CI 2.35-4.05), but not for other race/ethnicity groups. Compared with women whose 1st two successive pregnancies were not complicated by chorioamnionitis, the risk of leiomyoma in the 3rd pregnancy for women whose 1st but not 2nd pregnancy complicated by chorioamnionitis was 1.34-fold (95% CI 1.00-1.80). Two pregnancies with chorioamnionitis were associated with 5.22-fold increased risk of leiomyoma in the 3rd pregnancy. Conclusion: The findings of this study suggest that chorioamnionitis may be an independent risk factor for uterine leiomyoma, with the association between chorioamnionitis and uterine leiomyoma differing by race/ethnicity. Clinicians should be aware of this when counseling at-risk women.

A48

REPRODUCTIVE HEALTH KNOWLEDGE INCREASES AMONG AFRICAN-AMERICAN WOMEN UNDERGOING A CLINIC-BASED INTERVENTION TO REDUCE PSYCHOSOCIAL RISKS BUT MORE CAN BE DONE, PROJECT DC-HOPE.
M Kiely, C Robledo, U Backonja, K Flores, M Wallace

African-American women have higher rates of sexually transmitted infections (STIs), pregnancy, and infant mortality compared to white women. Lack of knowledge increases a woman's risk for both STIs and poor reproductive outcomes. This randomized controlled trial in the District of Columbia, was conducted to determine whether an integrated behavioral intervention reduced psycho-behavioral risk among pregnant African-Americans compared to usual care. African-American women were recruited during prenatal care and randomized. Women in the intervention group received individually tailored counseling sessions to address their risk(s) and reproductive health education. The purpose of this analysis was to assess whether or not women in the intervention group significantly increased their sexual health knowledge compared to usual care. All women were interviewed at baseline (n=1044), during pregnancy and at postpartum (n=830) by interviewers blind to randomization group. We used Chi-square tests to evaluate general reproductive health knowledge at baseline and postpartum. PROC GLM in SAS was used to assess whether overall postpartum reproductive health knowledge mean score differed by RCT group. At postpartum, women who participated in the intervention and thus received the reproductive health education, scored significantly better on the reproductive health questions (p=0.0009). While the intervention worked, the impact was small. It is important that women have a clear understanding of how to reduce the risk of and awareness about sexually transmitted diseases as well as how to maximize reproductive outcomes. Clearly, a better understanding of how to impart information that is correct, yet culturally sensitive is needed to improve health outcomes.

A49

SOY-BASED INFANT FORMULA FEEDING AND FIBROID RISK. *Upson K, Harmon QE, Baird DD

The effects of early phytoestrogen exposure from soy formula feeding during infancy on adult female reproductive health remain unclear. Uterine fibroids are a common hormonally-mediated condition of reproductive age women associated with substantial morbidity. Three prior studies of infant soy formula feeding and fibroids reported inconsistent results, although these studies were limited by use of self-reported fibroid diagnoses and low frequency of infant soy formula feeding. We examined the association using data from the Study of Environment, Lifestyle & Fibroids (SELF), an ongoing prospective cohort study of 1,696 African American women ages 23-34 years in Detroit, MI who were screened by ultrasound for fibroids at enrollment in years 2010-2012. Soy formula feeding during infancy was ascertained for 1,522 participants. Using enrollment data for which the prevalence of fibroids was 22%, we estimated relative risk (RR) and 95% confidence intervals (CI) using log-binomial regression or Poisson regression, adjusting for participant age, maternal smoking, maternal education, birth weight, and diabetic and hypertensive pregnancy complications. We observed no association between ever soy formula feeding (vs. never) and fibroid risk as well as the number of fibroids detected. However, among women with fibroids, soy formula feeding was associated with a 60% increased risk of larger fibroids (RR 1.6, 95% CI 1.2-2.1, comparing maximum fibroid diameter of ≥2cm to <2cm). We observed a similar association for volume of largest fibroid. Our study suggests that infant soy-formula feeding is not associated with fibroid initiation but may be associated fibroid growth.

A50

THE STUDY OF ENVIRONMENT, LIFESTYLE & FIBROIDS (SELF), AN ULTRASOUND-BASED PROSPECTIVE STUDY. D Baird D,* G Wegienka, C Barker-Cummings, QE Harmon, K Upson (National Institute of Environmental Health Sciences, Research Triangle Park, NC, USA)

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

A51

PREGNANCY INTENTIONS, SOCIO-ECONOMIC STATUS AND USE OF BIRTH CONTROL. Amy Metcalfe*, Rachel Talavlikan, Bea DuPrey, Suzanne Tough (University of British Columbia, Vancouver, Canada)

Unintended pregnancies refer to pregnancies that are mistimed (the woman wanted to be pregnant at a different point in time) or undesired (the woman did not want to be pregnant). This study aimed to assess contraception use and socio-economic characteristics of women with intended and unintended pregnancies. Data were obtained from two contemporaneous studies in Calgary Canada– one involving women seeking abortion services (n=577) and one involving women with continuing pregnancies (n=3552). Chi square tests and logistic regression were used to examine the association between socioeconomic variables, use of contraception and pregnancy intention. 96.5% of women seeking an abortion and 19.6% of women with ongoing pregnancies reported having an unintended pregnancy. Women with unintended pregnancies were significantly younger ($p<0.001$), less educated ($p<0.001$), had a lower household income ($p<0.001$) and were less likely to be in a stable relationship ($p<0.001$). 20.2% reported not using any form of birth control despite their desire to not get pregnant. Among women with unintended pregnancies, women seeking an abortion were more socioeconomically disadvantaged ($p<0.001$) and less likely to be in a stable relationship ($p<0.001$) than women with continuing pregnancies. Women who sought an abortion were more likely to have used condoms ($p<0.001$) or the emergency contraception pill ($p<0.001$); whereas women who opted to continue an unintended pregnancy were more likely to be using withdrawal as a form of birth control ($p<0.001$). Women who terminate an unintended pregnancy have more socioeconomic and relationship instability, suggesting that these services are an important part of women's health care.

A52

ASSOCIATION BETWEEN DEPO PROVERA USE AND PREVALENT FIBROIDS IN YOUNG AFRICAN AMERICAN WOMEN. Harmon QE* (National Institute of Environmental Health Sciences, Research Triangle Park, NC, USA), Baird DD

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

A53

**PERINATAL HEALTH INDICES AND THEIR ASSOCIATION WITH DAUGHTERS'
AGE AT MENARCHE**. Talge, NM* & Margerison-Zilko, CE (Michigan State University)

Puberty is a pivotal developmental transition whose timing is linked to many health outcomes.
However, it is unclear whether perinatal health is associated with pubertal timing and prior work
has not fully investigated these relations in a large, diverse sample. Using National Longitudinal
Study of Youth Children & Young Adults (NLSY79-CYA), we evaluated whether preterm birth
and size at birth were associated with one indicator of pubertal onset among girls: age at
menarche. The NLSY79-CYA includes children of female participants in the NLSY79, a
nationally-representative survey of United States youth in 1979. We included singleton, female
offspring with available birth outcome and age at menarche information (N=3041). Using
generalized estimating equations, we investigated associations of: 1) preterm birth (<37 weeks),
and 2) size at birth (small-, appropriate-, or large-for-gestational-age) with age at menarche
(years). Covariates included maternal age at menarche as well as pregnancy and demographic
characteristics. Preterm birth was not associated with age at menarche. Small-for-gestational-age
(SGA) birth was associated with younger age at menarche relative to appropriate-for-gestational-
age birth (mean difference: -0.21, 95%CI -0.35, -0.07). This association persisted following
adjustment for maternal age at menarche and pregnancy characteristics (e.g., parity), but was
attenuated following adjustment for demographics (mean difference: -0.12, 95%CI -0.03, 0.06),
a finding driven by maternal race/ethnicity. SGA birth was associated with earlier age at
menarche, but this association was attenuated substantially following adjustment for maternal
race/ethnicity. Investigating the sources of this attenuation has implications for interpreting links
between perinatal health and pubertal timing in girls.

A54

ASSOCIATION OF INFLAMMATORY MARKERS WITH MENSTRUAL SYMPTOMS AND PREMENSTRUAL SYNDROME IN YOUNG ADULT WOMEN. Bertone-Johnson ER*, Ronnenberg AG, Houghton SC, Nobles C, Zagarins SE, Takashima-Uebelhoer BB, Faraj J, Whitcomb BW (School of Public Health and Health Sciences, University of Massachusetts, Amherst, MA)

Premenstrual syndrome (PMS), experienced by 8-15% of premenopausal women, is characterized by moderate to severe symptoms occurring during the luteal phase of the menstrual cycle. Chronic inflammation has been implicated in the etiology of depression and other disorders that share common features with PMS, but whether inflammation contributes to PMS is unknown. We have evaluated the association of inflammatory factors with menstrual symptom experience and PMS in a population-based study of 277 women aged 18-30. Participants provided information on menstrual symptoms, lifestyle, diet, anthropometry and other factors by questionnaire and/or direct measurement, and provided a mid-luteal phase fasting blood sample. Inflammatory factors assayed in serum included interleukin (IL)-1beta, IL-2, IL-4, IL-5, IL-6, IL-7, IL-8, IL-10, IL-12, IL-13, tumor necrosis factor alpha, granulocyte macrophage colony stimulating factor, interferon gamma (IFN-gamma) and C-reactive protein. We observed significant positive associations between multiple inflammatory factors and menstrual symptom severity. After adjustment for age, smoking status, body mass index and other factors, total menstrual symptom score was positively associated with levels of IL-2, IL-4, IL-10 and IL-12 ($P<0.05$ for each). Furthermore, levels of IL-10, IL-12, IL-4 and IFN-gamma were approximately 2-fold higher in 37 women meeting criteria for PMS compared to 67 women meeting control criteria ($P<0.05$ for each). To our knowledge, this is among the first studies to suggest that levels of inflammatory factors may be elevated in women experiencing moderate to severe menstrual symptoms. Additional studies are needed to determine if inflammation plays a causal role in PMS.

A55

CHILDHOOD ABUSE AND EARLY MENARCHE AMONG PERUVIAN WOMEN.
Sanchez SE*, Barrios YV, Garcia PJ, Gelaye B, Zhong QY, Williams MA (Hospital Nacional Dos de Mayo, Lima, Peru)

Objective: Childhood abuse has been associated with accelerated menarche in some, but not all studies and few have assessed the independent associations of abuse with early menarche. We examined the association between childhood physical and sexual abuse and early menarche among pregnant women in Lima, Peru. Methods: Multivariable logistic regression procedures were used to estimate odds ratios (OR) and 95% confidence intervals (95%CI) for the relation of any childhood abuse, physical abuse only, sexual abuse only and both physical and sexual abuse with early menarche ($<=11$ years) in a cohort of 1,499 women interviewed in early pregnancy. Results: Approximately 69% of participants reported experiencing physical or sexual abuse in childhood. The frequencies of physical abuse only, sexual abuse only and both physical and sexual abuse were 37.4%, 7.7% and 24.5%, respectively. Compared with women who reported no childhood abuse, those who reported any childhood abuse had a 1.38-fold increased odds of early menarche (95% CI: 1.01-1.87). The odds of early menarche was increased among those reporting sexual abuse (OR=1.60; 95% CI 0.93-2.74) and those reporting exposure to both physical and sexual abuse (OR=1.56; 95% CI 1.07-2.25). Isolated physical abuse was weakly associated with early menarche (OR=1.23; 95% CI 0.87-1.74). There was not clear evidence of an association of childhood abuse with late menarche ($>=15$ years). Conclusion: Childhood abuse, particularly joint physical and sexual abuse, is associated with early menarche. Our findings add to an expanding body of studies documenting the enduring adverse health consequences of childhood abuse.

A56

STATE-SPECIFIC OVERVIEW OF 2010 U.S. ASSISTED REPRODUCTIVE TECHNOLOGY (ART) TREATMENT AND RESULTS, AND THE CONTRIBUTION OF ART TO U.S. OVERALL MULTIPLE BIRTH AND PRETERM INFANTS. S Sunderam*, DM Kissin, S Crawford, DJ Jamieson, WD Barfield (Women's Health and Fertility Branch, Division of Reproductive Health, National Center For Chronic Disease and Health Promotion, Centers For Disease Control and Prevention, Atlanta, Georgia, USA)

Objective: To report and compare U.S. ART statistics to all U.S. infant outcomes. Methods: Population-based retrospective analysis was used to report 2010 U.S. ART procedures and compare 2010 ART infant outcomes from 2009-2010 procedures to all infant outcomes, by state. Data were obtained from CDC's National ART Surveillance System (NASS) system and U.S. natality files. ART utilization was measured by the number of ART procedures performed per million women of reproductive age. Average number of embryos transferred, rates of elective single embryo transfers (eSET), and rates of ART-conceived multiple birth infants and preterm infants are reported. The proportion of ART infants to all infants, multiple births, and preterm infants was calculated. Results: Among 4,046,533 infants born in the U.S., 1.5% (59,119) were conceived with ART (range by state: 0.2%-5%). Nationally, 2,331 procedures were performed per million women of reproductive age; ART utilization was higher than this in 14 states, many of which were located in the northeast. The national eSET rate among women <35 years was 10% (range: 0%-45%). Approximately, 46% and 37% of ART infants were multiple births or preterm versus 3% and 12% of all infants, respectively. Nationally, ART infants contributed to 20% of all multiple-birth (range: 5%-41%) and 4% of all preterm (range:1%-13%) infants. Conclusions: Wide variations among states were observed in rates of ART births, utilization, eSET rates, and the contribution of ART to multiple births and preterm infants. Greater utilization of eSET, where appropriate, could reduce the contribution of ART to multiple birth infants.

A57

ERROR IN MATERNAL RECALL OF TIME-TO-PREGNANCY. R.G. Radin*, E.E. Hatch, K.J. Rothman, E.M. Mikkelsen, H.T. Sørensen, A.H. Riis, L.A. Wise (Boston University School of Public Health, Boston, MA)

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

A58

CHARACTERISTICS OF INFERTILE WOMEN SEEKING MEDICAL EVALUATION IN A UNITED STATES COHORT OF MEDICAL PROFESSIONAL WOMEN.

LV Farland* (Department of Epidemiology, Harvard School of Public Health, Boston, MA), A Collier, K Correia, F Grodstein, JE Chavarro, J Rich-Edwards, SA Mismmer

Not all women who meet the clinical definition of infertility seek diagnosis from their health care provider. The purpose of this analysis was to investigate the characteristics of infertile women who seek a medical evaluation for their infertility within a cohort of US nurses. Women who reported incident infertility with no history of hysterectomy, oophorectomy, or tubal ligation were followed from 1989 until 2009(N=7,422). Multivariable logistic regression was performed to calculate adjusted odds ratio(OR) and 95% confidence intervals(CI) of seeking infertility care. Approximately 65% of women who reported infertility had a medical evaluation. Demographic, lifestyle, and access factors played a role in seeking care. Women who were parous (OR:0.60; CI:0.53-0.67), racial/ethnic minorities (OR:0.46; CI:0.25-0.84), older (compared to women age 20-29, OR age 35-39:0.68; CI:0.56-0.82 , OR age 40-44:0.51 CI:0.41-0.63; P-value trend<0.0001), obese (OR:0.89; CI:0.76-1.05), or smoked (OR:0.75; CI:0.63-0.88) were less likely to seek medical care for infertility. On the other hand, women who lived in states with comprehensive insurance coverage (OR:1.55; CI:1.10-2.19), had a household income >\$150,000/year (OR:1.21; CI:1.06, 1.38), or who had a recent physical exam (OR:1.46; CI:1.22-1.74) were more likely to receive care. In sum, a variety of demographic, lifestyle, and access factors are associated with the likelihood of whether women seek a medical evaluation for infertility. In addition to highlighting potential barriers to care, these factors affect the distribution of the characteristics of women who receive infertility care, which may influence the generalizability of infertility clinic-based studies.

A59

THE RELATIONSHIP BETWEEN ALLOSTATIC LOAD AND SEMEN QUALITY IN A FOLLOW-UP OF 181 MALE PARTICIPANTS FROM THE CHILD HEALTH AND DEVELOPMENT STUDIES. Kahn LG*, Janevic T, Cirillo P, Cohn B, Factor-Litvak P (Columbia University, Mailman School of Public Health, NY, NY)

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

A60

FERTILITY TREATMENTS, MATERNAL REPRODUCTIVE HISTORY, AND FOLIC ACID SUPPLEMENTATION IN THE RISK OF CHILDHOOD ACUTE LEUKEMIA: THE ESTELLE STUDY. Ajrouche R*, Rudant J, Orsi L, Hémon D, Clavel J (Inserm, Centre for Research in Epidemiology and Population Health, Environmental Epidemiology of Cancer Team, Paris-Sud University, Paris, France)

We investigated the potential involvement of fertility treatments, infertility, maternal history of fetal loss and folic acid supplements in the etiology of childhood leukemia (CL). The ESTELLE study included 748 cases of CL (629 cases of acute lymphoblastic leukemia (ALL) and 98 of acute myeloblastic leukemia (AML)) diagnosed in France in 2010-2011 and 1421 population controls frequency-matched with the cases on age and gender. Data were obtained from structured telephone questionnaires administered to mothers. The odds ratios (OR) and their 95% confidence intervals were estimated using unconditional regression models adjusted for potential confounders. CL was not associated with difficulty in becoming pregnant (OR=0.9 [0.7-1.1]), in vitro fertilization (OR=0.5[0.2-1.3]) or the use of any fertility treatment (OR=0.7 [0.5-1.1]) for the index pregnancy. Folic acid supplementation during pregnancy was not associated with CL, but an inverse borderline association was observed for supplementation initiated in the 3 months preceding pregnancy (OR=0.7 [0.5-1.0]). In addition, CL was associated with a maternal history of stillbirth (ALL) and miscarriage (AML). The findings do not suggest that infertility and fertility treatments are associated with CL. The results support the hypothesis that folic acid supplements during preconception may reduce the risk of childhood leukemia.

A61

OCCUPATIONAL FACTORS AND TIME TO PREGNANCY IN NURSES. AJ Gaskins*

(Harvard School of Public Health, Boston, MA), JW Rich-Edwards, CC Lawson, E Schernhammer, SA Missmer, JE Chavarro

Background: Occupational factors have been related to several reproductive health outcomes. However, there are conflicting data on the relation between occupational factors and fertility. Methods: We examined occupational factors and time to pregnancy (TTP) among women with a planned pregnancy in the Nurses' Health Study 3(2010-present). Every 6-months women reported the duration of their pregnancy attempt. Women were considered at risk of pregnancy for the duration of their pregnancy attempt until they became pregnant, stopped trying to become pregnant, or were lost to follow-up. Work schedule and physical labor were self-reported on the baseline questionnaire. Multivariable Cox proportional hazards models for discrete survival time were used to estimate the fecundibility odds ratios (FOR) and 95% confidence intervals (CI). Results: Among the 2,581 women (mean age=34yrs, 94%Caucasian) 19% had a TTP>12 months. Women working >40 hours/week had a longer TTP (adjusted FOR=0.73[95%CI 0.62,0.87]) compared to women working 21-40 hours/week. Working for ≥6 years in permanent night shifts was associated with a longer TTP (adjusted FOR=0.46[95%CI 0.26,0.80]) compared to never working permanent night shifts. Women who reported lifting 25+ pounds ≥16 times/day had a longer TTP (adjusted FOR=0.61[95%CI 0.44,0.83]) compared to women who reported heavy lifting 1-5 times/day. Type of work schedule, frequency of night work, duration of rotating night shifts, and frequency of standing/walking at work were not associated with TTP. Conclusions: Greater than 40 hours of work per week, longer duration of permanent night shift work, and greater frequency of lifting heavy loads at work were associated with reduced fertility.

A62

BALANCING SUCCESS AND RISK OF ASSISTED REPRODUCTIVE TECHNOLOGY.
Kissin DM*, Kulkarni AD, Kushnir VA, and Jamieson DJ (Centers for Disease Control and Prevention, Atlanta, Georgia)

The current focus of traditional measures of Assisted Reproductive Technology (ART) success on pregnancy and live birth rates does not reflect obstetrical risks following ART and distracts attention from the risks of multiple births when decisions regarding the number of embryos to transfer are made. We assessed a measure of ART success that emphasizes good perinatal outcome while accounting for ART effectiveness (live-birth rates) and risks (multiple birth, prematurity, and low birth weight). We analyzed ART cycles initiated in 2011 in the United States that progressed to fresh embryo transfer among women using autologous oocytes and were reported to the National ART Surveillance System (n= 82,508). Percentage of transfers resulting in good perinatal outcome (live birth of a term [$\geq$37 weeks], normal birth weight [$\geq$2,500 grams] singleton infant) were stratified by prognosis, age, embryo stage, and the number of embryos transferred. Among favorable prognosis patients $\leq$35 years of age, chances of a good perinatal outcome were 43.3%, 26.6%, and 20.2% among blastocyst-stage embryo transfers, and 36.1%, 29.6%, and 21.9% among cleavage-stage embryo transfers, when 1, 2, or 3 embryos were transferred, respectively. Percentage of embryo transfers resulting in good perinatal outcome is a measure of ART success that balances ART effectiveness and risk, and could be used when decisions on how many embryos to transfer are made. Transferring a single embryo in favorable prognosis patients $\leq$35 years of age results in the best perinatal outcome.

A63

URINARY BISPHENOL A CONCENTRATIONS AND TIME TO PREGNANCY IN A PROSPECTIVE, PRE-CONCEPTION COHORT. Porucznik CA*, Cox KJ, Bailey NM, Stanford JB (University of Utah, Salt Lake City, UT)

A prospective, pre-conception cohort of couples (women 18–35, men 18–40) without known infertility were recruited in Utah beginning in early 2012. Recruitment is ongoing. Couples observed cervical mucus to identify an estimated day of ovulation (EDO) and fertile window and collected first-morning urine samples during the fertile window for up to two menstrual cycles. Concentrations of the endocrine disruptor bisphenol-A (BPA) were measured in each urine sample using quantitative liquid chromatography-tandem-mass spectrometry. Geometric means (GM) with 95% confidence intervals (CI) and interquartile ranges (IQR) for BPA concentrations were calculated for the fertile window that occurred closest to the time of conception. Time to pregnancy (TTP) was calculated as the difference between the date the couple began their pregnancy attempt and the conception date. The median GM BPA concentration for 52 pregnant couples was 2.23 ng/mL, IQR 1.14-3.98 [female 2.06 ng/mL (IQR 1.09-4.30), male 2.41 ng/mL (IQR 1.40-3.97)]. The median GM BPA concentration for 20 non-pregnant couples was higher at 2.35 ng/mL, IQR 1.57-3.46 [(female 2.06 ng/mL (IQR 1.44-3.03), male 2.72 ng/mL (IQR 2.03-4.49), but the difference was not statistically significant. The mean time to pregnancy was 4.4 ± 3.1 months. We examined the joint distribution of TTP and BPA in both men and women as both continuous and categorical measures and identified no statistically significant associations.

A64

ASSISTED REPRODUCTIVE TECHNOLOGY AND RISK OF PRETERM DELIVERY.
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In studies of singletons, women who undergo assisted reproductive technology (ART) are at a 2-fold increased risk of preterm delivery (PTD). However, the risk is potentially confounded by factors related to diagnoses of female infertility. Our study investigated whether PTD risk is higher for ART-users without identified female infertility but with male factor infertility, compared to couples who conceived without ART. Additionally, we compared PTD risk among four mutually exclusive groups of ART users based on infertility type: female infertility only, male factor only, both female infertility and male factor, and unexplained infertility; the female infertility only group served as the referent. Methods: We used a population-based dataset of singleton births between 2000 and 2008 in Michigan and Florida containing linked birth files and ART data for ART associated deliveries. Logistic regression models were used to calculate crude and adjusted odds ratios and 95% confidence intervals for the association between ART and PTD; adjusted models included maternal age, education, race, parity and previous PTD. Results: ART singletons born to couples without identified female infertility but with male factor infertility had significantly higher odds of PTD compared to non-ART singletons [aOR=1.43 (CI 1.29, 1.60)]. Among ART users, the group with male factor only had the lowest risk for PTD, relative to the female infertility group [aOR=0.70 (CI 0.61, 0.79)]. Conclusions: Among singleton births, the use of ART increased the risk for PTD, even in the absence of female infertility. Female infertility diagnosis may increase the likelihood of PTD in ART births.

A65

OBSTETRIC AND PERINATAL OUTCOMES OF TWIN PREGNANCIES CONCEIVED FOLLOWING IVF/ICSI TREATMENT COMPARED WITH SPONTANEOUSLY CONCEIVED TWIN PREGNANCIES. M. Geisler* (Cork Fertility Centre/Anu Research Centre,Cork University Maternity Hospital,Ireland), A. O'Mahony, S. Meaney, J. Waterstone, K. O'Donoghue

Introduction Twin pregnancy is associated with increased obstetric and perinatal risk. There are conflicting reports on whether assisted conception (ART) further increases these risks. Objective To assess the obstetric and perinatal outcomes of twin pregnancies according to mode of conception. Materials and Methods A retrospective study of viable dichorionic-diamniotic (DCDA) twin pregnancies (n=539) delivered at Cork University Maternity Hospital, Ireland between 2009-2012, divided according to spontaneous conception (SC) and ART conception, specifically IVF or ICSI. Results The ART conceived group were on average 4 years older (36.8 ± 4.23 v 32.3 ±4.93 years) and more frequently nulliparous (73.7%; n=126 v 36.1%; n= 133) than their SC counterparts (p<0.001). There was no significant difference in maternal antenatal complications. ART twins were twice as likely to be delivered by cesarean section (CS) (OR 2.35; 95% CI 1.76- 3.14). There was no significant difference in the rates of preterm birth or NICU admission rates according to mode of conception. ART conceived twins were almost twice as likely to be delivered moderately preterm (32-33+6) (OR 1.98, 95% CI 1.21-3.23) and were more likely to have RDS and neonatal hypoglycaemia Discussion Twin pregnancy, irrespective of mode of conception, carries an increased risk of morbidity and mortality for both mother and babies and therefore couples should be counselled regarding the increased risk of iatrogenic twinning associated with double embryo transfer. However, for those that do conceive twins, they can be advised that assisted conception conveys no significant disadvantage over naturally conceived twin pregnancies.

A66

ADVERSE CHILDHOOD EVENT EXPERIENCES, MENSTRUAL CYCLE CHARACTERISTICS, AND FERTILITY DIFFICULTIES. M Jacobs*, E Harville, A Shankar, R Boynton-Jarrett (Tulane University, New Orleans, LA)

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

A67

SOY FOOD INTAKE AND INFERTILITY TREATMENT OUTCOMES OF WOMEN UNDERGOING ASSISTED REPRODUCTION. Chavarro JE*, Afeiche M, Williams P, Wright D, Petrozza J, Hauser R (Harvard School of Public Health)

Background: Phytoestrogen supplements have improved live birth rates following infertility treatment in two previous trials. It is unknown whether soy foods could yield similar results. Methods: Starting in 2007, pre-treatment intake of soy and soy-based foods was assessed among women presenting for infertility treatment to the Massachusetts General Hospital Fertility Center. Clinical outcomes from 315 women who underwent 520 assisted reproductive technology (ART) cycles completed through June 2013 were abstracted from electronic medical records. Women were divided into four categories: those who did not eat soy foods served as reference and the remaining women were divided into tertiles of intake. Generalized linear mixed models with binomial distribution, log link function, and random intercepts to account for multiple IVF cycles per woman were used to evaluate the association of soy food intake with ART outcomes adjusting for age, BMI, race, day 3 FSH, primary infertility diagnosis, and protocol type. Results: There were no differences in baseline characteristics across categories of soy food intake. Soy food intake was positively related to the probability of having a live birth as a result of ART. The adjusted probability of live birth (95% CI) for women in increasing categories of soy food intake was 31% (24-39%) for women who did not eat soy foods, 37% (26-49%) for women consuming 0.04-0.07 servings/day, 43% (34%-52%) for women consuming 0.09-0.23 servings/day, and 45% (36-54%) for women consuming 0.25-4.5 servings/day (p,trend=0.04). Conclusions: Soy food intake is positively related to the probability of having a live birth following ART.

A68

THE FERTILITY EXPERIENCES STUDY: LIVE BIRTHS AMONG CLINIC AND POPULATION-RECRUITED WOMEN RECEIVING DIFFERENT FERTILITY TREATMENTS. JN Sanders* (University of Utah, Salt Lake City, UT) SE Simonsen (University of Utah, Salt Lake City, UT) JB Stanford (University of Utah, Salt Lake City, UT)

The Fertility Experiences Study is retrospective cohort of Utah women with primary infertility. The Utah Population Database was used to identify women with possible infertility using linked marriage, divorce, and birth records. Additional participants were recruited from two Utah infertility clinics. We identified 1,105 eligible women (576 population-based women and 529 clinic-based women), and enrolled 920 (83%), of which 837 (91%) completed both the online survey and phone interviews. Participants reported the date they started being sexually active without contraception. Cumulative live births were assessed by linking to Utah birth certificates through 2010. We stratified by mutually exclusive treatment categories, which we defined by the most intensive treatment received. We used life table analysis to calculate the cumulative proportion of women with a live birth. After 3 years at risk, the proportion achieving a live birth among women receiving no treatment, infertility drugs, artificial insemination, and in vitro fertilization was 55.3%, 58.5%, 40.7%, and 32.3% among population-recruited women and 44%, 50.8%, 45.6%, 37.2% among clinic-recruited women. These proportions increased to 74.6%, 76.4%, 65.9%, and 70.8% by 5 years for population-based women and to 64%, 71.2%, 64.7%, and 62.5% among clinic-based women, respectively. The cumulative proportion with live birth converged over time between all treatment groups in both the population- and clinic-based cohort. However, a limitation to the current analysis is that we have not yet determined whether pregnancies were linked to specific treatment episodes. In subsequent analysis, we will explore the link to specific treatments and evaluate potential confounders.

A69

DIFFERENCES IN WHO VISITS A DOCTOR FOR HELP BECOMING PREGNANT.

Chin HB*, Hartnett KP, Hyman ME, Fothergill A, Mertens AC, Spencer JB, Howards PP (Rollins School of Public Health, Emory University, Atlanta, GA)

Women may visit a doctor for help getting pregnant for many reasons including infertility, irregular menstruation, or reproductive conditions. These problems affect all groups of women, but not all women seek medical help. Reproductive age (22-45 years) women in Georgia were interviewed about their reproductive histories for the FUCHSIA Women's Study. Among women recruited to represent the demographic make-up of reproductive-aged women in Georgia (n=1,071), 16% visited a medical professional for help becoming pregnant. In models adjusted for age, income, education, and race, black women were less likely than white women to seek fertility counseling (adjusted odd ratio (aOR) = 0.44, 95% confidence interval (CI) 0.28, 0.70), and women with at least a college degree were more likely than those without to visit a doctor for fertility counseling (aOR =1.18, 95% CI 0.76, 1.82). These differences persisted among the subset of women who had not reached their reproductive goals by the time of the interview. For all education levels, the most commonly reported reason to seek fertility counseling was 'trying to get pregnant' (college degree or higher 87%; no college degree 77%). However, women with a college degree reported other reasons including 'to get information,' 'because of a prior reproductive condition,' or 'problems with partner' (14% total), while none of the women without a college degree reported these reasons. Race and education may affect women's motivation and ability to access fertility counseling, potentially resulting in some women not receiving the information or treatment they need to meet their reproductive goals.

A70

VARIANTS IN THE INTERFERON-EPSILON GENE AND SEXUALLY TRANSMITTED INFECTIONS AMONG AFRICAN AMERICAN WOMEN WITH PELVIC INFLAMMATORY DISEASE. BD Taylor*, T Darville, RE Ferrell, RB Ness, CL Haggerty (University of Pittsburgh, Pittsburgh, PA)

Objective: Increased expression of previously uncharacterized Interferon-epsilon (IFNe) is reported to be required for innate immune defense against infection in the reproductive tract. We determined if INFe variants that lead to amino acid substitutions are associated with selected bacteria, histologically confirmed endometritis (Kiviat's criteria: ≥5 neutrophils and ≥1 plasma cells), and subsequent infertility among women with clinically suspected pelvic inflammatory disease (PID). Methods: We conducted a pilot study utilizing archived DNA from154 African American women who participated in the PID Evaluation and Clinical Health (PEACH) study. Associations between genotypes in variants rs1125488 and rs2039381 and baseline chlamydia, gonorrhea, Mycoplasma genitalium, endometritis, and infertility (>12 months without conception over the 84 month mean follow-up in PEACH) were examined in age adjusted logistic regression models. Results: Women who carried one or more of the T alleles for rs2039381 had higher odds of gonorrhea (odds ratio (OR) 1.5, 95% confidence interval (CI) 0.5-6.2) and endometritis (OR 2.0, 95% CI 0.5-8.4), although results were not statistically significant. In addition, women who carried the AC genotype for rs1125488 had a non-significantly increased risk for infertility (relative risk (RR) 1.5, CI 0.6-6.1). Conclusions: This pilot study reveals trends towards increased odds of sexually transmitted infections, endometritis and infertility among women who carried INFe variants that lead to amino acid substitutions. These gene variants are rare and we were underpowered to detect significant associations. Given the suggested biological importance of INFe in the reproductive tract, variants in this gene should be examined in a larger cohort of women.

A71

FASTIDIOUS, NOVEL BACTERIAL VAGINOSIS-ASSOCIATED BACTERIA INCREASE THE RISK OF PELVIC INFLAMMATORY DISEASE. Haggerty CL,* Totten PA, Astete S, Ness RB, Fielder TL, Bass DB, Fredricks DN (*University of Pittsburgh, Graduate School of Public Health, Department of Epidemiology, Pittsburgh, PA)

Background: Pelvic inflammatory disease (PID) is a syndrome of infection /inflammation in the female upper genital tract that often causes infertility. As up to 70% of cases lack an identified etiology, we sought to determine the relationship between select novel, fastidious bacterial vaginosis(BV)-associated bacteria and PID. Methods: We conducted a pilot case-control study of 20 patients who developed PID and 17 controls, matched by visit date and race, nested within the prospective Gynecologic Infections and Follow-Through(GIFT) study. Seventeen species-specific 16S ribosomal rRNA gene quantitative PCR assays were applied to vaginal swabs from visits occurring immediately preceding and within 3 months of PID. DNA concentrations were log-transformed and negative samples assigned half the lower limit of detection. Analyses were adjusted for age and gonorrhea. Results: Women who tested positive for Eggerthella-like bacterium(ORadj 7.5, 95% CI 1.5-36.9), Atopobium vaginae (AV, ORadj 5.8, 1.3–26.7) or Leptotrichia/Sneathia(ORadj 5.8, 1.1–29.1) were significantly more likely to develop PID, with similar trends for BV associated bacterium 1(BVAB1, ORadj 2.6, 0.6–10.7), BVAB2(ORadj 2.9 0.7–12.4) and Megasphaera phylotype 1& 2(ORadj 3.9, 0.9–16.2). Cases had higher median DNA concentrations of AV(2.3E5 vs. 5.9E1, p-valueadj=0.05) and Megasphaera(2.7E4 vs. 5.9E2, p-valueadj=0.08). Conclusions: This is the first study to associate an Eggerthella-like bacterium (recently identified among women with BV) with PID. Further, it is the first to show that Eggerthella-like bacteria, AV, Leptotrichia/Sneathia, BVAB1, BVAB2, and Megasphaera are predictive of subsequent PID, suggesting a causal relationship. Our results suggest that higher vaginal anaerobe quantities may increase PID risk.

A72

RISK FACTORS FOR HYPERTENSIVE DISORDERS OF PREGNANCY AMONG HIV-NEGATIVE TANZANIAN WOMEN. E O'Neal* (Harvard School of Public Health, Boston, MA), D Spiegelman (Harvard School of Public Health, Boston, MA), E Lieberman (Brigham and Women's Hospital, Boston, MA), S Missmer (Harvard School of Public Health, Boston, MA), E Hertzmark (Harvard School of Public Health, Boston, MA), W Fawzi (Harvard School of Public Health, Boston, MA)

Background: Tanzania has a maternal mortality ratio of 454 deaths per 100,000 live births, ranking 22nd in the world. Hypertensive disorders of pregnancy are the 3rd leading cause of maternal mortality worldwide. Research on hypertension during pregnancy in African countries has been limited. Methods: We examined risk factors for hypertension in a cohort of 8468 pregnant women in Dar es Salaam, Tanzania who were enrolled at 12-27 weeks gestation in a randomized trial of multivitamins between August 2001 and July 2004. Preeclampsia was defined as systolic blood pressure ≥ 140 or diastolic blood pressure ≥ 90 with urine protein $\geq 1+$ in antenatal care or provider diagnosis at delivery. Gestational hypertension was defined by the same blood pressure criteria with absent or trace urine protein, or by provider diagnosis at delivery. Risk factors for hypertensive disorders of pregnancy were examined using log binomial regression. Results: Hypertensive disorders were identified in 7.2% of pregnancies. Twins, increased body mass index, and history of miscarriage or abortion were risk factors for both preeclampsia and gestational hypertension. Factors specific to preeclampsia included nulliparity and, among multiparous women, history of preeclampsia, low birth weight, and cesarean section. For gestational hypertension alone, risk factors included blood pressure $\geq 120/80$ at enrollment, history of diabetes, and family history of hypertension. Conclusion: In this Tanzanian cohort, some risk factors appeared to be shared between preeclampsia and gestational hypertension, while others were related to only one disorder. In resource limited settings, presence of these characteristics may warrant closer antenatal surveillance or nutrition-related interventions.

A73

ASSOCIATION BETWEEN ANTIBIOTIC USE AND BIRTH DEFECTS AMONG WOMEN WHO HAD URINARY TRACT INFECTIONS IN THE FIRST TRIMESTER OF PREGNANCY. Ailes EC*, Gilboa SM, Gill SK, Broussard C, Crider KS, Berry RJ, Carter T, Hobbs C, Reefhuis J and the National Birth Defects Prevention Study (Centers for Disease Control and Prevention, Atlanta, GA)

Previous studies reported associations between antibiotics used to treat urinary tract infections (UTIs) and some birth defects; however, it is unclear if these findings were due to antibiotic use, infection or chance. To minimize potential confounding by indication, we restricted the analyses to women reporting UTIs in early pregnancy and compared antibiotic users to non-users. The National Birth Defects Prevention Study is a multi-site, population-based case-control study of risk factors for major birth defects. Controls included live-born infants without major birth defects. We analyzed singleton pregnancies from 1997-2009 among non-diabetic women with UTIs from one month before conception through the third month of pregnancy. Logistic regression was used to estimate associations between antibiotic use and birth defects, after adjusting for maternal age, race/ethnicity, education, and calendar year. We included 1770 case and 671 control mothers with UTIs, of whom 1403 case (79%) and 521 control mothers (78%) used antibiotics. Trimethoprim-sulfamethoxazole use was associated with oral clefts (Odds Ratio: 2.12, [95% CI: 1.01, 4.45]), esophageal atresia (4.13 [1.25, 13.67]), and hypospadias (5.92 [1.49, 23.58]). Cephalosporin use was associated with anorectal atresia/stenosis (6.27 [1.50, 26.26]), and macrolides with cleft palate (5.16 [1.11, 24.04]). Inverse associations were observed between penicillin and neural tube defects (0.53 [0.30-0.95]) and use of multiple antibiotics and cleft lip with cleft palate (0.32 [0.11-0.95]). Additional elevated but non-significant associations were observed, particularly for trimethoprim-sulfamethoxazole use. To better inform clinical practice, studies are needed to confirm these findings and examine the relative safety of UTI antibiotic therapies during pregnancy.

A74

THE IMPACT OF MATERNAL ANTIRETROVIRAL THERAPY ON RISK OF SMALL FOR GESTATIONAL AGE INFANTS INCREASES WHEN ACCOUNTING FOR SURVIVAL BIAS.

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Background: The presence of stillbirths in perinatal epidemiology studies may lead to survival bias, particularly when the exposure has an effect on both the risk for stillbirths and the birth outcome of interest. Methods: We evaluated the risk of small for gestational age infants (SGA, birthweight below the 10th percentile for gestational age) due to antiretroviral therapy (ART) among HIV-infected women who delivered in Botswana. Women who continued ART from before pregnancy were compared with all other HIV-infected women. We used a recently developed regression-based approach to account for survival bias induced by stillbirths. The approach produces estimates of what is known as the survivor average causal effect (SACE) of ART, which is the exposure effect on SGA among births that would be live irrespective of maternal ART status. Results: Among 2644 HIV- infected pregnant women, 408 (15%) delivered SGA infants. Women who continued ART from before pregnancy had a higher risk of giving birth to an SGA infant. We estimated an adjusted risk ratio of 1.6 (95% CI: 1.4, 1.9) using standard logistic regression model; results from the SACE analysis were 25% larger, adjusted risk ratio 2.0 (95% CI: 1.5, 2.6). In addition, the SACE analysis produced empirical evidence rejecting the null hypothesis of no survival bias (p-value = 0.03). Conclusions: Standard regression analysis in the presence of survival bias may be overly conservative when estimating the effect of maternal exposures on birth outcomes; the proposed SACE analysis may both reveal when such bias is present and correct inference.

THE EFFECT OF LOG10 COPY-YEAR VIREMIA ON PREGNANCY LOSS AMONG HIV-INFECTED WOMEN. Cates JE*, Westreich DJ (University of North Carolina, Chapel Hill, NC), Wright RL (Department of Obstetrics & Gynecology, Montefiore Medical Center, Bronx, NY), Minkoff H (Department of Obstetrics & Gynecology, Maimonides Medical Center, Brooklyn, NY), Colie C (Department of Obstetrics & Gynecology, Georgetown University, Washington, DC), Greenblatt RM (Departments of Clinical Pharmacy, Epidemiology, and Biostatistics, University of California, San Francisco, CA), Cejtin H (Department of Obstetrics and Gynecology, Northwestern University Feinberg School of Medicine, Chicago, IL), Golub E (Department of Epidemiology, Johns Hopkins School of Public Health,Baltimore, MD), Haddad L (Department of Gynecology and Obstetrics, Emory University School of Medicine, Atlanta, GA), Kempf MC (School of Public Health, University of Alabama at Birmingham, Birmingham, AL), Adimora AA (Departments of Epidemiology and Medicine, University of North Carolina, Chapel Hill, NC)

BACKGROUND: Higher plasma viral load, an indicator of advanced maternal HIV disease, has been previously associated with adverse birth outcomes. The aim of this research was to evaluate the potential etiologic effect of cumulative inflammation and immune system activation, measured through log10 copy-year viremia, on pregnancy loss among HIV-positive women. METHODOLOGY: We conducted a cohort analysis of 310 pregnancies from HIV-positive women who initiated antiretroviral therapy (ART) while enrolled in the Women's Interagency HIV Study (WIHS) from 1994-2012 who reported at least one pregnancy post-ART initiation. Risk ratios for a 1-unit increase in log10 copy-year viremia were estimated using log binomial regression, with adjustment for confounders identified using a directed acyclic graph (DAG). RESULTS: Out of a total of 310 pregnancies, 183 (59%) were from mothers who identified as black race, 35% were from mothers who smoked during pregnancy, and there were 103 pregnancy losses. The adjusted risk ratio of pregnancy loss for a one-unit increase in log10 copy-year viremia is 0.93 (95% CI: (0.83-1.03)). The adjusted risk ratio of pregnancy loss for the top quintile of log10 copy-year viremia (>5.11 log10 copies/year) compared to the bottom quintile (<3.16 log10 copies/year) is 0.76 (95% CI: (0.45-1.29)). CONCLUSION: The low precision of the effect estimates and null association suggests that no relationship exists between log10 copy-year viremia since ART initiation and pregnancy loss. However, this could be due to misclassification of the exposure due to inability to measure from seroconversion or effect modification by time from ART initiation to pregnancy outcome.

A76

THE ASSOCIATION BETWEEN REPEAT TRICHOMONAS VAGINALIS INFECTION AND SMOKING AMONG HIV-INFECTED WOMEN. Alys Adamski, MPH* (Tulane University, New Orleans, LA); Rebecca A Clark, MD, PhD; Leandro Mena, MD, MPH; Harold Henderson, MD; Judy Levison, MD, MPH; Norine Schmidt, MPH; Hirut T Gebrekristos PhD; David H Martin, MD; Patricia Kissinger, PhD

Objective: This study was conducted to assess the role of smoking in repeat infections with Trichomonas vaginalis (TV) among HIV+ women. Smoking can alter the normal vaginal flora and a dose response between number of cigarettes smoked per day and an increased risk for contracting bacterial vaginosis (BV) has been well established. Both of which may increase a woman's risk of sexual transmitted infections. Methods: A secondary data analysis was performed on a multi-centered cohort of HIV+/TV+ women who were treated with either single (2gm) dose or 7day (500mg BID) dose metronidazole (MTZ). Only women who tested negative at their 7day test-of-cure visit and returned for their 3 months re-test visit were included. Demographic, social and behavioral characteristics were elicited using computer assisted self-administered interviews. Logistic regression models were adjusted for sexual exposure in the last 3 months, contraceptive use, BV status at baseline, and MTZ dose. The association between smoking and TV using bivariable, multivariable, and trend analyses was assessed. Results: Of the 147 women included, 16% had a repeat infection, 57% reported some level of smoking, and 88% denied sexual exposure in the last 3months. The highest level of smoking has an increased risk of TV compared to non-smokers aOR=5.88; 95%C.I. 1.58-21.82 and Cochran-Armitage trend test p=0.010 between increasing levels of smoking and TV+. Conclusions: Smoking cigarettes may increase a woman's risk of repeat TV infection. Possible limitations are the high percentage of women who denied sexual exposure and lack of sensitivity of culture post-treatment.

A77

THE EFFECT OF MATERNAL OBESITY ON BIRTH WEIGHT: A RETROSPECTIVE COHORT STUDY. Yao R*, Irani RA, Croft DJ, Plante LA

An improved understanding of the effect of maternal obesity on fetal growth velocity may shed light on the pathophysiology behind the association between obesity and stillbirth. We set out to establish the pattern of fetal growth throughout gestation among obese women based on the weight of their infants at delivery in comparison to the normal growth curve. This is a retrospective cohort analysis using Texas Vital Records Database. Analysis was limited to non-anomalous singleton pregnancies. We defined large for gestational age (LGA) as >90th percentile birth weight at each gestational week. We then compared the rate of LGA deliveries for each BMI class, as defined by World Health Organization, at each gestational week to the baseline rate for non-obese women. Over 1.8 million deliveries were included in the analysis. The difference in average birth weight and rate of LGA both peaked at 37 gestational weeks. The weight difference between overweight, class I, class II and class III compared to normal weight is 76.8, 118, 159.1 and 206.1 grams. The rate of LGA delivery is 14.4%, 17.5%, 20.7% and 23.4% respectively for overweight, class I, class II and class III obesity. Obesity is associated with an increased risk for LGA deliveries. This association exhibits a dose-response relationship. The observed rate of LGA deliveries peaks at 37 weeks and subsequently decreases. One possible interpretation of these data suggests the development of uteroplacental insufficiency as the growth velocity slows after 37 weeks, leading to the observed increase in stillbirth rate associated with obesity.

A78

ASSOCIATIONS OF GESTATIONAL WEIGHT GAIN WITH PRETERM BIRTH AMONG UNDERWEIGHT AND NORMAL WOMEN. Sharma AJ*, Vesco KK, Bulkley J, Callaghan WM, Bruce FC, Staab J, Hornbrook MC, Berg CJ (Centers for Disease Control and Prevention, Atlanta, GA)

Studies report increased risk of preterm birth (PTB) among underweight and normal weight women with low gestational weight gain (GWG). However, few studies examined GWG over the same gestational period for term and preterm births which can bias associations because GWG rate changes over the course of pregnancy. Within one integrated delivery system, we examined 12,526 singleton pregnancies between 2000-2008 among women with a body mass index<25 kg/m2, who began prenatal care in the first trimester and delivered a live-birth >28 weeks gestation. Using self-reported pregravid weight and serial measured antenatal weights, we estimated GWG in the first 28 weeks of gestation as well as traditional GWG measures including total GWG, average GWG rate, and GWG rate in the second and third trimesters. Using logistic regression adjusted for covariates, we examined associations between the various GWG measures and PTB (<37 weeks gestation). We additionally examined associations according to the reason for preterm birth by developing a novel algorithm using diagnoses and procedure codes. While total and average rate of GWG (measures over different gestational periods) were inversely associated with PTB, GWG in the first 28 weeks was not associated with PTB (aOR 0.99, 95%CI 0.97, 1.01). A positive association was found for rate of GWG in second and third trimesters and medically-indicated PTB, but was attenuated after excluding women with preeclampsia. Our findings do not support an association between GWG in the first 28 weeks gestation and PTB among underweight and normal weight women.

A79

A SYSTEMATIC APPROACH FOR ESTABLISHING THE RANGE OF RECOMMENDED WEIGHT GAIN IN PREGNANCY.

Hutcheon JA* and Bodnar LM (Department of Obstetrics & Gynaecology, University of British Columbia, Vancouver, Canada)

Background: Current approaches for establishing public health guidelines on the recommended range of weight gain in pregnancy are subjective and non-systematic. Objective: In this paper, we outline how decision making on gestational weight gain guidelines could be aided by the quantitative approaches used in non-inferiority trials. Methods: The theoretical application of non-inferiority margins to pregnancy weight gain guidelines was reviewed. A worked example illustrated the selection of the recommended range of pregnancy weight gain in women delivering at the Magee-Womens Hospital (Pittsburgh, PA, 2003-2010) by identifying the weight gain z-scores in which the risk of unplanned Cesarean delivery, preterm birth, small-for-gestational-age infant, and large-for-gestational-age infant were not meaningfully increased (based on non-inferiority margins of 10% and 20%). Results: In normal-weight women, the lowest risk of adverse perinatal outcome was observed at a weight gain z-score of -0.2 standard deviations (SD). With a non-inferiority margin of 20%, risks of adverse outcome were not meaningfully increased from the -0.2SD reference value between z-scores of -0.97SD and +0.33SD (corresponding to 11.3 to 18.4kg). Among overweight women, the recommended range was much broader: -2.11SD to +0.29SD (4.4 to 18.1 kg). Conclusions: The new approach illustrated in this paper has a number of advantages over current methods for establishing pregnancy weight gain guidelines because it is systematic, reproducible, and allows policy-makers to derive guidelines that explicitly reflect the values at which risk of adverse outcome becomes meaningfully increased based on expert clinical opinion.

A80

GESTATIONAL WEIGHT GAIN AND RISK OF INFANT MORTALITY. LM Bodnar*,
TL Lash, JA Hutcheon, SM Parisi, B Abrams (University of Pittsburgh, Pittsburgh, PA)

With maternal and child obesity rising, some have advocated for restricted weight gain during
pregnancy, particularly for obese women. Yet, the effect of low gestational weight gain (GWG)
on the risk of serious adverse birth outcomes is unknown. Our objective was to estimate the
association between total GWG and infant mortality. We used Pennsylvania linked birth-infant
death records from 2003 to 2010 (n=979,534). GWG was classified using gestational age- and
prepregnancy BMI-standardized z-scores and then converted to kilograms at 40 weeks.
Curvilinear relations were modeled using splines in multivariable logistic regression models.
Optimal GWG ranges were defined as those in which risk was increased by no more than 20%.
A probabilistic bias analysis informed by an internal validation study was used to simultaneously
account for misclassification of BMI and GWG. In the conventional analysis, the confounder-
adjusted risk was significantly increased at the high and low tails of GWG z-score for most BMI
groups. Optimal GWG was 12 to 23 kg for underweight, 15 to 24 kg for normal weight, 16 to 23
kg for overweight, -2.5 to 15 kg for obese class 1, -4 to 12 kg for obese class 2, and -5 to 5 kg for
obese class 3 women. The bias analysis revealed that the conventional relative risks associated
with high and low GWG were biased towards the null. In this large population-based cohort,
optimal GWG ranges associated with reduced risk of infant death varied by BMI and were
broader in obese women. Assuming a valid bias model, low and high GWG may be more
strongly associated with infant death than the conventional estimates indicate.

A81

INFLAMMATION AND RATE OF GESTATIONAL WEIGHT GAIN. Perng W*, Rich-Edwards J, Stuebe A, Oken E (Harvard Medical School and Harvard Pilgrim Health Care Institute, Boston MA, USA)

Background: While inflammation is traditionally regarded as a consequence of excess adiposity, recent studies suggest that elevated inflammatory biomarkers may precede weight gain. Little is known of this association during pregnancy. Objective: To investigate the extent to which inflammation predicts a greater rate of subsequent gestational weight gain (GWG). Methods: We assayed C-reactive protein (CRP), interleukin-6 (IL-6), and tumor necrosis factor alpha (TNF-alpha) from plasma taken at median 28 weeks gestation from 765 women in Project Viva, a Boston-area pre-birth cohort. We calculated rate of GWG as the difference between the last measured weight prior to delivery and weight at the time of blood draw, divided by the time difference. Using multivariable linear regression, we examined the relation between quartiles of each inflammation biomarker and GWG rate. Results: Median age at enrollment was 32.3 years (range: 14.8-43.6). Mean±SD pre-pregnancy BMI was 24.9±5.5 kg/m2, and GWG rate was 0.24±0.13 kg/week; 72.5% were white. Mean±SD CRP, IL-6, and TNF-alpha was 1.51±1.23 mg/L, 33.68±35.78 pg/mL, and 43.57±51.53 units/mg, respectively. After accounting for age, gestation length at blood draw, race, education level, partner's BMI, parity, BMI at blood draw, and GWG rate before blood draw, greater CRP was associated with higher subsequent GWG. In comparison to women in the first quartile, those in the fourth quartile experienced 0.04 (95% CI: 0.01, 0.07) kg/week higher GWG (P trend=0.001). Neither IL-6 nor TNF-alpha was related to GWG. Conclusions: Prenatal inflammation may contribute to gestational weight gain. This finding merits additional investigation in other pregnancy cohorts.

A82

MATERNAL SERUM MARKERS OF LIPID METABOLISM IN RELATION TO NEONATAL ANTHROPOMETRY. *NS. Boghossian, P. Mendola, C. Robledo, EH. Yeung. (Division of Intramural Population Health Research, Eunice Kennedy Shriver National Institute of Child Health and Human Development, Bethesda, MD)

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

A83

PREVALENCE OF ADEQUATE GESTATIONAL WEIGHT GAIN ACCORDING TO THE 2009 INSTITUTE OF MEDICINE GUIDELINES. Deputy NP*, Sharma AJ, Kim SY, Hinkle SN *Presenting author (Nutrition & Health Sciences Program, Graduate Division of Biological and Biomedical Sciences, Laney Graduate School, Emory University. Atlanta, GA)

In 2009, the Institute of Medicine revised guidelines for gestational weight gain (GWG) by adopting World Health Organization body mass index (BMI) categories and providing a recommendation for obese women. Recommended GWG ranges depend on pre-pregnancy BMI: underweight (BMI<18.5) 28-40 pounds; normal (BMI 18.5-24.9) 25-35 pounds; overweight (BMI 25.0-29.9) 15-25 pounds; obese (BMI≥30.0) 11-20 pounds. We describe prevalence of GWG below, within and above recommendations and identify predictors of GWG outside recommendations. We used data from women delivering full-term (≥37 weeks), singleton infants in 24 states and New York City participating in the 2010 Pregnancy Risk Assessment Monitoring System. BMI and GWG were calculated from self-reported pre-pregnancy weight and height, and delivery weight from the birth certificate. We estimated adjusted odds ratios (OR) and 95% Confidence Intervals (CI) for GWG below or above compared to within recommendations. Overall, 21% of women gained below, 32% within and 47% above recommendations. Pre-pregnancy BMI was the strongest predictor of GWG. Underweight and obese class III women had increased odds of GWG below recommendations (OR=1.39, CI: 1.08, 1.80; OR=1.99, CI: 1.36, 2.91, respectively). Overweight and obese class I women had the highest odds of GWG above recommendations (OR=2.70, CI: 2.36, 3.08; OR=2.81, CI: 2.32, 3.40, respectively). Non-Hispanic black race, unmarried status, parity≥1, education<12 years, and delayed prenatal care were associated with increased odds of GWG below recommendations. Nulliparity and smoking cessation were associated with increased odds of GWG above recommendations. Most women gained outside recommendations indicating a need for interventions to ensure appropriate GWG.

A84

MATERNAL CAFFEINE CONSUMPTION DURING PREGNANCY AND THE RISK OF OBESITY IN OFFSPRING: A PROSPECTIVE COHORT STUDY WITH 15 YEARS OF FOLLOW-UP. De-Kun Li*, MD, PhD (Division of Research, Kaiser Foundation Research Institute, Kaiser Permanente, Oakland, CA; Department of Health Research and Policy, School of Medicine, Stanford University, Stanford, CA), Jeannette Ferber, MPH, Roxana Odouli, MSPH

Objectives: The present study examines the impact of high maternal caffeine intake during pregnancy on the risk of childhood obesity in offspring. Design: A prospective cohort study of pregnant women with 15 year follow-up of their offspring. Setting: Kaiser Permanente member population in the San Francisco area. Participants: Pregnant women and their offspring from the index pregnancy. Exposure(s): Maternal caffeine intake during pregnancy. Main Outcomes: Obesity measured by BMI >95th percentile against the CDC age- and gender-specific standard among the offspring of the index pregnancy ascertained from medical charts up to 15 years of age. Results: After controlling for potential confounders, maternal daily caffeine intake ≥150 mg/d was associated with more than twice the risk of childhood obesity: odds ratio (OR) =2.1, 95% confidence interval (CI): 1.22-3.50, compared with no caffeine intake. Daily caffeine intake < 150 mg/d was not associated with statistically significant risk of childhood obesity. The association was not dependent on the source of caffeine. There was a dose-response relationship with increasing amount of maternal caffeine intake associated with further increased risk of obesity in offspring. The association was stronger for persistent obesity. There was no relationship with transitory obesity (not likely true obesity). Conclusions: Maternal intake of high amount of caffeine during pregnancy is associated with increased risk of childhood obesity in offspring.

A85

ASSOCIATIONS OF EARLY AND LATE GESTATIONAL WEIGHT GAIN WITH OFFSPRING BIRTHWEIGHT. PL Wander* (University of Washington, Seattle, WA); C Sitlani (University of Washington, Seattle, WA); SE Badon (University of Washington, Seattle, WA); DS Siscovick (University of Washington, Seattle, WA); MA Williams (Harvard University, Boston, MA); DA Enquobahrie (University of Washington, Seattle, WA)

Introduction Higher gestational weight gain (GWG) is associated with higher birthweight (BW); however, associations of early- and late-pregnancy GWG with BW have not been rigorously examined. Methods We studied 3624 mother-offspring pairs from Omega, a cohort study based in Seattle, WA. Demographics and history were obtained by questionnaire at an average of 16 weeks gestation. GWG and BW were abstracted from medical records. GWG (kg) was characterized by total, early (<20 weeks), and late ($\geq$20 weeks). We used multivariable linear regression to calculate mean differences and 95% CIs relating GWG to BW overall and in sex-stratified analyses. Models were adjusted for maternal age, pre-pregnancy BMI, height, parity, race, smoking, education, medical comorbidities, offspring sex, and gestational age at delivery. Results Average total, early, and late GWG were 16.3, 6.8, and 9.5 kg. A 1kg change in GWG was associated with a 16.4g change in BW (95% CI 13.8-18.9, $p< 0.0001$). A 1kg change in early GWG was associated with a 14.5g change (95% CI 10.8-18.2, $p<0.0001$) in BW adjusted for late GWG. A 1kg change in late GWG was associated with an 18.8g change (95% CI 14.8-22.9, $p<0.0001$) adjusted for early GWG. Overall, there was no evidence the association differed for early vs. late GWG (Wald test $\chi2$ 3.99, $p=0.0459$). Associations were significant in sex-stratified models for males and females. Formal sex interaction terms were not significant ($p=0.424$ early, $p=0.543$ late). There was a suggestion the association was different for early vs. late GWG among female infants; however, this result did not reach significance ($\chi2$ 3.60, $p=0.0578$). Discussion Early and late GWG are associated with BW. Understanding GWG across pregnancy will help guide obstetric recommendations.

MATERNAL DIET DURING PREGNANCY AND EXCESS GESTATIONAL WEIGHT GAIN. Sridhar SB* (Kaiser Permanente Northern California, Division of Research, Oakland, CA), Xu F, Ferrara A, and Hedderson MM

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

A87

GESTATIONAL WEIGHT GAIN AND THE RISK OF OBESITY AMONG PRESCHOOL CHILDREN. Mgutshini NL*, Liu J, Fleischer N, Wilcox S (University of South Carolina, Columbia, SC)

Data from the 2001 Early Childhood Longitudinal Study – Birth Cohort were used to examine the association between maternal gestational weight gain (GWG) and the risk of obesity, and the possible mediating role of birth weight. The Centers for Disease Control and Prevention's growth reference charts and child's height and weight measured at age 4 or 5 years old were used to determine child's body mass index (BMI) Z-scores or obesity status ($\geq$ 95th percentile). Multiple linear or logistic regression models were used to adjust for mother's age, race, education, smoking status, prepregnancy BMI, and breastfeeding status. In this population (unweighted n=6400), 43.4% of mothers exceeded the 2009 Institute of Medicine (IOM) weight gain recommendation, while 30.2% gained weight below the recommendation. 17.6% of children were obese. We found that a 1 kg increase in the weekly rate of GWG in the second and third trimesters was associated with 0.75-unit increase in BMI Z-score (95% CI: 0.33-1.17), and 2.12 times higher odds of being obese (95% CI: 1.39-3.24). Additional adjustment for categorical birth weight indicator (small-, appropriate-, and large-for-gestational age), attenuated the estimates (Z-score: 0.64, 95% CI 0.21-1.07; obesity: OR=1.90, 95% CI 1.23-2.29). In a subsample of offspring who were born full term (unweighted n=5400), a 5-kilogram increase in total GWG was also associated with 0.15 unit increase in BMI Z-scores (95% CI: 0.07-0.24) and 1.17 times the odds of being obese (95% CI: 1.07-1.27). Our findings suggest that targeting maternal GWG is a promising approach to prevent childhood obesity.

A88

COMPARISON OF BODY MASS INDEX PERCENTILE AND PERCENT BODY FAT ON RISK FACTORS FOR TYPE 2 DIABETES MELLITUS IN CHILDREN AGED 10-14. Fernando SI* (University of North Texas Health Science Center, TX), Fulda K, Franks S, Bowman W.P., Shah D, Proffitt-Leyva R, Bawa B, Habiba N

Purpose: The growing rate of type 2 diabetes mellitus (T2DM) in children presents a critical public health problem. The present study examined the association between BMIP (Body Mass Index Percentile, a traditional indicator) with risk factors for T2DM, compared to percent body fat (PBF) with risk factors for T2DM. Methods: Data were obtained from 290 10-14 year olds in North Central Texas. During study visits, subjects' BMIPP and PBF were obtained using height/weight measurements as well as a Tanita body composition device. Associations were assessed using logistic regression models against four critical risk factors for T2DM: Average blood pressure (BP) above 95th percentile or history of high BP, family history of T2DM, Acanthosis Nigricans (AN) and a high glucose test, controlling for age, gender and race/ethnicity. Results: Among 290 subjects, 78.2% were Hispanic, with 13.4% Black. 51% were female, while age was evenly distributed (11.87±1.41). Logistic regression models found that both PBF and BMIP were significantly associated with AN (PBF: Sβ 0.584 $p<0.01$ vs. BMIP: Sβ 0.489 $p<0.05$), average systolic BP above 95th percentile (PBF: Sβ 0.219 $p<0.05$ vs. BMIP: Sβ 0.124 $p<0.05$), family history of T2DM (PBF: Sβ 0.189 $p<0.01$ vs. BMIP: Sβ 0.172 $p<0.01$), and high glucose (PBF: Sβ 0.152 $p<0.01$ vs. BMIP: Sβ 0.119 $p<0.05$). Conclusions: Data from this study provide evidence that PBF may be a better measurement of T2DM risk among children compared to BMIP. It may be beneficial for physicians to measure PBF alongside BMIP to better ascertain a patient's risk of T2DM.

A89

PREGNANCY WEIGHT GAIN IS POSITIVELY CORRELATED WITH VISCERAL FAT GAIN AMONG OBESE WOMEN. Vesco KK*, King JC, Vargas J, Leo MC, Smith KS, Purnell JQ, Stevens VJ (Kaiser Permanente Northwest Center for Health Research, Portland, OR, USA)

Visceral fat (VF) is metabolically active endocrine tissue and increased amounts are associated with insulin resistance (IR). IR increases with advancing gestation. Understanding the change in VF and its potential contribution to IR during pregnancy could help inform studies of fetal development and maternal health during pregnancy and postpartum. We conducted a longitudinal pilot study using abdominal ultrasound to determine changes in VF among obese pregnant women. Maternal weight and VF were measured in 26 participants at a mean±SD of 15.2±2.3 weeks gestation (baseline) and again at 3.3±1.1 weeks postpartum. With participants in the supine position and the ultrasound probe placed along the linea alba, visceral fat thickness (VFT) was measured from the inner border of the rectus abdominus muscle to the anterior wall of the aorta 1 cm above the umbilicus. Mean weight was 96.2 kg (BMI 35.3 kg/m2) and VFT was 57.4 mm at baseline. Change in weight showed a strong correlation with change in VFT ($r=0.56$, $p<0.01$). In a multiple regression including change in other body composition measures, there was a positive relationship between change in VFT with change in weight from early pregnancy to the postpartum period ($\beta=0.57$, $p<0.01$). These data suggest weight gain during pregnancy among obese women leads to an increase in VF stores. Excessive VF gain may adversely affect fetal health by increasing IR and, if retained long-term after delivery, maternal health by increasing risk for diabetes and cardiovascular disease. Future studies should evaluate visceral fat, weight, and insulin sensitivity in tandem during pregnancy.

A90

FIRST TRIMESTER GESTATIONAL WEIGHT GAIN IS ASSOCIATED WITH WEIGHT CHANGE, WAIST CIRCUMFERENCE AND SYSTOLIC BLOOD PRESSURE IN A LARGE COHORT. Walter JR*, Perng W, Kleinman KP, Rifas-Shiman SL, Rich-Edwards JW, Oken E (Harvard Medical School, Department of Population Medicine, Boston, MA)

We investigated the association of gestational weight gain timing with postpartum weight gain, waist circumference, and cardio-metabolic outcomes. Adjusted multiple linear regressions were applied to determine associations between the rate of first, second, third trimester and total gestational weight gain with maternal outcomes for a prospective cohort of pregnant women (n=801 subjects) stratified by pre-pregnancy BMI. Median age at enrollment was 33.9 years (range: 16.4, 44.9). 65.2% were white. Mean ± SD rate of gestational weight gain was 0.38 ± 0.14 kg/week. Women gained faster during second (0.22 ± 0.23 kg/week) and third trimesters (0.44 ± 0.23 kg/week) compared to the first (0.22 ± 0.23 kg/week). Only the rate of first trimester weight gain was positively associated with increased postpartum weight, waist circumference, and systolic blood pressure for all women at three years postpartum. Increases in early weight gain were associated with greater postpartum weight change and waist circumference when compared to increases in the rate of total gestational weight gain. For normal, overweight, and obese women, each standard deviation increase in the rate of first trimester gestational weight gain translated to increases of 0.53 kg, 0.53 kg and 0.60 kg, respectively. At 7 years postpartum, early gestational weight gain rate was the only factor associated with increased weight and waist circumference for normal and overweight women. First trimester gestational weight gain is the most consistently associated measure for postpartum weight increase, waist circumference and systolic blood pressure for all women. Initiatives targeting early gestational weight may be most beneficial.

A91

EXCESSIVE GESTATIONAL WEIGHT GAIN IS ASSOCIATED WITH CHILDHOOD BODY COMPOSITION AT SEVEN YEARS IN AFRICAN AMERICAN AND DOMINICAN CHILDREN IN THE BRONX AND NORTHERN MANHATTAN. Widen EM*, Whyatt RM, Hoepner LA, Ramirez-Carvey J, Oberfield SE, Hassoun A, Perera FP, Gallagher D, Rundle AG (Columbia University, New York, NY)

It is unclear whether gestational weight gain (GWG) is associated with childhood body composition. We examined the association between GWG and offspring size and body composition at 7 years [weight, height, waist circumference (WC), body-mass-index Z-score (BMIZ) and bioelectrical impedance analysis estimates of fat mass (FM), fat-free mass (FFM) and percentage body fat (%fat)] in African American and Dominican dyads (n=299) in the Columbia Children's Center for Environmental Health study. Sex-stratified linear regression evaluated the association between total or excessive GWG (> IOM 2009 guidelines) and outcomes, adjusting for pregravid BMI and covariates. Pregravid BMI (mean ± SD, all such values) and total GWG were 26±7 kg/m2 and 16±8 kg (63%>IOM), respectively. Excessive GWG was associated with higher FM and %fat in boys [FM β: 1.5 kg, p=0.03; %fat β: 2.4 %, p=0.02] and higher FM, FFM, BMZ, weight and height in girls [FM β: 1.2 kg, p=0.02; FFM β: 1.2 kg, p=0.02; BMIZ β: 0.40, p=0.02, Weight β: 2.94 kg, p=0.002, Height β: 1.80 cm, p=0.04]. Total GWG was associated with higher FM, FFM, %fat, WC, and weight in boys [FM β: 0.14 kg, p=0.003, FFM β: 0.11 kg, p=0.009; %fat β: 0.18 %, p=0.01; WC β: 0.22 cm, p=0.02; weight β: 0.21 kg, p=0.02] and higher FFM and weight in girls [FFM β: 0.07 kg, p=0.02; weight β: 0.15 kg, p=0.02]. Excessive GWG was highly prevalent and was associated with several childhood size and body composition outcomes. Strategies to support healthy weight gain in pregnancy are warranted.

A92

BREASTFEEDING OUTCOMES AMONG PARTICIPANTS IN THE HEALTHY MOMS STUDY, A RANDOMIZED TRIAL TO LIMIT GESTATIONAL WEIGHT GAIN AMONG OBESE WOMEN. CL Eckhardt* (School of Community Health, Portland State University, Portland, OR), KK Vesco (Kaiser Permanente Center for Health Research, Portland, OR), N Karanja (Kaiser Permanente Center for Health Research, Portland, OR), MC Leo (Kaiser Permanente Center for Health Research, Portland, OR), KS Smith (Kaiser Permanente Center for Health Research, Portland, OR), VJ Stevens (Kaiser Permanente Center for Health Research, Portland, OR)

Maternal obesity is often associated with lower breastfeeding initiation and duration rates. We describe breastfeeding practices and test for intervention effects among obese pregnant women enrolled in a randomized trial aimed at limiting gestational weight gain, with intervention components that included breastfeeding education. Obese women (n=114) in the Kaiser Permanente Northwest HMO were recruited at 14.9±2.6 weeks gestation. The intervention group received dietary counseling and a weekly group-based behavioral intervention. Controls received one-time dietary counseling. Infant feeding data were collected via questionnaire at 4, 6, 9 and 12 months postpartum. Questionnaire return rates varied from 54% at 6 months to 75% at 6 and 9 months. There were no breastfeeding differences by group, thus results are pooled. Almost all (97%) of the women initiated breastfeeding. By the four month questionnaire, 59% (n=51) of women were breastfeeding only, 20% practiced mixed-feeding (n=23), and 17% (n=15) were formula-feeding only. Breastfeeding prevalence diminished over subsequent survey points. Approximately 35% of breastfeeding and mixed-feeding mothers, and 47% of formula-feeding mothers had introduced solid foods and/or other beverages by the 4 month survey. By 12 months, 56% of moms who initiated breastfeeding had weaned. Reasons included concern over milk production (48%), baby loss of interest (22%), and difficulties managing pumping (22%). Breastfeeding initiation was almost universal, but continuation diminished quickly despite available outpatient lactation support. Attention should be given to decreasing barriers to pumping in the workplace and to accessing lactation services, and to discouraging premature introduction of solid foods, which may reduce milk production.

A93

MATERNAL ANXIETY AND INFLAMMATION ASSESSED IN OVERWEIGHT AND OBESE WOMEN 6 TO 12 MONTHS AFTER DELIVERY. JM Catov*, DJ Abatemarco, M Flint (University of Pittsburgh, Pittsburgh PA)

Pre-pregnancy overweight and obesity combined with post-partum weight retention (PPWR) adversely affect both maternal and child health, and race disparities persist. We considered that trait anxiety assessed 6-12 months after delivery would be related to a pro-inflammatory signature independent of BMI and PPWR. A cohort of overweight or obese women (65% African American) were recruited early in pregnancy and followed through, on average, 9 months post partum (n=217). Women completed the Speilberger Trait Anxiety Inventory (STAI) at the post partum visit. Pro-inflammatory (Interleukin-2 [IL-2] and Interferon-gamma [IFN]) and anti-inflammatory cytokines (Interleukin-10 [IL-10] and Interleukin-1 receptor antagonist [IL-1RA]) were assessed using Luminex assays in samples collected at the same visit. Ratios of pro and anti-inflammatory cytokines were also evaluated, and PPWR was weight at post partum visit – pre pregnancy weight. Pro- and anti-inflammatory cytokines were correlated (spearman correlations 0.26 to 0.61, all p<0.01); IL-1RA was modestly correlated with PPWR (r=0.14, p=0.047). No individual cytokines were related to anxiety scores. In contrast, the ratio of IFN to IL-1RA (increasing ratio indicates a more pro- to anti-inflammatory signature) was positively correlated with anxiety scores (r=0.29, p<0.01), independent of pre pregnancy BMI and PPWR. Similar results were detected for the IFN to IL-10 ratio (r=0.46; p=0.01). The balance of pro- and anti-inflammatory markers are essential for homeostasis, and our results are consistent with the possibility that chronic anxiety among overweight and obese women may disrupt this inflammatory signature. Our results raise the possibility that efforts to reduce PPWR may need to address maternal anxiety.

A94

PRECONCEPTION BMI TRAJECTORY PREDICTS GESTATIONAL WEIGHT GAIN.

Boone-Heinonen J,* Marwardt S, Rdesinski R, Hollombe CB, Vesco KK, LC Messer (Oregon Health & Science University; Portland, OR)

BACKGROUND: Maternal obesity and gestational weight gain (GWG) are independent predictors of poor birth outcomes and life course health in the offspring. However, weight change before pregnancy may affect GWG by altering appetite or motivation to control weight during pregnancy. This hypothesis has not been tested, perhaps due to lack of preconception data. METHODS: We used electronic medical record data from 7,936 women with singleton live births delivered at an integrated health system between 2000 and 2010. Using growth mixture modeling, we derived classes of body mass index (BMI) trajectories from 2 years pre-pregnancy until the start of pregnancy. In multinomial logistic regression analysis, we estimated effects of preconception BMI trajectory classes on adherence to GWG recommendations, adjusting for maternal age and health insurance status (socioeconomic indicator). RESULTS: Four preconception BMI trajectories were identified: C1: Normal weight, stable; C2: Obese, increasing BMI; C3: Severe obese, stable; C4: Obese, decreasing BMI. Compared to C1, C2 was less likely to gain weight within GWG recommendations; that is, C2 had greater odds of gaining less than and greater than recommended [OR (95% CI): 1.48 (1.22, 1.80), 1.61 (1.36, 1.90)]. Compared to C1, C3 was associated with less than recommended GWG [1.99 (1.41, 2.80)] and C4 was associated with excessive GWG [1.79 (1.25, 2.57)]. CONCLUSIONS: Obese women who lost weight prior to pregnancy were more likely exhibit excessive GWG. Study findings suggest that preconception weight loss among obese women, while potentially beneficial, may still require tailored weight management strategies during pregnancy.

A95

PERCEIVED MATERNAL STRESS AND EMOTIONAL WELLBEING AS RISK FACTORS FOR MISCARRIAGE. Meaney S* Corcoran P, Gallagher S, Lutomski JE, Spillane N, O'Dongohue K (National Perinatal Epidemiology Centre,University College Cork, Ireland)

Background: Miscarriage is the most common adverse outcome in pregnancy. Investigations suggest numerous risk factors however the cause remains poorly understood. The study aimed to examine the contribution of an array of psychological factors to risk of miscarriage. Methods: A cohort study was conducted in a large, tertiary hospital (8,500 deliveries per annum) in the Republic of Ireland in 2012. Women randomly selected at their first booking visit (10-14wks) were asked to complete a detailed lifestyle questionnaire, which included common risk factors for miscarriage. Emotional wellbeing, social support, life orientation and perceived stress were assessed using the following validated psychometric tests; the RAND 36-Item Health Survey, the Maternity Social Support Scale, the Revised Life Orientation Test and the Perceived Stress Scale. All participants were followed up at 20 weeks gestation to determine pregnancy outcome. Logistic regression was conducted to assess associations with risk of miscarriage. Results: Of the 417 participants, 32.1% (n=134) had a confirmed miscarriage at follow-up. After adjustment, women with high levels of perceived stress had an increased odds of miscarriage (OR: 1.97; 95% CI: 1.14-3.44) relative to women with low perceived stress (44.1% vs. 26.0%). While high emotional wellbeing was somewhat protective (OR: 0.68; 95% CI: 0.38-1.11) relative to women with low emotional wellbeing (26.8% vs. 35.9%). Maternal social support and life orientation were not associated with miscarriage. Conclusion: Perceived stress and low emotional wellbeing may increase risk of miscarriage. Early assessment and greater support to vulnerable women may be important and warrants further investigation.

RISK OF MISCARRIAGE ASSOCIATED WITH MATERNAL AND PATERNAL SMOKING. Meaney S*, Corcoran P, Lutomski JE, Spillane N, O' Donoghue K (National Perinatal Epidemiology Centre, University College Cork, Ireland)

Background: Maternal smoking has been associated with increased risk of miscarriage. However little is known about the influence of paternal smoking. The study aimed to examine maternal and paternal smoking as risk factors for miscarriage. Methods: A cohort study was conducted in a large, tertiary hospital (8,500 deliveries per annum) in the Republic of Ireland in 2012. Women randomly selected at their first booking visit (10-14wks) were asked to complete a detailed lifestyle questionnaire including maternal and paternal smoking and the mother's exposure to partner's smoke. All participants were followed up at 20 weeks gestation to determine pregnancy outcome. Results: Of the 417 participants, the prevalence of maternal and paternal smoking was 26.3% and 30.7%, respectively, and 13.4% of mothers were exposed to their partner's smoke. One in three (n=134, 32.1%) had a confirmed miscarriage at follow-up. Miscarriage was not associated with maternal smoking (30.6% for non-smokers versus 32.4% for smokers; P=0.737) or paternal smoking (31.2% for non-smokers versus 32.8% for smokers; P=0.763). A higher proportion of women exposed to their partner's smoke experienced miscarriage (44.2% versus 29.9%; Odds ratio=1.86, 95%CI=1.03-3.38; P=0.038). The association remained even after adjustment for the mother's own smoking (Adjusted odds ratio=2.22, 95%CI=1.12-4.40; P=0.022). Conclusion: Our findings suggest an association between mother's exposure to partner's smoke and miscarriage. That risk of miscarriage could be influenced by passive smoking but not active smoking is biologically implausible. However, a mother's exposure to her partner's smoke may be a proxy for other risk factors that warrant further investigation.

A97

CAFFEINE AND CAFFEINATED BEVERAGE CONSUMPTION AND RISK OF SPONTANEOUS ABORTION. Hahn, KA*, Wise LA, Rothman KJ, Mikkelsen EM, Brogly SB, Hatch EE (Boston University School of Public Health, Boston, MA)

Introduction: Caffeine consumption has been hypothesized as a risk factor for spontaneous abortion (SAB) since the 1980s, but published results are conflicting. Methods: We examined risk of SAB in relation to caffeine and caffeinated beverage consumption among 2833 Danish women participating in an Internet-based prospective cohort study. We calculated daily caffeine consumption based on self-reported servings of coffee, tea and cola within 90 days before conception. Total caffeine was categorized as <100, 100-199, 200-299 and ≥300 mg per day. Daily consumption of individual beverages was also considered. We used discrete-time Cox regression to estimate risk ratios (RRs) and 95% confidence intervals (CI) for the associations of interest, controlling for potential confounders. Results: Consumption of ≥300 mg/day of caffeine was associated with a 28% increased risk of SAB (RR: 1.28; 95% CI: 0.99, 1.66). Coffee consumption (3+ cups/day) was associated with an increased risk of SAB compared with no consumption (RR: 1.40; 95% CI: 0.91, 2.15). Consumption of 2+ cups/day of cola, black tea, and herbal tea was associated with decreased risks of SAB (RRs: 0.83, 0.78, 0.81, respectively). There is potential for residual confounding by smoking and other variables which would be expected to inflate the observed RRs. Conclusions: Higher levels of caffeine and coffee consumption are associated with an increased risk of SAB. Cola, black tea, and herbal tea were inversely associated with SAB.

A98

HISTORY OF ORAL CONTRACEPTIVE USE AND RISK OF SPONTANEOUS ABORTION. Hahn, KA*, Hatch EE, Rothman KJ, Mikkelsen EM, Brogly SB, Wise LA (Boston University School of Public Health, Boston, MA)

Introduction: Pregravid oral contraceptive (OC) use has been associated with a decreased risk of spontaneous abortion (SAB) in some but not all studies. Little is known about the influence of dose of estrogen or type of progestin on risk of SAB. Methods: We assessed SAB risk in relation to recency and total duration of OC use, as well as dose and generation of the most recent OC used, among 4862 Danish participants from a prospective cohort study. We divided recency of OC use into the following categories: 0-1, 2-6, 7-12, and >12 months. The categories of duration were: <4, 4-7, 8-11, and ≥12 years. We used discrete-time Cox regression to estimate risk ratios (RRs) and 95% confidence intervals (CI), controlling for potential confounders and mutually adjusting for recency and duration of OC use. Results: Use of OCs within 0-1 months of conception was associated with an 18% increase in risk of SAB vs. use >1 year before conception (RR: 1.18; 95% CI: 0.88, 1.57). Women who most recently used a 4th generation progestin had 1.14 times the risk of SAB compared with women who used a 3rd generation progestin (95% CI: 0.89, 1.48). Overall, duration of OC use and dose of estrogen were not materially associated with SAB risk. Conclusions: More recent OC use and use of a 4th generation progestin as the recent formulation were independently associated with a small increase in SAB risk. Dose of estrogen and duration of OC use were not materially associated with risk.

A99

A RETROSPECTIVE OBSERVATIONAL STUDY OF SECOND-TRIMESTER MISCARRIAGE. Morris A*, Meaney S, Spillane N, O'Donoghue K (Anu Research Centre, Department of Obstetrics & Gynaecology, University College Cork, Cork University Maternity Hospital, Ireland)

In the UK and Ireland, second-trimester miscarriage is defined as pregnancy loss after the 14th and before the 24th week of gestation[1]. Those who suffer a second-trimester loss represent a small cohort but experience significant morbidity associated with both their index loss and subsequent pregnancies[1]. The literature on this topic, however, is limited. This study aimed to assess maternal characteristics of second-trimester loss. A retrospective observational study of women who experienced a second-trimester miscarriage was undertaken in a large, tertiary hospital (8,500 deliveries per annum) in the Republic of Ireland. All cases between July 2009 and December 2012 were identified. Charts were reviewed; examining maternal demographics, mechanism of pregnancy loss and inpatient course. During this 3.5 year period, 150 women experienced a second-trimester miscarriage; with a mean age of 33.7 years (SD:5.52) and mean BMI of 27.38 (SD:6.73). 32.7% were primiparous. 12.4% had previously experienced a second-trimester loss. The average gestation of loss was 18+2 weeks (SD:30 days). 64% of losses were intra-uterine deaths with 20% following pre-term premature rupture of membranes and 17% following preterm labour. 40.6% delivered spontaneously however 56% required medical induction of labour with a further 2% requiring surgical evacuation. All patients required inpatient admission with a mean stay of 2.6 days (SD:2.98); 36.3% required antibiotic therapy. 24.7% required manual removal of placenta. Identification of maternal and pregnancy characteristics of second-trimester loss may aid optimisation of risk-stratification and surveillance in future populations, thereby reducing morbidity. Our understanding would benefit from more populous prospective case-control studies.

A100

REPORTS OF CHILDHOOD EXPERIENCE FROM YOUNG ADULT TWINS AND THEIR MOTHERS. Hwang AE*, Cozen W, Hamilton AS, Gauderman J, Bernstein L, Cockburn MG, Zadnick J, Hopper JL, Mack TM (University of Southern California, Los Angeles, CA)

Childhood exposures are increasingly linked to adult diseases. In case-control studies, the subjects' early childhood health history is poorly assessed by recall. Identical twins customarily compare their childhood experience, and these comparisons can be validated by their mothers. We asked members of 126 identical twin pairs (mean age = 31 yrs) to provide information about the frequency and magnitude of their own childhood illnesses, developmental milestones and body size (self-report), and then asked the twins to compare their experience relative to their co-twin's (intra-pair comparison). We then interviewed their mothers (mean age= 56 yrs) in order to validate the responses. More complete information (i.e. fewer "don't know" or "same") was obtained from the intra-pair comparison questions than from self-reports. Agreement between co-twins (R = 0.88, p = <0.0001) and between twins and their mothers (R=0.77, p =<0.0001) was high for most responses. Even more complete information was obtained from the mothers' intra-pair comparisons of their twins' experiences than from the twins' own intra-pair comparisons (33% versus 17%). Certain individual twins consistently reported more subtle distinctions. We conclude that intra-pair comparisons of the twins' early childhood health experience by the twins and their mothers can serve as a useful and informative analytic tool.

A101

LINKING DATABASES ON PERINATAL HEALTH: A REVIEW OF THE LITERATURE AND CURRENT PRACTICES IN EUROPE. Marie Delnord*, Katarzyna Szamotulska, Ashna Monhangoo, Mika Gissler, Carmen Barona, Henrique Barros, Sylvie Berrut, Jim Chalmers, Nirupa Dattani, Luule Sakkeus, Isira Zile, Jennifer Zeitlin and the Euro-Peristat group *INSERM, Perinatal, Obstetrical and Pediatric Epidemiology Research Team, Center for Epidemiology and Biostatistics (U1153), Paris, France

Background: International comparisons of perinatal health are complicated by the heterogeneity of data sources on pregnancy, maternal and neonatal outcomes. Record linkage by harmonizing data systems, enhances coverage, increases the information available about each birth and can improve the validity and quality of routine data. We sought to assess the extent to which routine sources are linked for perinatal health research and reporting. Methods: We conducted a systematic review of the literature by searching PubMed for studies on perinatal health citing linkage of routine databases or a cohort study to a routine database from 2001 to 2011.We also surveyed European health monitoring professionals participating in the Euro-Peristat project about use of linkage for national perinatal health monitoring. Results: 535 studies fit our inclusion criteria. Nearly half were from the US, Sweden and the UK; a further 24 countries contributed at least one publication. Most studies linked combinations of vital statistics data, hospital records, medical birth registers and cohort studies. Other sources were specific registers (cancer (N=61), congenital anomaly (53) and ART (19)) as well as census (63), occupational (43), insurance (23) prescription (20), and educational (10) databases. Eighteen of 29 (62%) European countries reported using at least one linked dataset in 2010 to derive Euro-Peristat perinatal indicators and 5 used 2 or more. Conclusions: Studies using linkage are concentrated in a few countries and routine linkages are not systematic practice in Europe. Broader adoption of linkage could yield substantial gains for research and surveillance of perinatal health nationally and internationally.

A102

A HISTORY OF OVARIAN SURGERY IS NOT ASSOCIATED WITH AN INCREASED RISK OF A TRISOMIC PREGNANCY. Honorato TC*, Haadsma ML, Andersen AN, Henningsen AK, Lidegaard Ø, Pinborg A, Skovlund CW, Hoek A, Groen H

BACKGROUND: The risk of a trisomic pregnancy rises exponentially in ageing women, especially above the age of 35. This results from meiotic errors in the oocytes, whose number decreases with age. Ovarian surgery also reduces the number of oocytes, but it is unclear whether this contributes to a diminished quality of recruited oocytes, e.g. aneuploidy rates, irrespective of age. OBJECTIVE: To assess whether ovarian surgery increases the risk of trisomic pregnancy. METHODS: We performed a case-control study on data from Danish registries (from 2000 to 2011) regarding pregnancies in the general population. Cases (n= 1723) were women with a trisomic pregnancy regardless of pregnancy outcome. Controls (n=6850) had a live born child without a trisomy. Cases and controls were matched on maternal age at conception and year of conception. Generalized Estimating Equations analysis was used to evaluate differences in trisomic pregnancies proportions between women with (n=218) and without (n=8355) ovarian surgery prior to the index pregnancy. RESULTS: The risk of a trisomic pregnancy in the surgery group (46/218; 21.1%) was not significantly different (OR=1.00 95%CI [0.99-1.01] P=0.87) from the non-surgery group (1677/8355; 20.1%). Additional analysis showed no statistically significant effect of the indication of surgery, maternal age at pregnancy and surgery or the time interval between surgery and pregnancy on trisomic pregnancy risk. CONCLUSIONS: A history of ovarian surgery was not associated with an increased risk of a trisomic pregnancy. Our results do not support the hypothesis that oocyte quantity is related to oocyte quality and increased occurrence of aneuploidy.

A103

TREATMENT-INDUCED AMENORRHEA IN CANCER SURVIVORS: TEMPORARY OR PERMANENT? Hyman ME*, Fothergill A, Chin HB, Hartnett KP, Mertens AC, Spencer JB, Howards PP (Emory University, Atlanta, GA, 30322)

Some cancer therapies adversely affect the reproductive system, which may manifest during treatment through amenorrhea, defined as at least six months without menses. Although chemotherapy-induced amenorrhea has been identified in breast cancer survivors, it is unclear how persistent the absence of menstruation is, and whether it occurs in women with other cancer types and treatments. The FUCHSIA Women's Study recruited female cancer survivors who were diagnosed with cancer between the ages of 20-35, and were at least 2 years post-diagnosis at the time of recruitment (median=7 years, interquartile range (IQR): 5-11). At the time of cancer treatment, 1,045 women had not had a hysterectomy. Among the subset that received chemotherapy (N=599), 51.8% had amenorrhea, and menses never returned in 14.4%. The median length of temporary amenorrhea in this group was 10.5 months (IQR=7-13.5). Women who had radiation without chemotherapy were less likely to report amenorrhea (5.7% any and 2.5% permanent). Among women who received chemotherapy, those diagnosed at older ages (30-35 versus 20-29) were more likely to experience permanent amenorrhea (adjusted odds ratio (aOR)=2.3, 95% confidence interval (CI): 1.1, 4.9). Advanced cancer stage at diagnosis (stage 3-4 versus stage 0-2) was also associated with permanent amenorrhea (aOR=2.2, 95% CI: 1.1, 4.4). Early age at menarche (<12 versus 12 years) also appeared to be associated with permanent amenorrhea, although the estimate was imprecise (aOR=1.8, 95% CI: 0.8, 4.4). Chemotherapy is associated with the loss of menses, and factors such as advanced age and stage may increase the risk of premature menopause.

A104

STROKE IN ADULTS BORN PRETERM – THE HELSINKI BIRTH COHORT STUDY 1924-1944. E Kajantie* C Osmond, JG Eriksson

BACKGROUND. Each year ~15 million babies, 11% of all newborns worldwide, are born preterm, before 37 weeks of gestation. Adults born preterm have increased risk factors of stroke including higher blood pressure and higher rates of type 2 diabetes than those born at term. Whether they actually have higher rates of stroke has been little studied, with inconsistent results. METHODS. We studied 19115 people born in Helsinki between 1924-1944, living in Finland in 1971 and with reliable data on length of gestation, calculated from last menstrual period. Stroke diagnoses came from comprehensive validated hospital discharge and death registers. Data were analyzed by Cox regression, stratified by sex and year of birth and adjusted for childhood socio-economic position. RESULTS. 137 subjects(0.7%) were born early preterm (<34 weeks of gestation) and 1006(5.3%) late preterm (34 to <37 weeks). 1805(9.4%), 1082(10.9%) men and 723(7.8%) women, had had stroke. Hazard ratios for stroke were 0.86 (0.71,1.04) for those born preterm; 0.83 (0.50,1.38) for early and 0.86 (0.70,1.36) for late preterm. For stroke before 65 years, HR for preterm was 0.76 (0.57,1.02), and after 65 years, 0.94 (0.74,1.21). For hemorrhagic stroke, it was 0.86 (0.58,1.30), for hemorrhagic stroke before 65 years 0.53 (0.27,1.04) and for thrombotic stroke 0.83 (0.65,1.04). CONCLUSIONS. We found no evidence of an increased risk of stroke in adults born preterm. If anything, the risk of stroke before 65 years may be decreased. Possible reasons include survivor bias, competing mortality from other causes and unknown factors that counteract the well-established risk factors.

A105

RECOMMENDATIONS RECEIVED BY YOUNG FEMALE CANCER SURVIVORS ON WHETHER TO POSTPONE PREGNANCY. Hartnett KP*, Chin HB, Hyman ME, Spencer JB, Mertens AC, Fothergill A, Howards PP (Emory University, Atlanta, GA, 30322)

Many cancer survivors report that having children after treatment is one of their most important concerns. When advising survivors on whether to postpone pregnancy, clinicians must weigh many factors. The FUCHSIA Women's Study interviewed women ages 22-45 diagnosed with cancer between ages 20-35. All invasive cancers and in situ breast cancers were eligible except non-melanoma skin cancer. Of 1,122 survivors able to become pregnant, 34.5% said a health professional told them how long to wait after treatment before trying to conceive. Among the 307 survivors told how long to wait, 25% said less than a year, 30% 1 year to less than 2 years, 25% 2-4 years, 17% 5 years, and 3% more than 5 years. Among thyroid cancer survivors, the most common recommendation (66%) was 6-12 months. The modes for breast cancer survivors were 5 years (34%), 1 year (22%), and 2 years (13%), likely because many require long-term treatment with hormonal medications such as Tamoxifen that can cause birth defects. The odds of not having a conversation about how long to postpone pregnancy after treatment were higher among younger women at diagnosis (age 20-24 vs. 30-35: adjusted odds ratio (aOR) = 2.0, 95% confidence interval (CI) = 1.1, 3.8) and those who already had a child at diagnosis (aOR=3.0, 95% CI = 2.1, 4.4). The variability in recommendations likely reflects differences in patient prognosis, treatment and desire for children, as well as a scarcity of evidence on best practices.

A106

FERTILITY COUNSELING AT CANCER DIAGNOSIS AND LATER LIFE SATISFACTION WHEN FACING POTENTIAL IMPAIRED FERTILITY. Fothergill A*, Chin HB, Hyman ME,Hartnett KP, Mertens AC, Spencer JB, Howards PP (Emory University, Atlanta GA)

For women, the ability to have children can play an important role in overall life satisfaction, and reproductive age cancer survivors may face impaired fertility due to the side effects of some cancer treatments. Although fertility counseling is recommended at the time of cancer diagnosis, little is known about factors associated with life satisfaction when facing potential impaired fertility. The FUCHSIA Women's Study recruited reproductive aged women (22-45 years), diagnosed with young adult cancers (20-35 years), who were 2-21 years post-diagnosis (N=1,282). Study participants completed a telephone interview about their cancer and fertility experiences. Among women who had not met their reproductive goals (n=435) 20% reported being dissatisfied with their life given their potential inability to have (more) children. Even among women who had met their goals (n=337), 6.8% reported they would still be dissatisfied if unable to have (more) children. Among women willing to adopt (n=507), 16% would still be dissatisfied with their life if unable to have (more) children. Women who received fertility counseling were less likely to report being dissatisfied compared with those who were not counseled (adjusted odds ratio (aOR) = 0.62, 95% confidence interval (CI) [0.38, 0.99]), after adjusting for marital status, current age, race, having met their reproductive goal, and feeling they received enough fertility information. These results suggest that having fertility counseling may have benefits even among women who may not be able to reach their reproductive goals.

A107

CANCER SURVIVORS AND EARLY MENOPAUSE. PP Howards*, ME Hyman, AC Mertens, JB Spencer (Emory University, Atlanta, GA)

Some cancer therapies may decrease fertility in cancer survivors, but little is known about their effects on the timing of menopause. The FUCHSIA Women's Study recruited reproductive-aged female cancer survivors (22-45 years), diagnosed between the ages of 20-35 years, who were at least 2 years post-diagnosis (median=7; interquartile range 5-11). All cancer types except non-melanoma skin cancer were eligible. Comparison women who had not had cancer were frequency matched to survivors on age and residence. Menopause was defined as 12 or more consecutive months through the interview date without a menstrual period. Among cancer survivors (n=1,282), 12% reported non-surgical menopause; 22% reported surgical menopause; 23% had unknown menopausal status (e.g., due to current hormonal medication use); and 43% had not experienced menopause. Among the comparison women (n=1,071), 1% reported non-surgical menopause, 7% reported surgical menopause, 32% were using hormonal medication, and 60% had not experienced menopause. Of the cancer survivors reporting non-surgical menopause (n=148), 62% started menopause during cancer treatment, but 11% started menopause later and had not ceased menstruation at the time of cancer treatment. In a Cox regression model limited to cancer survivors, where women experiencing surgical menopause were censored at the time of surgery, treatment with chemotherapy was associated with an increased hazard of menopause (hazard ratio=1.3; 95% confidence interval 0.9-1.8) compared with no chemotherapy after adjusting for cancer type and age at diagnosis. These results suggest that cancer survivors may face early menopause, which for some may not be evident at cancer treatment.

A108

DOES LATE CHILDBEARING INCREASE THE RISK FOR BEHAVIOURAL PROBLEMS IN CHILDREN? A LONGITUDINAL COHORT STUDY. J.E. Tearne[1,2], M. Robinson[1], J. Li[3], P. Jacoby[1], J. P. Newnham[4], N. McLean[2] ([1]Telethon Institute for Child Health Research, Centre for Child Health Research, The University of Western Australia; [2]School of Psychology, The University of Western Australia; [3] Social Science Research Center Berlin, Reichpietschufer 50, 10785 Berlin, Germany; [4] School of Women's and Infants' Health, The University of Western Australia at King Edward Memorial Hospital, Perth, Western Australia)

This study aimed to examine the relationship between advanced parental age and behavioural outcomes in offspring in a longitudinal cohort of children in Western Australia. The Western Australian Pregnancy Cohort (Raine) Study is a prospective cohort study of 2900 pregnancies. Offspring were followed up at ages 2, 5, 8, 10, 14, and 17. 1754 adolescents were available for follow up at 17 years. The Child Behaviour Checklist was used to measure child behaviour, including internalising (e.g. anxious/withdrawn) and externalising (e.g. aggressive/destructive) behaviours. Maternal age at the child's birth of <20 years and 20-24 years was associated with increased risk of total, internalising and externalising behaviour morbidity in offspring, relative to offspring of 25-29 year old mothers. A protective effect of maternal age of 40 and over was evident for total, internalising, and externalising behaviour morbidity, although this did not reach statistical significance. Paternal age of <20 years was also associated with an increased risk of total and externalising behaviour morbidity in offspring, compared to the reference group Paternal age of 30-34 years was associated with decreased risk of total behaviour morbidity, and paternal age of 35-39 years with decreased risk of total and internalising behaviour morbidity in offspring. No effect of paternal age 40 and over was found. This study showed no evidence that late parenthood is associated with adverse behavioural outcomes in offspring.

Plenary Session 1

Tuesday, June 24th
8:15 - 9:30 am

Counting Time Matters

SUCCESSIVE TIME-TO-PREGNANCY AMONG WOMEN EXPERIENCING HCG PREGNANCY LOSS. Sapra KJ*, McLain AC, Maisog JM, Sundaram R, Buck Louis GM (Eunice Kennedy Shriver National Institute of Child Health and Human Development, Rockville, MD, USA)

Two pregnancy cohort studies using retrospectively reported time-to-pregnancy (TTP) reported high TTP repeatability among fertile women, but no data exist for women with fecundity impairments such as pregnancy loss. Thus, we evaluated successive prospectively observed TTP among women experiencing ≥1 hCG confirmed pregnancy losses in the LIFE Study preconception cohort. 501 couples attempting to become pregnant were followed for 12 months allowing for continued participation of women with hCG pregnancy losses until censoring. Discrete Cox models with robust standard errors were used to generate fecundability odds ratios (FOR) for subsequent compared to first pregnancy attempt, accounting for cycles off contraception before study entry using left truncation. TTP was counted from the first fully-observed cycle (first day of menses observed) after study entry (TTP(first attempt)) or loss (TTP(second/third attempts)). Models were adjusted for maternal age, BMI, previous pregnancy loss before study entry (yes/no/never pregnant), and time-varying cigarette, alcohol, and caffeine consumption preconception. 70 couples had 2 attempts, while 9 had 3 attempts. Mean age was 30.3±4.3 years; 21% had a prior loss at study entry. Compared to TTP(first attempt), TTP(second attempt) was longer in 59% of women, same in 19%, and shorter in 22%. Among women with longer TTP(second attempt), 52% took ≥3 cycles longer. After adjustment, TTP(second attempt) was significantly longer than TTP(first attempt) (FOR: 0.42, 95% CI: 0.28, 0.65). TTP(third attempt) was non-significantly longer (FOR: 0.56, 95% CI: 0.11, 2.79). Unlike fertile women, TTP in women experiencing losses varies and is significantly longer after compared to before an observed loss.

CIRCADIAN RHYTHM OF PLACENTAL ABRUPTION ONSET. Miguel Angel Luque-Fernandez*, Cande V. Ananth, Sixto E. Sanchez, Chun-fang Qiu, Sonia Hernandez-Diaz, Unnur Valdimarsdottir, Bizu Gelaye, Michelle A. Williams (*Department of Epidemiology, Harvard School of Public Health, Boston, MA, US)

Background: Circadian rhythms modulate physiologic processes including cortisol and oxytocin secretion; these rhythmic changes are, in turn, associated with the timing of myocardial infarction, stroke, and other vascular disorders. The circadian variation in the onset of placental abruption (PA) is unknown. We modeled the time of PA onset and assessed whether PA presents a different pattern by gestational age, infant sex and parity. Methods: We used parametric and nonparametric methods including trigonometric and fractional polynomial regression in the framework of generalized linear models to characterize the circadian variation in PA onset. The study population included 163 singleton pregnancies with PA and a non-induced delivery between 21-44 gestation weeks in Lima, Peru, between 2009 and 2010. We replicated our analysis with 633 PA cases from the US National Collaborative Perinatal Project (NCPP, 1959-66). Results: We observed a similar diurnal pattern of the time of PA onset in both populations, with an aggregation of cases during the morning, afternoons and late evening. We found a distinct morning peak at 07h:00' ranging between 06h:00' and 08h:00' in the Peruvian study and at 10h:00', ranging between 09h:00' and 11h:00', in the NCCP study. Diurnal pattern of PA onset was similar across groupings of gestational age, infant sex and parity, with no significant differences in a harmonic term by variable interaction test. Conclusion: The time-of-onset of PA in these studies showed a predominant diurnal circadian pattern. Increased understanding of circadian rhythms in pregnancy and parturition may yield important insights toward an understanding of the pathophysiologic processes and mechanisms leading to PA.

COMPARING MODELS IN TIMING OF MISCARRIAGE RISK WITH SELF-REPORTED VITAMIN SUPPLEMENTATION AND SMOKING DURING EARLY PREGNANCY. Mukherjee S.*, Velez-Edwards D., Hartmann KE. (Vanderbilt University, Nashville, TN)

In miscarriage studies (pregnancy loss at <20 weeks), gestational age is traditionally estimated using the first day of a woman's last menstrual period (LMP). However, embryologic development may stop weeks prior to onset of clinical symptoms. In models that estimate risk of time-varying exposures in early pregnancy, this gap has the potential to bias effect estimates by over-estimating exposure time. We estimated the risk of miscarriage with common putative factors associated with loss, to determine if this gap influences effect estimates. Women were enrolled in Right from the Start (RFTS), a prospective pregnancy cohort, from 2000-2012. Participants completed study ultrasounds as well as detailed first-trimester interviews. We compared models that estimated gestational age based on self-reported LMP as well as gestational age at time of arrested development (GAAD). We used bootstrap methods to determine the extent of overestimation and potential bias for both models. There were 697 observed miscarriages among 5,513 women. The risk of miscarriage was reduced with vitamin use for both models (adjusted hazard ratio (aHR) 0.41 95% confidence interval (CI) [0.30, 0.55] LMP model; aHR=0.43 95% CI [0.27, 0.69] GAAD model). However, smoking during pregnancy was not associated with miscarriage (current smokers compared to never-smokers aHR=0.93 95% CI [0.61, 1.41] LMP model; aHR=1.09 95% CI [0.64, 1.88] GAAD model). The bootstrap ratio difference comparing models was significant for smoking use (current smokers ratio=0.85, 95% CI [0.75, 0.94]) but not vitamin use (ratio=0.93, 95% CI [0.86, 1.02]). Misattributing exposure-time in studies of miscarriage results in biased risk estimates.

LEFT TRUNCATION AS A POTENTIAL EXPLANATION FOR THE PROTECTIVE EFFECT OF MATERNAL SMOKING ON PREECLAMPSIA. Lisonkova S*, Joseph KS (University of British Columbia, British Columbia, Canada)

BACKGROUND: Although studies have consistently documented a protective effect of maternal smoking on preeclampsia, the association remains counterintuitive and unexplained. OBJECTIVE: To examine if left truncation explains the negative association between maternal smoking and preeclampsia. STUDY DESIGN: Rates of preeclampsia were estimated within a hypothetical cohort of smokers and non-smokers followed from early pregnancy, and the rate ratio of preeclampsia given smoking was estimated at 20 weeks gestation and beyond. Assumptions used to build the models included a) no direct association between smoking and preeclampsia in early pregnancy; b) similar incidence rates of pregnancies with abnormal placentation and subsequent preeclampsia among smokers and non-smokers; c) higher rates of early pregnancy loss among pregnancies with abnormal placentation; d) higher rates of early pregnancy loss among smokers; and e) modification of the effect of abnormal placentation on early pregnancy loss by smoking. Monte Carlo simulation was used to model uncertainty around assumed probabilities. RESULTS: Differential early pregnancy loss among pregnancies with and without abnormal placentation, and between smokers and non-smokers, and the synergistic effect of smoking and abnormal placentation on early pregnancy loss resulted in a negative association between smoking and preeclampsia after 20 weeks gestation. The protective effect of maternal smoking was evident in the simulated cohort under various plausible assumptions. The simulated models were also consistent with the observed higher rates of preterm birth and perinatal death observed among smokers compared with non-smokers. CONCLUSION: Left truncation bias is a plausible explanation for the inverse association between maternal smoking and preeclampsia.

MATERNAL LOW BIRTHWEIGHT AND RECURRENT PRETERM BIRTH OF OFFSPRING. I Chihara* (University of Illinois at Chicago, Chicago, IL), KM Rankin , JW Collins Jr

Background: Maternal low birthweight (<2500g; LBW) has been negatively associated with offspring gestational length. The objective of the study was to examine whether maternal LBW is a risk factor for recurrent preterm birth of the offspring among women who had a preterm birth. Methods: Data from the Illinois transgenerational birth file was used. Analysis was restricted to 14–35 year old African-American (n=1586) and white women (n=2225) who had two consecutive singleton births between 1989 and 1991, and who had a preterm birth (<37 weeks gestation) for the first of the two consecutive births. Preterm birth recurrence was defined as having two consecutive preterm births (<37 weeks gestation). Results: Preterm birth recurrence rate was higher for African-American women (34.2%) compared to white women (14.8%). Former LBW women had a higher preterm birth recurrence rate compared to women who themselves were normal birthweight among African-American (42.4% vs 32.4%) and white women (30.8 vs 14.0%). After controlling for sociodemographic and behavioral risk factors, maternal LBW was significantly associated with recurrent preterm birth among older African-American women (age 30-35 years; adjusted relative risk 1.9, 95%CI 1.1-3.2) and white women of all ages. Conclusions: Among women who recently had a preterm birth, maternal LBW is a risk factor for recurrent preterm birth for white women and for older African-American women. Our results suggest that the intergenerational effect may be interacting with accumulation of risks over the woman's life course among African-American women.

Plenary Session 2

Tuesday June 24th
10:00 – 11:15 am

Behaviors Matter

THE IMPACT OF AN EXERCISE INTERVENTION ON PHYSICAL ACTIVITY DURING PREGNANCY: THE BEHAVIORS AFFECTING BABY AND YOU (B.A.B.Y.) STUDY. M. Hawkins* (University of Massachusetts, Amherst, MA), B. Marcus (University of San Diego California, San Diego, CA), E. Stanek (University of Massachusetts, Amherst, MA), B. Braun (University of Massachusetts, Amherst, MA), G. Markenson, (BayState Medical Center, Springfield, MA). J. Ciccolo (Columbia, NY, NY), L. Chasan-Taber (University of Massachusetts, Amherst, MA)

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

ASSOCIATION OF CHILDHOOD PHYSICAL AND SEXUAL ABUSE WITH INTIMATE PARTNER VIOLENCE, POOR GENERAL HEALTH AND DEPRESSIVE SYMPTOMS AMONG PREGNANT WOMEN. Barrios YV, Zhong QY, Sanchez SE, Mascaro PA, Garcia PJ, Rondon M, Gelaye B*, Williams MA (Harvard School of Public Health, Boston, MA)

Objective: We examined associations of childhood physical and sexual abuse with risk of intimate partner violence (IPV). We also evaluated the extent to which childhood abuse was associated with self-reported general health status and symptoms of depression. Methods: In-person interviews were conducted to collect information regarding history of childhood abuse and IPV from 1,521 women during early pregnancy. Prevalent depressive symptomatology was evaluated using the Patient Health Questionnaire-9. Logistic regression procedures were used to estimate odds ratios (OR) and 95% confidence intervals (95% CI) and adjusted for confounders. Results: Any childhood abuse was associated with 2.2-fold increased odds of lifetime IPV (95%CI 1.72-2.83). Compared with women who reported no childhood abuse, those who reported both childhood physical and sexual abuse had a 7.14-fold lifetime risk of physical and sexual IPV (95%CI 4.15-12.26). The odds of experiencing physical and sexual abuse IPV in the past year was 3.33-fold higher among women with a childhood history of physical and sexual abuse as compared to women who were not abused as children (95%CI 1.60-6.89). Childhood abuse was associated with higher odds of self-reported poor health status (OR=1.32, 95% CI 1.04-1.68) and with symptoms of major depression in early pregnancy (OR=2.07, 95%CI 1.58, 2.71). Conclusion: These data indicate that childhood sexual and physical abuse is associated with IPV, poor general health and depressive symptoms in adulthood. The high prevalence of childhood abuse and the enduring effects of early trauma on women's health warrant concerted global health efforts in preventing violence.

RANDOMIZED CLINICAL TRIAL OF PRECONCEPTION LOW DOSE ASPIRIN USE AND PREGNANCY RATE: THE EAGER TRIAL (2006-2012). Schisterman EF*, Schliep KC, Silver RM, Stanford JB, Galai N, Lesher LL, Wactawski-Wende J, Lynch AM, Townsend JM, Perkins NJ, Faraggi D, Mumford SL

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

PRETERM BIRTH IN THE CONTEXT OF INCREASING INCOME INEQUALITY IN THE UNITED STATES. Wallace ME* (NICHD), Mendola P (NICHD), Chen Z (NICHD), Hwang BS (NICHD), Laughon SK (NICHD)

Income inequality may have a deleterious impact on population health. Preterm birth is a leading cause of infant morbidity and mortality in the United States, and rates are consistently higher among socioeconomically disadvantaged women. Little is known about the contextual effect of income inequality on preterm birth, an issue of increasing concern in the US where the economic divide is the largest since 1928. We sought to examine the relationship between increasing income inequality and preterm birth. We studied singleton deliveries from an electronic medical record-based cohort (n=223,502) conducted in 12 states from 2002-2008. Income inequality was determined using state-level Gini index, a measure of resource distribution in a population. Increasing income inequality was defined as a positive change in Gini index from the year prior to birth. Multi-level models were used to estimate independent effect of increasing inequality on preterm birth < 37 weeks. The preterm birth rate was higher in states when inequality increased (12.3%) compared to 10.9% where inequality was constant or decreased. After controlling for maternal demographic characteristics, markers of individual-level socioeconomic position, health behaviors, and underlying medical conditions, increasing inequality was still associated with preterm birth (adjusted odds ratio=1.07; 95% confidence interval=1.03, 1.10). The magnitude of inequality increase was less important than the increase itself and findings were similar regardless of the degree of initial inequality. Understanding processes through which increasing income inequality impact preterm delivery and identifying factors that limit risk among the most disadvantaged women should be priorities for future reproductive health research.

FRUIT AND VEGETABLE INTAKE, PESTICIDE RESIDUE STATUS, AND SEMEN PARAMETERS AMONG SUBFERTILE MEN. Y-H. Chiu*(Harvard School of Public Health, Boston, MA), M. Afeiche, P. Williams , J. Petrozza , C. Tanrikut, R. Hauser, J.E. Chavarro

BACKGROUND: Fruits and vegetables have a multitude of health benefits but there is concern about the reproductive health effects of pesticide residues in these foods. We examined the association of fruit and vegetable intake with semen parameters, considering pesticide residue status, among men presenting for infertility evaluation. METHODS: Starting in April 2007, 155 men presenting to a fertility center completed a food frequency questionnaire and produced a total of 338 semen samples over an 18-month period. Fruits and vegetables were categorized as high or low pesticide residue based on the USDA pesticide data program. Linear mixed models were used to analyze the association of fruits and vegetables with semen parameters accounting for within-person correlations across repeat samples. Models were adjusted for age, abstinence time, physical activity, race, total energy intake, and data-derived dietary patterns. RESULTS: Total fruit and vegetable intake was unrelated to semen parameters. High-pesticide residue fruit and vegetable intake, however, was associated with lower semen parameters. Men in the highest quartile of high-pesticide fruit and vegetable intake ($\geq$1.6 servings/day) had 48% (95% CI: 28, 63) lower sperm count and 35% (95% CI: 19, 51) lower percent morphologically normal sperm than men in the lowest quartile of intake (<0.5 servings/day)(p, trend=0.007 and 0.02, respectively). Low-pesticide fruit and vegetable intake was not related to semen parameters. CONCLUSIONS: Consumption of fruits and vegetables with high levels of pesticide residues was associated with lower sperm count and lower percent morphologically normal sperm among men presenting to a fertility clinic

THE RISK OF FETAL DEATH WITH PREECLAMPSIA. Harmon, QE* (National Institute of Environmental Health Sciences, Durham, NC, USA), Huang L, Umbach DM, Klungsøyr K, Engel SM, Magnus P, Skærven R, Zhang J, Wilcox AJ

Background: Preeclampsia is known to increase the risk of stillbirth. However, fetal risk in the presence of preeclampsia at specific gestational weeks has not been estimated because of the difficulty in obtaining data. Fetal risk with preterm preeclampsia would be relevant to clinical decisions regarding timing of delivery. Methods: We estimated gestational-age-specific risk of stillbirth for 554,333 singletons delivered in Norway 1999-2008, using a life-table approach. The onset of preeclampsia was extrapolated from a subset of 1857 preeclamptic pregnancies for which prenatal records had been obtained. Risks are expressed as simple absolute and relative risks. Results: Preeclampsia was recorded at delivery for 3.8% (21,020) of pregnancies. Risk of stillbirth was 3.6/1000 overall and 5.2/1000 among pregnancies with preeclampsia (relative risk (RR) = 1.45, 95% confidence interval (CI) =1.19, 1.76). Using the subset of preeclampsia pregnancies with clinical data, we estimated that 8% of preeclamptic pregnancies emerged by the end of week 28, 36% by end of week 34, and 71% by end of week 37. Risk of stillbirth was far higher with preeclampsia in early pregnancy. In week 26 there were 11.6 stillbirths per 1000 preeclamptic pregnancies, compared with 0.1 stillbirth per 1000 without preeclampsia (RR = 86, 95% CI = 56, 131). Fetal risk with preeclampsia declined as pregnancy advanced, but remained consistently higher than in non-preeclamptic pregnancies. Conclusions: Preeclampsia in early pregnancy constitutes a particular hazard to the fetus. Fetal death should be included among the important risks clinicians must balance in the management of preterm preeclampsia.

Poster Session B

Tuesday, June 24th
12:00 pm – 1:30 pm

B1

ASSOCIATIONS BETWEEN FREQUENCY OF INTERPERSONAL CONTACT OPPORTUNITIES AND EXCLUSIVE BREASTFEEDING COVERAGE IN USAID'S CHILD SURVIVAL AND HEALTH GRANTS PROGRAM. Kirsten Unfried Debra Prosnitz Jennifer Yourkavitch* (University of North Carolina, ICF)

This analysis examines the association between frequency of interpersonal contact opportunities with mothers through community-based support mechanisms and changes in exclusive breastfeeding (EBF) coverage in project areas in Africa, Asia, and Latin America. All projects with the following criteria were included: active between 2004 and 2011; ended between 2009 and 2011; dedicated effort to breastfeeding promotion or support; and reported baseline and endline data from population-based surveys (N=30). The authors reviewed project evaluation reports and extracted information describing strategies involving interpersonal contacts, which they divided into seven categories: peer support groups (PSGs), regular household visits (HHVs), targeted HHVs (e.g., time-limited visits such as for antenatal or postnatal care), small group events, large group events, outreach services, and growth monitoring/Positive Deviance/Hearth. Changes in EBF coverage were calculated using survey data from each project. Of 30 projects reviewed, 18 reported statistically significant increases in EBF coverage. All of these projects used peer support groups or household visits as interpersonal communication channels. Project areas where more than one regular contact opportunity per month occurred were more likely to have increased EBF coverage and also showed a greater average increase in EBF coverage than project areas where one or fewer contacts occurred per month. This analysis suggests that areas where community-based breastfeeding promotion and support projects employ interpersonal contact strategies will have greater increases in EBF coverage if there is more than one regular contact opportunity per month.

B2

CO-SLEEPING AT 14 WEEKS POSTPARTUM PREDICTS BREASTFEEDING DURATION REPORTED AT 2 YEARS: EVIDENCE FROM THE OREGON PREGNANCY RISK ASSESSMENT MONITORING SYSTEM (PRAMS) AND PRAMS-2. ML Bovbjerg*, J Hill, KD Rosenberg (Oregon State University, Corvallis OR)

Breastfeeding advocates promote co-sleeping (i.e., Baby sharing a bed with Mother) to facilitate nighttime breastfeeding. However, little scientific evidence exists regarding correlation between co-sleeping and breastfeeding duration. PRAMS uses a stratified random sample from birth certificates, sending questionnaires to mothers when the child is 2-6 months old (average 14 weeks). The co-sleeping question asks whether mothers co-sleep "never," "rarely," "sometimes," "often," or "always." Oregon's PRAMS-2 re-surveys respondents shortly after the child's 2nd birthday; mothers who report ever breastfeeding the index child are asked how old the child was when she/he was completely weaned. We used the Cox proportional hazards model to assess potential effects of co-sleeping frequency on breastfeeding duration, while controlling for primiparity, cesarean delivery, race/ethnicity, pre-gravid BMI, marital status, and maternal employment. In adjusted models, we found a positive dose-response association between co-sleeping at 14 weeks and subsequent breastfeeding duration. In particular, 77% of mothers who always co-slept reported still breastfeeding at 6 months, compared to 74%, 65%, 67%, and 63% for often, sometimes, rarely, and never co-sleeping, respectively. For any breastfeeding at 12 months, the proportions were 48%, 45%, 33%, 33%, and 29%; for any breastfeeding at 18 months, 28%, 23%, 14%, 8%, and 7%. Co-sleeping at 14 weeks postpartum was associated with breastfeeding duration reported retrospectively at 2 years postpartum, among mothers responding to Oregon's PRAMS and PRAMS-2 surveys. If confirmed in other US samples, this finding would have clinical and public health implications for both breastfeeding promotion and SIDS prevention (through safe sleep spaces) efforts.

B3

TYPE OF PRENATAL CARE ON INTENT TO BREASTFEED: IS CENTERINGPREGNANCY(R) THE ANSWER? Morris JR*, Masho SW, Stern M, Leibach G, Crooke B (Virginia Commonwealth University, School of Medicine, Richmond VA)

Background: Although breastfeeding in the first six months postpartum has been shown to decrease adverse outcomes, breastfeeding rates remain low. CenteringPregnancy ® is a novel mode of prenatal care that provides continuous knowledge on importance of breastfeeding throughout pregnancy. This study aims to examine the association between type of prenatal care and intention to breastfeed especially among indigent populations. Methods: Pregnant women in their third trimester (N=212) were interviewed in an inner-city University Medical Center regarding their intent to initiate breastfeeding. The Infant Feeding Intention scale was used to assess intention to initiate and continue this behavior. Data on breastfeeding intent was dichotomized to represent "Low" vs. "High" intention. Logistic regression analyses were conducted to examine the relationship between type of prenatal care and breastfeeding intent. Results: Of women recruited into the study, 36% received CenteringPregnancy(R) prenatal care. Those receiving routine prenatal care were more likely to be African American, unmarried, and have an unintended pregnancy. Of respondents, 75% reported high intent to breastfeed. Participants enrolled in CenteringPregnancy ® were 2.5 times more likely to report high breastfeeding intent compared to those in routine prenatal care (CI: 1.2- 5.3). After controlling for age, pregnancy intent, race, education, marital status, Medicaid use, and support from baby's father, odds of having high breastfeeding intent were no longer affected by prenatal care type. Conclusion: This study underscores the importance of promoting breastfeeding practices throughout the prenatal period as this may be the only time providers can educate pregnant women, particularly the underserved with low intention to breastfeed.

B4

ASSOCIATIONS BETWEEN MATERNAL PREPREGNANCY BODY MASS INDEX AND CHILD PSYCHOSOCIAL DEVELOPMENT AT 6 YEARS OF AGE. Jo H*, MPH, Schieve LA, PhD, Sharma AJ, PhD, MPH, Hinkle SN, PhD, Li R, MD, PhD, Lind JN, PharmD, MPH

Objective: Maternal obesity has been associated with child neurodevelopmental outcomes. We used the 2005–2007 Infant Feeding Practices Study II and its 2012 Year 6 Follow-up to examine associations between maternal prepregnancy body mass index (BMI) and child psychosocial development. Methods: Children were categorized according to mothers' prepregnancy BMI [underweight (BMI <18.5 kg/m2), normal weight (18.5-24.9), overweight (25.0-29.9), obese class I (30.0-34.9), and obese class II/III (≥35.0)] (n=1523). Child development was assessed by maternal report of the child's psychosocial difficulties measured in the Strengths and Difficulties Questionnaire, developmental diagnoses, and receipt of special-needs services. Multivariable logistic regression models included maternal and child sociodemographic characteristics. Additional models included potential mediators of prepregnancy BMI-child development associations (birthweight, pregnancy weight gain, gestational diabetes, breastfeeding, and postpartum depression). Results: After adjusting for sociodemographic factors, children of obese class II/III mothers had increased odds of emotional symptoms [adjusted odds ratio (aOR) 2.13; 95% confidence interval (CI) 1.22-3.70], peer problems [aOR 2.06; 95%CI 1.27-3.33], total psychosocial difficulties [aOR 2.05; 95%CI 1.20-3.53], attention deficit (hyperactivity) disorder diagnosis [aOR 4.13; 95%CI 1.72-9.90], autism/developmental delay diagnosis [aOR 2.67; 95%CI 1.02-6.97], receipt of speech/language therapy [aOR 1.75; 95%CI 1.08-2.82], receipt of psychological services [aOR 2.33; 95%CI 1.16- 4.65], and receipt of any special-needs service [aOR 1.93; 95%CI 1.31-2.86] compared with children of normal weight mothers. There was only slight attenuation of a few estimates after adjustment for potential mediators. Conclusions: Severe maternal prepregnancy obesity is associated with adverse childhood neurodevelopmental outcomes. Further study of the underlying mechanism is needed.

B5

IMPACT OF PARENTAL MULTIPLE SCLEROSIS AND THE ASSOCIATED MENTAL COMORBIDITY ON EARLY CHILDHOOD DEVELOPMENT. **Razaz Neda,* Tremlett Helen, Guhn Martin, Boyce W.Thomas, Marrie Ruth Ann (*School of Population and Public Health, Faculty of Medicine, University of British Columbia, 2206 East Mall, Vancouver, British Columbia, V6T 1Z3, Canada)**

Purpose: Exposure to early-life stressors, are believed to tax children's bodies and mind, leading to harmful changes in their social and emotional functioning. We aimed to examine the impact of parental multiple sclerosis (MS) and the associated mental comorbidity on child developmental outcomes. Methods: Retrospective matched cohort study in Manitoba, Canada, using linked population-based administrative databases. Of 49,328 children who were part of the Early Development Instrument data (EDI) collection, and born between 1999 and 2006, those with an MS parent were compared to children matched from the general population. The primary outcome of interest was childhood development, as measured by EDI. Findings are expressed as adjusted odds ratios (aOR) from multivariable conditional logistic regression models. Results: Overall, 153 children had an MS parent and 888 formed the matched cohort. Children with an MS parent were similar to the matched population on all EDI domains, except vulnerability in social competence (aOR:0.50;95%CI:0.25-0.97). However, mental comorbidity affected more MS parents compared to the general population (77/153 [50.3%] vs. 313/888 [35.3%],$P<0.001$). Compared to unaffected MS parents, those with mental comorbidity were more likely to have a child who was vulnerable on the social competence (aOR:5.33;95%CI:1.12–25.44) or emotional maturity (aOR:3.11;95%CI:1.10–8.77) domains. Conclusion: The presence of parental MS was not independently associated with adverse developmental outcomes in children. However, mental comorbidity was more common in MS parents and had a detrimental impact on development. Health professionals need to be aware of the impact of mental health in MS on childhood development.

B6

CHILDHOOD ACUTE LEUKEMIA AND INDICATORS OF EARLY IMMUNE STIMULATION: A CHILDHOOD LEUKEMIA INTERNATIONAL CONSORTIUM (CLIC) STUDY. J. Rudant*, T. Lightfoot, K.Y Urayama, J.D Dockerty, C. Magnani, E. Milne, E. Petridou, L.G Spector, A. Kang, E. Stiakaki, L. Orsi, E. Roman, C. Metayer, C. Infante-Rivard, J. Clavel (Inserm, Centre for Research in Epidemiology and Population Health, Environmental Epidemiology of Cancer Team, University Paris-Sud, Paris, France)

We investigated the association between childhood acute lymphoblastic leukemia (ALL) and several proxies of early stimulation of the immune system, using data from 11 case-control studies participating in the Childhood Leukemia International Consortium. The sample included 8,030 ALL cases and 12,725 controls aged 1-14 years. The data were collected by questionnaires administered to the parents. Pooled odds ratios (ORs) and 95% confidence intervals (CIs) were estimated by unconditional logistic regression adjusted for age, sex, study, maternal education and maternal age. Attendance at day-care centers in the first year of life was associated with a reduced risk of ALL (OR=0.80, 95%CI: 0.74, 0.87), and a marked inverse trend with earlier age at start was noted (p for trend <0.0001), a finding made possible by the enhanced statistical power of this pooled analysis. A significant inverse association was also observed with breastfeeding duration of six months or more (OR=0.85, 95%CI: 0.78, 0.92), but not with history of common infections in the first year of life (OR=0.96, 95%CI: 0.88, 1.04). In summary, the results presented show that attendance at day-care was associated with decreased risk of ALL but there was no association between self-reported infections and ALL risk.

B7

MEALTIME BEHAVIOR PROBLEMS IN RELATION TO SELF-REGULATION: FINDINGS FROM THE PREK PICNIC STUDY OF PRESCHOOL-AGED CHILDREN BORN VERY PRETERM. Anderson SE*, McNamara K, Andridge RA, Keim S (Ohio State University College of Public Health, Columbus, Ohio, USA)

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

B8

MEALTIME BEHAVIOR PROBLEMS IN PRESCHOOL-AGED CHILDREN BORN PRETERM: PREVALENCE AND ASSOCIATIONS WITH ADHD AND PARENT USE OF FOOD AS A REWARD. Keim SA*, McNamara KA, Anderson SE (Ohio State University Colleges of Public Health and Medicine, Columbus, OH, USA)

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

B9

THE EFFECT OF MATERNAL STRESS ON CHILD ACADEMIC READINESS, AS MEDIATED BY PRETERM BIRTH. Burke RM* (Emory University, Atlanta, GA), Chapple-McGruder T, Kramer MR

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

B10

PRETERM, EARLY TERM OR POST TERM BIRTH INCREASES RISK OF FIRST GRADE ACADEMIC PROBLEMS, BUT THIS RELATIONSHIP IS NOT MODIFIED BY MATERNAL RACE/ETHNICITY. Jennifer L. Richards* (Department of Epidemiology, Rollins School of Public Health, Emory University) Michael R. Kramer (Department of Epidemiology, Rollins School of Public Health, Emory University) Theresa Chapple-McGruder (Office of Epidemiology, Maternal and Child Health Program, Georgia Department of Public Health)

Being born earlier is associated with increased risk of cognitive development and academic problems, and this relationship may persist even into early term births (37-38 weeks). We evaluated the association between gestational age and first grade performance on the Georgia Criterion-Referenced Competency Test (CRCT) for mathematics, among 309,331 children born in Georgia from 1998-2003. We hypothesized that this relationship may be modified by maternal race/ethnicity, specifically that increased risk of CRCT failure at earlier gestational ages would be more pronounced among non-Hispanic black infants. We fit a logistic model to estimate odds ratios for the association of gestational age categories and CRCT failure. Non-Hispanic black infants were at higher risk of CRCT failure (19.5%) than non-Hispanic white infants (7.6%); however, we did not find significant interaction between gestational age and maternal race/ethnicity. In our adjusted model, we found that there was increased risk of CRCT failure for all gestational age categories compared to infants born at term (39-41 weeks): OR=3.08 (95% CI: 2.72-3.48) for early preterm (20-27 weeks), OR=1.59 (1.50-1.70) for moderate preterm (28-33 weeks), OR = 1.18 (1.14-1.23) for late preterm (34-36 weeks), OR=1.06 (1.04-1.09) for early term (37-38 weeks), and OR=1.07 (1.01-1.13) for post term ($\geq$42 weeks). Our findings suggest that elementary school academic performance is optimal among infants born at 39-41 weeks. While non-Hispanic black infants were at higher overall risk of CRCT math failure, we did not find that maternal race/ethnicity modified the relationship between gestational age and risk of CRCT failure.

B11

GESTATIONAL AGE AT TERM, DELIVERY CIRCUMSTANCE, AND THEIR ASSOCIATION WITH CHILDHOOD ATTENTION PROBLEMS. Allswede, DM, Talge, NM,* & Holzman, C (Michigan State University)

Perinatal characteristics may identify subgroups of term-born children at risk for attention problems. Using follow-up data from the Pregnancy Outcomes and Community Health (POUCH) Study, we subdivided term births according to two potential markers of perinatal risk (gestational age, delivery circumstance) and evaluated their association with attention problems. We included children born at term whose mothers completed the Conners' Parent Rating Scales (CPRS) (N=610; ages: 3-9 years). The CPRS yields age- and sex-referenced T-scores for two dimensions of attention problems (inattention, hyperactivity) and a global index reflecting the combination of these dimensions. Using separate general linear models, we investigated whether: 1) early term birth (ETB: 37-38 weeks) or post-term birth (41+ weeks) was associated with higher levels of attention problems relative to FTB (39-40 weeks), and 2) clinical circumstances that may reflect perinatal risk (labor with caesarean delivery; no labor with caesarean delivery) were associated with higher levels of attention problems relative to the typical circumstance observed (labor with vaginal delivery). Following adjustment, neither ETB nor post-term birth was associated with attention problems. Labor with caesarean delivery was associated with higher levels of attention problems (mean differences: inattention: 2.9, 95%CI 0.5,5.4, hyperactivity: 2.6, 95%CI 0.1,5.0, global index: 2.8, 95%CI 0.6,4.9). The no labor, caesarean delivery subtype was not associated with any attention problem dimension. Among term-born children, only those whose mothers experienced labor culminating in caesarean delivery exhibited higher levels of attention problems. Prenatal, antepartum, and/or postnatal complications associated with this delivery profile may reflect increased risk for such problems.

B12

MATERNAL CONCENTRATION OF 25-HYDROXYVITAMIN D (25(OH)D) IN PREGNANCY AND RISK OF OFFSPRING ASTHMA: RESULTS FROM A PROSPECTIVE DANISH COHORT WITH 20 YEARS OF FOLLOW-UP USING NATIONAL DISEASE REGISTRIES. S Hansen* (Centre for Fetal Programming & Statens Serum Institut, Copenhagen, Denmark) E Maslova (Centre for Fetal Programming & Statens Serum Institut, Copenhagen, Denmark) M Strøm (Centre for Fetal Programming & Statens Serum Institut, Copenhagen, Denmark) A Cohen (Statens Serum Institut, Copenhagen Denmark) A Linneberg (Research Centre for Prevention and Health, Glostrup, Denmark) SF Olsen (Centre for Fetal Programming & Statens Serum Institut, Copenhagen, Denmark, Harvard School of Public Health, Bosten, USA)

Background Results from studies examining the relation of maternal levels of 25-hydroxy(OH)D with offspring asthma have been conflicting. No studies have followed-up offspring until adulthood. Objective To examine the relation of maternal levels of 25(OH)D in gestational week 30 with offspring risk of asthma using population-based disease registries and self-report. Methods We used data from a prospective birth cohort including 965 Danish pregnant women from 1988-1989. Maternal levels of 25(OH)D were quantified in serum taken in gestational week 30 by the LC-MS/MS (n=850). Offspring asthma was assessed from the Registry of Medicinal Product Statistics (n=850) and the National Patient Register (n=850) and from offspring self-report (n=654,71%). The registry outcomes were analyzed by Cox regression models calculating multivariable hazard ratios (HR) and 95% CI. Log-binomial regression was used to calculate relative risks (RRs) and 95% CI for the self-reported outcomes. Results Median (IQR) level of maternal 25(OH)D was 76.2(57.0) nmol/L. For the registry outcomes, the HR(95%CI) for every 10 nmol/L increase in maternal 25(OH)D was 1.04 (1.00-1.08, p=0.09) for offspring asthma medication use and 1.14 (1.05-1.21, p=0.001) for asthma hospitalizations. There was no association with offspring self-reported doctor diagnosis of asthma, but a 10 nmol/L increase in maternal 25(OH)D increased the RR of offspring self-reported current medication use by 1.09 (1.02-1.16, p=0.01). Conclusion We found evidence of a modest direct association between maternal 25(OH)D levels and offspring use of asthma medication and hospitalizations assessed in national registries and of self-reported asthma medication use at age 20.

B13

PREDICTED VITAMIN D STATUS IN MID-PREGNANCY AND CHILD ALLERGIC DISEASE -A PROSPECTIVE STUDY FROM THE DANISH NATIONAL BIRTH COHORT. Maslova, E* (Centre for Fetal Programming, Department of Epidemiology Research, Statens Serum Institut, Copenhagen, Denmark), Hansen, S, Thorne-Lyman, A, Jensen, CB, Strøm, M, Cohen, A, Nielsen, NO, Olsen, SF.

Background: Vitamin D deficiency in pregnancy may be a risk factor for child allergic disease. However, less is known about disease risk across different levels of vitamin D. Objective: To examine the relation between a maternal vitamin D prediction score and child allergic disease. Methods: A total of 32,456 pregnant women were enrolled in the Danish National Birth Cohort (1996-2003) and had data on a validated vitamin D prediction score based on 1,497 mid-pregnancy serum 25(OH)D samples. Child allergic disease was assessed at 18 months and at 7 years using questionnaire data and national registry extracts. We used multivariable log-binomial models to quantify risk ratios (RR) and 95% CI. Serum 25(OH)D was examined in a stability analysis. Results: Median(IQR) vitamin D prediction score was 58.7(49.2-69.0)nmol/L. In main analysis there was no association between vitamin D prediction score and child allergic disease. However, maternal vitamin D prediction score >=100nmol/L(vs. 50-79.9nmol/L) was associated with increased risks of child asthma at 18 months (RR: 1.36, 95%CI: 1.02, 1.80) and asthma by hospital admission (RR: 1.65, 95%CI: 1.04, 2.62), which were robust to covariate adjustment. For vitamin D prediction score <25-30 nmol/L there were non-significant increased risks of child asthma by hospital admission and allergic rhinitis at age 7. Similar results were found for serum 25(OH)D. Conclusions: Overall we found no association between maternal vitamin D prediction score and child allergic disease. However increased risks were observed for vitamin D prediction score <25nmol/L and >=100nmol/L, but more consistently so for the latter.

B14

MATERNAL SMOKING AND CHILDHOOD NEURODEVELOPMENT: IS THE ASSOCIATION MEDIATED THROUGH BIRTH WEIGHT? Parker SE*, Werler MM, Collett BR, Speltz ML (Slone Epidemiology Center, Boston University, Boston, MA)

Maternal smoking during pregnancy is associated with poor behavioral outcomes in offspring. Given associations between smoking and low birth weight and between low birth weight and neurodevelopment, we examined the extent to which the effect of maternal smoking on childhood behavior problems is mediated through low birth weight (<2500g). Eligible participants were children aged 5 to 12 years, who served as controls in a case-control study of prenatal exposures and a craniofacial malformation. Data on demographic characteristics and smoking during pregnancy were collected through a maternal interview conducted on average 12 months after delivery. Internalizing behavior problems (e.g., anxiety, depression) and externalizing behaviors (e.g., oppositional behavior) were measured by mother report, using the Child Behavior Checklist (CBCL) and teacher report, using the Teacher Report Form (TRF). Adjusted linear regression models were used to calculate mean differences in scores between children of smokers and non-smokers. Models allowing for a dichotomous mediator and a continuous outcome were used to calculate direct and indirect effects. Among the 560 children in the follow-up study, 16% of their mothers reported smoking at any point during pregnancy. CBCL and TRF scores for externalizing behavior problems were worse among children of smokers with differences of 2.16 (-0.21, 4.54) and 2.69 (0.55, 4.83), respectively. Scores for internalizing behavior problems were similar. The indirect effects of maternal smoking on externalizing behavior problems were 0.01 for CBCL scores and 0.02 for TRF scores indicating that < 1% of the association was mediated through low birth weight.

B15

EATING ATTITUDES AND BEHAVIORS AND CARDIOMETABOLIC RISK PROFILE IN PRE-ADOLESCENCE. S Yang*, MS Kramer, E Oken, R Patel, O Skugarevsky, M Dahhou, R Martin (Pediatrics, Research Institute of McGill University Health Centre, Montreal, Canada)

Eating habits are established early in life, likely to track, and associated with adverse cardiometabolic risk factors in adulthood. Unhealthy eating attitudes and behaviors in childhood may be an early marker of the increased risk of chronic diseases in later life. We examined whether eating attitudes and dieting behaviors—food preoccupation, bulimia, and concerns about body weight—are associated with blood pressure, body fat composition, and fasting insulin, glucose, adiponectin, and apolipoprotein A1 in pre-adolescence. In a sample of 13,584 children who participated in the 11.5-year-follow-up of the Promotion of Breastfeeding Intervention Trial, we estimated mean differences in risk factors between children with problematic eating attitudes, defined as having a total score of 22.5 (85th percentile) or greater on the Children's Eating Attitudes Test, and those without problematic eating attitudes, after controlling for a wide range of child and family characteristics measured at birth and age 6.5 years. Children with problematic eating attitudes showed slightly higher levels of blood pressure [0.8 (95% CI: 0.04, 1.1) mm Hg for DBP; 0.7 (-0.2, 0.7) mmHg for SBP], % body fat [2.6 (2.3, 3.0) %), and fasting insulin [0.5 (0.3, 0.8) mU/L], but lower levels of glucose [-0.5 (-0.9, -0.01) mmol/L) and adiponectin [-0.5 (-0.9, -0.1) μg/mL]. No difference was observed by eating attitudes for apolipoprotein A1. Although the clinical significance remains unclear given the modest effect sizes, our study suggests that unhealthy eating attitudes and dieting behaviors are associated with increased cardiometabolic risk factors as early as 11 years of age.

B16

SCHOOL AND INDIVIDUAL CHARACTERISTICS ASSOCIATED WITH DELAYED SPECIAL EDUCATION SERVICES FOR AUTISM. JH Knight*, MR Kramer, C Drews-Botsch (Emory University, Atlanta, GA)

The timing of autism diagnosis varies by race and socioeconomic status, but it is unclear how the placement of children with autism in special education services is influenced by school and individual characteristics. We used data from Georgia children entering first grade between 2001 and 2005 to compare these characteristics between children who received special education services for autism by the end of first grade to children who first received services under an autism diagnosis between first and fifth grade (delayed indication). Among 2,629 children served for autism in elementary school, 66.2% were indicated by the end of first grade. Almost 75% of those indicated later were indicated for another disability in first grade. In adjusted models the risk of delayed indication for autism was significantly higher for children in schools with a higher percentage of Black students (3% increase in likelihood of delayed services per 10% increase in percent Black) and lower percentage of students on free or reduced lunch (5% increase in likelihood of delayed services per 10% decrease in percent with free or reduced lunch). Whether the individual child was Black or on free or reduced lunch was not significantly associated with identification after first grade. Risk for delayed service was increased in students in urban schools compared urbanizing (adjRR = 1.21) or suburban schools (adjRR = 1.08). Our results suggest that the characteristics of the school have a greater influence on the timing of service for autism than the individual characteristics evaluated above of the student.

B17

THE ASSOCIATION BETWEEN BODY IMAGE AND CHANGE IN DEPRESSIVE SYMPTOMS DURING THE PUBERTAL PERIOD AMONG NON-OBESE CHILDREN IN JAPAN: MULTILEVEL ANALYSES. Sato M*, Suzuki K, Yamagata Z (University of Yamanashi, Japan)

This study investigated the effects of body dissatisfaction on the trajectory of depressive symptoms from ages 9.5 to 12.5 years among non-obese children. Only non-obese children were analyzed to minimize the probable confounding effect of weight. Every year, students in Koshu City, Japan, are screened for depressive symptoms. Information on their weight status and body dissatisfaction is also collected. Study participants were 754 children who had no depressive symptoms and were not obese at 9.5 years of age. Participants of each gender were categorized into groups with high and low depression scores (HD and LD, respectively) to consider the effects of the baseline on later trajectories of scores. Multilevel analyses were conducted to examine the association between the body dissatisfaction and trajectory of depression score, stratified by sex and HD/LD group. The results indicated that depression scores were more likely to increase among children who had body dissatisfaction. The scores of girls with body dissatisfaction rapidly increased in comparison to those without such dissatisfaction between the ages of 9.5 and 10.5 years in both LD and HD groups. The scores of boys with body dissatisfaction also increased rapidly between 10.5 to 11.5 years of age in the LD group. In conclusion, having body dissatisfaction at the start of puberty might be an independent risk factor for increased depressive symptoms throughout this period. From a public health perspective, it is important to pay attention to the strong desire for thinness, especially in girls, regardless of their actual weight.

B18

COMPLEXITIES OF CEREBRAL PALSY DIAGNOSIS AT AGES TWO, SIX AND NINE YEARS: A TRI-COUNTY LOW BIRTH WEIGHT COHORT STUDY. Steven J. Korzeniewski, PhD[1,2*], Jennifer A. Pinto-Martin, Agnes H. Whitaker, Judith F. Feldman, John M. Lorenz, and Nigel Paneth [1]Perinatology Research Branch, NICHD/NIH/DHHS; [2]Wayne State University School of Medicine, Department of Obstetrics and Gynecology

We sought to determine whether children born weighing 500g-2,000g who met criteria for the diagnosis of cerebral palsy (CP) at age two still carried this diagnosis when re-examined at ages six and/or nine years. The prevalence of disabling and non-disabling CP at age two was 8% (n=61/777) and 7% (n=52/777), respectively. Of 48 children with disabling CP at age two who were re-examined at school age, 98% were again classified as having CP, and one had an uncertain CP status. In contrast, 40% (n=17/43) of the children with non-disabling CP at age two were classified as not having CP at school-age. Of the 441 children who were not diagnosed with CP at age two and were re-examined at age six, 2% (n=7) were classified as definitely having CP, and 6% (n=28) were classified as probably having CP. The majority of these children (66%, n=23/35) had evidence of motor impairment at age two, but were not ultimately diagnosed with CP. Total Riley Motor Problems Inventory scores at school age for children in the transient non-disabling CP study group were consistent with those of children classified as not having CP, whereas children with a persistent non-disabling CP had scores consistent with those classified as having late emerging CP. Hence, a diagnosis of disabling CP at age two years among children born preterm and/or low birth weight nearly always persists through childhood. However, nearly half of those diagnosed with non-disabling CP at age two do not appear to have CP in later childhood.

B19

VALIDATION OF SELF-ASSESSED SEXUAL MATURATION USING THE METHOD OF TRIADS. Chavarro JE*, Afeiche M, Zhang Z, Sanchez B, Cantonwine D, Mercado-Garcia A, Meeker J, Tellez-Rojo Martha Maria, Peterson KE (Harvard School of Public Health)

Background: Self-assessed sexual maturation is often required in large scale epidemiologic studies, and generally validated against physician assessments. However, physician assessments are highly dependent on specialized training and experience. Methods: We adapted a self-assessment instrument that 248 Mexican children and adolescents, age 8-15 years, completed. They were examined by a pediatric endocrinologist and provided fasting blood samples for measurement of levels of reproductive hormones (T, E2, SHBG, Inhibin B) and other hormones known to increase during adolescence (C-peptide, IGF-1, DHEA-S). Spearman correlations (r) were calculated among the average rank of all hormones, self-, and physician-assessed Tanner stage. The method of triads, a technique developed to validate dietary assessment tools, was used to estimate the correlation between self-assessed sexual maturation and true, but unobservable, sexual maturation based on all available data. 95% Confidence intervals (CI) were constructed using bootstrap sampling. Results: Validity of self-reported genitalia staging for boys was modest (r[95%CI]= 0.50[0.31-0.65]). Results were similar when testicular volume was used instead of physician's Tanner staging. Breast stage was well reported (0.89[0.79-0.97]) and slightly superior to physician assessment (0.80[0.70-0.89]). Pubic hair stage was well reported by boys (0.91[0.79-0.99]) and girls (0.99[0.96-1.00]) and superior to physician assessment (0.79[0.57-0.97] and 0.91[0.83-0.97], respectively). Correlations between self- and physician assessments were comparable to those observed in traditional validation studies. Conclusions: Self-assessment can be validly used in epidemiologic studies for the evaluation of sexual maturation in girls and pubic hair development in boys. Physician assessment may be necessary to differentiate genitalia from pubic hair development in boys.

B20

CHILDHOOD CANCER IN CHILDREN WITH CONGENITAL ANOMALIES IN OKLAHOMA. AE Janitz (University of Oklahoma Health Sciences Center, College of Public Health, Department of Biostatistics and Epidemiology), BR Neas, JE Campbell, A Pate, R Powell, JA Stoner, S Magzamen, JD Peck

Introduction: Data-linkage studies have reported an association between congenital anomalies and childhood cancer. However, this association has not been investigated using existing registry data from Oklahoma, which offers information on a diverse population including American Indians. We aimed to conduct a data-linkage in order to examine associations between anomalies and childhood cancer. Methods: Data were obtained from the Oklahoma State Department of Health from 1997-2009. We linked Vital Statistics records for singleton deliveries (n= 630,377) to the Oklahoma Birth Defects Registry using name, birth date and gender. We then linked this dataset to the Oklahoma Central Cancer Registry. We assessed the relation between anomalies and childhood cancer using modified (robust error variance) Poisson regression adjusted for the log of person-time at risk. Results: There were 23,368 (4.0%) children with anomalies and 531 (0.08%) children with cancer. Median age at cancer diagnosis was 1 year for children with anomalies and 3 years for children without anomalies ($p<0.0001$). Children with anomalies had an unadjusted rate of childhood cancer that was three times higher than children without anomalies (IRR 2.97; 95% CI: 2.25, 3.92). Adjustment for potential confounders did not change the point estimate >20%. Discussion: Our results were consistent with previous studies indicating an increased rate of childhood cancer and younger age at cancer diagnosis among children with anomalies. Analyses evaluating specific anomalies and cancers are in progress and will be presented. Efforts to understand the relation between anomalies and childhood cancers may reveal common risk factors and possible targets for intervention.

B21

UNPACKING THE "CENTER EFFECT": VARIATION IN MORTALITY AND NEURODEVELOPMENTAL OUTCOMES IN EXTREMELY PRETERM INFANTS.
Rysavy MA*, Li L, Bell EF, Das A, Hintz SR, Stoll BJ, Vohr BR, Carlo WA, Shankaran S, Walsh MC, Colaizy TT, Alleman BW, Higgins RD (*University of Iowa, Iowa City, IA)

Background: Between-hospital differences in neurodevelopmental outcomes for extremely preterm infants have been reported and remain largely unexplained. Methods: We analyzed data collected prospectively for inborn infants <27 weeks gestational age born April 2006-March 2011 at 24 hospitals in the NICHD Neonatal Research Network. Certified examiners conducted assessment of neurodevelopmental impairment (NDI) at 18-22 months corrected age. Severe NDI was defined as: Bayley-III cognitive or motor score <70, severe cerebral palsy, GMFCS Level ≥4, bilateral blindness, or severe hearing impairment. We used multivariable hierarchical models to derive the intraclass correlation coefficient (ICC) for the composite outcome of death or severe NDI controlling for patient characteristics. ICC indicates the proportion of variance in outcome attributable to hospital of birth. We compared model results for all infants and infants receiving active treatment (i.e. excluding infants who died at <12 hours of birth without receiving medication, intubation, or ventilation). Results: Adjusted for patient characteristics, 10% of variation in death or severe NDI among all infants (n=4692) was attributable to hospital of birth (ICC=0.10, 95%CI: 0.05-0.17). ICC decreased with increasing gestational age (ICC=0.22, 0.09, and 0.04 for ≤23, 24 and 25-26 weeks, respectively). Among infants receiving active treatment (n=3924), ICC was 0.04 (95%CI: 0.02-0.08). Reductions in ICC were most pronounced at low gestational ages (ICC=0.02, 0.07, and 0.03 for ≤23, 24 and 25-26 weeks). Conclusions: The "center effect" for death and NDI among extremely premature infants is reduced among actively treated infants and is related to gestational age. These results have implications for future research.

B22

COGNITIVE TRAJECTORY IN THE ABERDEEN CHILDREN OF THE 1950S STUDY (ACONF). Chapko D*, Staff RT, Murray AD (Aberdeen Biomedical Imaging Centre, University of Aberdeen, Aberdeen, UK)

Background: The environmental factors affecting cognitive trajectory in early life are not fully understood. It is possible that early life factors (intrauterine, childhood environment) may have a long lasting influence on cognition, health and wellbeing. In this study we examine cognitive trajectories based on the repeated childhood measures available through ACONF (12,150 participants). Here we hypothesize that cognitive ability measured between the ages of 7 and 11 years can be described by a linear combination of father's occupation at birth, birth weight, gestational length, gender and age. Methods: Cognitive ability was tested within six months of the child's 7th, 9th and 11th birthdays (Moray House Picture Intelligence; Schonell and Adams Essential Intelligence Test Form; Moray House verbal reasoning tests I and II respectively). All tests were standardized for age. Birth weight (lbs), gestational length (weeks), and father's occupation at birth coded on a 7-point scale (1 = professional) were abstracted from the Aberdeen Maternity and Neonatal Databank. We analysed repeated-measures IQ data with a hierarchical structure (time points nested within individuals). Results: Childhood IQ was significantly associated with paternal occupation at birth (Beta = -3.128, SE = 0.061), birth weight (Beta = 0.506, SE = 0.048), gender (Beta = 1.619, SE = 0.191) and age (Beta = -0.786, SE = 0.058). Gestational length was not significantly associated with the IQ score (B = 0.016, SE = 0.060). Conclusion: IQ class position of children who are heavier at birth and have higher childhood SES improves during the phase between ages 7-11.

B23

THIRD GRADE ACADEMIC PERFORMANCE AMONG CHILDREN WITH OROFACIAL CLEFTS: A POPULATION BASED STUDY. Stephanie Watkins PhD, MSPH, MSPT* (University of North Carolina Chapel Hill), Robert Meyer PhD, MPH, Arthur S. Aylsworth, MD, Ronald Strauss, DMD, PhD

Background and Purpose: Children with orofacial clefts (OFCs) may experience learning impairments affecting academic achievement. This study examined the association between presence of isolated nonsyndromic OFC and school performance on end of grade assessments (EOG) in third grade. Methods: We identified a cohort of 711 children with OFC identified from the NC Birth Defects Monitoring Program, and a random sample of 6,822 children without a structural birth defect identified from birth certificates born between 1997 and 2003. We classified children by cleft type (cleft lip alone (CL), cleft lip with cleft palate (CLP), cleft palate only (CPO), and matched subjects to NC Department of Public Instruction EOG scores from grades 3-8. We estimated the odds of failing third grade EOG tests in reading and math among children with an isolated OFC and by cleft type using logistic regression. A "failing score" is the inability to demonstrate proficiency in NC State Standards. Results: Children with an isolated nonsyndromic OFC (N=458) did not have an increased odds of failing either reading (OR: 1.00 95% CI: 0.82-1.24) or math (OR:0.86 95% CI: 0.67-1.11) third grade EOG assessments controlling for maternal education and public pre-kindergarten enrollment. This was also true for children with CL and CPO. Children with CLP were more likely to fail the third grade EOG test in both subjects (Reading; OR: 1.44 95% CI: 0.87, 2.38) (Math; OR:1.87 95% CI:1.12,3.14). Conclusions: Children with nonsyndromic CLP may be less likely to demonstrate grade level proficiency in reading and math in third grade.

B24

PLACENTAL MORPHOLOGY AND EARLY ASD-RELATED PHENOTYPE. BY Park* (Drexel University, Philadelphia, PA) C Salafia (Placental Analytics, Larchmont, NY) Z X i (Drexel University, Philadelphia, PA) T Girardi (Placental Analytics, Larchmont, NY) D Misra (Wayne State University, Detroit, MI) L Croen (Kaiser Permanente Northern California, Oakland, CA) MD Fallin (Johns Hopkins University, Baltimore, MD) I Hertz-Picciotto (UC Davis, Davis, CA) CK Walker (UC Davis, Davis, CA) CJ Newschaffer (Drexel University, Philadelphia, PA)

Background: The prenatal period is a critical window in the neuropathology of autism spectrum disorders (ASD). During this time the placenta not only regulates maternal-fetal exchange of endogenous and exogenous molecules but also actively produces substances that affect the developing brain. Further, placental villous growth, which strongly influences placental shape, is driven by factors similar to those influencing fetal neurogenesis. Methods: Placentas from 85 births in the EARLI (Early Autism Risk Longitudinal Investigation) pregnancy cohort, comprised of women who were already mothers of a child with ASD, were evaluated using standard gross examinations and photograph-based measurements. Offspring ASD-related phenotype at a 12 month visit was assessed with the Autism Observation Scale for Infants (AOSI). Higher AOSI scores indicate phenotypes more suggestive of ASD. Placental morphology measures included those related to overall placental size, surface perimeter irregularity, umbilical cord displacement, and thickness. Four separate stepwise regressions were fit to identify items within each measure associated with AOSI score. Variables with p-values<0.15 in these models were forced into a final model also adjusting for gestational age and sex. Interactions between gender and placental morphology measures were explored. Results: Irregular shape, characterized as more large or small radii, was associated with larger AOSI scores after adjustment for gestational age and sex (p=0.049). The p-values for the sex-morphology interaction was>0.90. Conclusion: This study provides initial evidence that irregularly shaped placentae were more common for one-year-old children who scored higher for ASD phenotype, implicating the prenatal environment and/or factors influencing placental development in autism etiology.

B25

PRENATAL TRIPTAN EXPOSURE AND NEURODEVELOPMENT IN CHILDREN: RESULTS FROM THE NORWEGIAN MOTHER AND CHILD COHORT STUDY.

Mollie Wood*, M.P.H. (Clinical and Population Health Research Program, University of Massachusetts Medical School) Eivind Ystrøm, Ph.D. (Division of Mental Health, Norwegian Institute of Public Health) Kate Lapane, Ph.D. (Clinical and Population Health Research Program, University of Massachusetts Medical School) Jean Frazier, M.D. (Department of Psychiatry, University of Massachusetts Medical School) Hedvig Nordeng, Ph.D. (School of Pharmacy, University of Oslo)

Background: Triptans are serotonin agonists used to treat migraine. Triptans cross the placenta and fetal blood-brain barrier, and are plausible developmental teratogens. This study seeks to examine effects of triptan medications on neurodevelopmental outcomes in children using marginal structural models. Methods: The Norwegian Mother and Child Cohort Study is a birth cohort that includes more than 100000 women recruited during pregnancy. Data are collected through questionnaires and linkage to birth registries. This study included 101625 live singleton births without major malformations. 48029 were present at 36 months, of which 457 (1%) reported taking triptans during pregnancy. A T score of 70 or higher on the internalizing or externalizing subscales of the Child Behavior Checklist indicated clinically significant problems. We used a marginal structural model (MSM) approach with stabilized inverse probability of treatment weights (IPTW). Logistic regression models with IPTW and robust standard errors were fit to obtain estimates of the average effect of prenatal triptan exposure on child behavior, expressed as odds ratios (OR) with 95% confidence intervals (CI). Results: Prenatal exposure to triptan medications resulted in a 2-fold increased risk of externalizing behavior that was borderline significant (OR: 2.13, 95%CI: 0.84, 5.38) but no increased risk of internalizing behavior (OR: 0.55, 95%CI: 0.14, 2.18) in 3-year-old children. Conclusion: This study is the first to report that prenatal triptan exposure is associated with behavior problems in children. Future analyses will consider the timing of triptan exposure.

B26

EARLY CHILDHOOD OBESITY AND COGNITIVE ABILITY. Amanda K. Brzozowski* (Emory University, Atlanta, GA), Carolyn D. Drews-Botsch (Emory University, Atlanta, GA)

Using data from the Collaborative Perinatal Project (CPP), we sought to confirm our previous results which found no consistent association between overweight/obesity and cognitive ability in a population of black and white Atlanta children aged 4.5 years. We used linear regression to evaluate the possible association between body mass index (BMI) at ages 4 and 7 years (underweight/normal weight/overweight/obese classified using CDC norms) and cognitive ability (4-year full-scale IQ, Stanford-Binet Intelligence Scale; 7-year full-scale/verbal/nonverbal IQ, Wechsler Intelligence Scales for Children). 15,862 white and black children born at term from the CPP were included in this analysis. We excluded multiple births and children with missing/implausible values for critical variables, IQ ≤ 60 at age 4, or major congenital malformations diagnosed prior to age 1 year. After adjustment for confounding, children who were underweight at 4 years had lower scores on 4- and 7-year full-scale and 7-year verbal IQ tests compared with normal weight children. Similarly, children underweight at 7 years scored lower on 7-year full-scale and verbal IQ tests. Overweight/obesity were not associated with any cognitive outcome at either age, nor was change in (continuous) 4- to 7-year BMI on any 7-year cognitive outcome. Stratifying by race and/or gender did not change the conclusions. Being underweight was associated with declines in full-scale and verbal IQ in 4- and 7-year old children; no meaningful association between overweight/obesity and IQ was found in this population. This would suggest that the obesity epidemic in young children, by itself, is unlikely to substantially impact cognitive development.

B27

IS THE RECENT TREND IN VAGINAL BIRTH AFTER CESAREAN MODIFIED BY RACE/ETHNICITY? Michael J. Fassett, MD; Darios Getahun, MD, PhD, MPH

OBJECTIVE: To examine recent trends in VBAC by race/ethnicity. STUDY DESIGN: We examined temporal trends in VBAC among singleton births (n=379,645) using information from Hospital Inpatient, outpatient, and birth certificate records of women delivering in Kaiser Permanente Southern California hospitals (1999-2012). VBAC rate was estimated as the percent of vaginal births to women who have had a previous cesarean. We calculated the proportion of VBAC stratified by race/ethnicity. Adjusted relative risks (RR) were used to estimate the magnitude of the change. RESULTS: The proportion of VBAC decreased from 38.9% in 1999 to 6.7% in 2008 (p <.0001) and remained relatively stable thereafter through the four-year follow-up at 7.6%. Race/ethnicity-specific analysis revealed a higher rate of VBAC among Hispanics and Asian/Pacific Islanders than among other racial/ethnic groups. From 1999-2000 to 2007-2008, VBAC decreased among Whites from 35.4% to 8.4% (RR 0.16 [95% confidence interval (CI) 0.14-0.20]); among Blacks, from 32.5% to 8.2% (RR 0.19 [95% CI 0.14-0.25]), among Hispanics, from 41.8% to 9.8% (RR 0.15 [95% CI 0.13-0.17]); and among Asian/Pacific Islanders, from 39% to 10.4% (RR 0.18 [95% CI 0.14-0.23]). A significant decrease in rates between 2007-08 and 2011-2012 was seen for Blacks. On the other hand rates for Whites, Hispanics, and Asian/Pacific Islanders remained stable between 2007-08 and 2011-2012. CONCLUSIONS: We found that the VBAC rate has decreased over time. In addition, there is a wide variability in rate of VBAC by race/ethnicity with a modest increase in the gap in recent years between Blacks and other racial/ethnic groups.

B28

IS A NOVEL RISK-STRATIFIED ADEQUACY OF PRENATAL CARE INDEX (RSAPCI) A BETTER PREDICTOR OF BIRTH WEIGHT OUTCOMES THAN KOTELCHUCK'S ADEQUACY OF PRENATAL CARE INDEX? Michael Matean Aziz1*, Zhen-qiang Ma[2], Carlos Benito[1] ([1]Atlantic Health System, Department of Obstetrics, Gynecology, and Women's Health, 100 Madison Ave, Morristown NJ; [2]Pennsylvania Department of Health, Bureau of Epidemiology, 625 Forrester St., Harrisburg PA)

Background: Kotelchuck's Adequacy of Prenatal Care Index (APNCU) divides care into four categories based on the trimester of initiation of prenatal care and the proportion of observed versus expected number of antepartum visits. Our risk-stratified index uses the same tenants, but it removes the bias that higher risk patients create by positively skewing the number of visits without conferring additional adequacy of care. Methods: 28,647 deliveries from 2003 to 2006 in Montgomery County, Pennsylvania were analyzed. 4,502 were categorized as high risk based on reported infections or previous poor pregnancy outcomes. Remaining pregnancies were then categorized as low risk and further divided into adequate (n=14,404) and inadequate (n=6,145) subgroups based on first trimester initiation and number of prenatal care visits. Multiple comparisons determined if birth weight differences between categories in the APNCU and RSAPCI were significant. Results: Nearly 35% of Kotelchuck's Adequate Plus category would be included in our new high risk pregnancy category. Multiple comparisons demonstrated statistically significant differences between all three of our RSAPCI categories but failed to demonstrate differences in birth weights between Kotelchuck's intermediate and adequate groups (p=0.84). Conclusions: The RSAPCI showed a clear progression towards worse birth outcomes, whereas the APNCU demonstrated lowest birth weights in the group with the most prenatal care visits. The RSAPCI is a better predictor of birth weight outcomes than the APNCU index, and its coding leads to more meaningful categorization of care. This assessment of prenatal care should be utilized to study and improve other pregnancy outcomes.

B29

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

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

B30

GLYCEMIC CONTROL AMONG WOMEN WITH PREGESTATIONAL DIABETES: MODELING ITS POTENTIAL PUBLIC HEALTH IMPACT ON THE PREVENTION OF CONGENITAL HEART DEFECTS IN THE UNITED STATES. *RM Simeone, OJ Devine, JA Marcinkevage, SM Gilboa, H Razzaghi, BH Bardenheier, AJ Sharma, MA Honein (Centers for Disease Control and Prevention, Atlanta, GA 30333)

Maternal pregestational diabetes (PGDM) is a risk factor for the development of congenital heart defects (CHDs). Glycemic control before pregnancy reduces the risk of CHDs. We estimated population attributable fractions (PAFs) and the annual number of CHDs in the United States that could potentially be prevented by establishing glycemic control prior to pregnancy. We conducted a systematic search of the literature through December 2012. We included case-control or cohort studies that had a comparison group of women without PGDM. Of 3,352 studies, 12 met criteria for a meta-analysis of all CHDs. Meta-analyses of specific CHD subtypes used subsets of 3 to 5 studies. We estimated summary odds ratios (ORs) with Bayesian meta-analysis methods and combined these estimates with estimates of CHD prevalence using Monte Carlo simulations to obtain uncertainty intervals (UIs) for PAFs. The summary OR for the association between PGDM and all CHDs was 3.8 (95% UI 3.0-4.9); summary ORs ranged from 3.7 (95% UI 1.7-7.4) for coarctation of the aorta to 10.6 (95% UI 4.7-20.9) for atrioventricular septal defect. We estimate that 2,670 95% UI 1,795-3,795) cases of CHDs, 140 (95% UI 35-315) cases of coarctation of the aorta, and 435 (95% UI 195-745) cases of atrioventricular septal defect could potentially be prevented annually if all women in the United States with PGDM achieve glycemic control before pregnancy. Estimates from this analysis suggest that adequate preconception care of PGDM could have a measureable impact by reducing the number of infants born with a CHD.

B31

FACTORS ASSOCIATED WITH HIGH HOSPITAL RESOURCE UTILIZATION IN A POPULATION-BASED STUDY OF CHILDREN WITH OROFACIAL CLEFTS. Hilda Razzaghi* (CDC, Atlanta, GA), April Dawson (CDC, Atlanta, GA), Scott D. Grosse (CDC, Atlanta, GA), Russell S. Kirby (USF, Tampa, FL), Richard Olney (CDC, Atlanta, GA), Jane Correia (FDH, Tallahassee, FL), Cynthia H. Cassell (CDC, Atlanta, GA)

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

B32

FACTORS ASSOCIATED WITH HOSPITAL RESOURCE UTILIZATION IN A POPULATION-BASED STUDY OF INFANTS WITH DOWN SYNDROME. AL Dawson* (NCBDDD, CDC, Atlanta, GA) CH Cassell (NCBDDD, CDC, Atlanta, GA) ME Oster (CHOA, Emory University, CDC Atlanta, GA) RS Olney (NCBDDD, CDC, Atlanta, GA) JP Tanner (University of South Florida, Tampa, FL) RS Kirby (University of South Florida, Tampa, FL) J Correia (Florida Department of Health, Tallahassee, FL) SD Grosse (NCBDDDD, CDC, Atlanta, GA)

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

B33

SELF-REPORT OF TROUBLE SLEEPING BY RACE/ETHNICITY IN PREGNANT WOMEN AND WOMEN OF CHILD-BEARING AGE. M Amyx*, X Xiong, Y Xie, and P Buekens (Tulane University School of Public Health and Tropical Medicine, New Orleans, LA)

The purpose of this secondary analysis of data from the National Health and Nutrition Examination Survey (NHANES) from 2005-2010 was to examine report of trouble sleeping to a physician and inadequate sleep ($\leq$5 hours) by race/ethnicity in pregnant (N=432) and non-pregnant women (N=3175) of childbearing age (15-44 years old). The proportion who reported trouble sleeping, inadequate sleep time, and both trouble sleeping and inadequate sleep was estimated by race/ethnicity, stratified by pregnancy status. The differences in the proportions by race/ethnicity were tested using the Rao-Scott $\chi2$ statistic. In both pregnant and non-pregnant women, non-Hispanic white women (17.6% and 27.2% respectively) were more likely to have reported trouble sleeping than Mexican-American (9.2% and 10.0%) or non-Hispanic black women (11.4% and 19.6%), though the difference was only significant in non-pregnant women ($p<0.01$). In contrast, in both groups, non-Hispanic black women (19.7% pregnant and 22.7% non-pregnant) were significantly more likely to report inadequate sleep than non-Hispanic white (3.4% and 11.0%) and Mexican-American women (7.9% and 10.6%). Among women with inadequate sleep, non-Hispanic white women (37.9% pregnant and 51.8% non-pregnant) were most likely to report trouble sleeping, as compared to non-Hispanic blacks (16.1% and 27.8%) and Mexican-Americans (26.4% and 22.9%, $p<0.01$). In conclusion, non-Hispanic white women were more likely to report trouble sleeping to a physician, while non-Hispanic black women were more likely to report inadequate amounts of sleep. Further, non-Hispanic white women were more likely to have reported trouble sleeping to a physician than minority women getting the same amount of sleep.

B34

POPULATION-BASED SURVEILLANCE AND PREVALENCE OF STILLBIRTHS: IOWA STILLBIRTH SURVEILLANCE PROJECT (ISSP). *P Romitti, K Piper, C Fall, S Gorton, F Foo, K Conway, S Au, C Druschel, and M Ruttenber (The University of Iowa, Iowa City, IA 52242)

Introduction: In the United States, stillbirth prevalence is commonly estimated from fetal death certificates (FDCs) with reports of 6/1,000 deliveries. FDC reporting is guided by the Model State Vital Statistics Act and Regulations (Model Law), which recommends defining a fetal death as a stillbirth if delivery weight was ≥350 grams or gestation was ≥20 weeks. Each state, however, develops its own FDC criteria, which limits its use for generating national estimates. Methods: An alternative to FDCs is use of birth defect surveillance systems to identify stillbirths. In 2005, the ISSP engaged the Iowa Registry for Congenital and Inherited Disorders to conduct population-based stillbirth surveillance among nearly 40,000 deliveries annually. Iowa defines a reportable stillbirth per the Model Law. Using this definition, we conducted multisource surveillance (e.g., FDCs, perinatal reports, inpatient and outpatient records) and estimated stillbirth prevalence (N stillbirths/N live birth+stillbirth deliveries) in Iowa. Results: From 2005-2011, we ascertained 1,363 reportable stillbirths among 278,666 deliveries, producing an overall prevalence of 4.9/1,000 deliveries; annual estimates ranged from 4.2 to 5.9. Our multisource ascertainment verified that 82% of FDCs issued were for reportable stillbirths. Additionally, 15% of all reportable stillbirths were not issued a FDC. Conclusions: Our population-based estimates for stillbirths tend to attenuate those previously reported. Our approach can serve as a model for other states to conduct stillbirth surveillance. To this end, we recently expanded to birth defect surveillance systems in Colorado, Hawaii, and New York State, and now annually monitor more than 120,000 deliveries with a diverse racial/ethnic composition.

B35

COMPARISON OF THE PHQ-2 AND THE EPDS-B AS SCREENING TOOLS FOR DEPRESSIVE SYMPTOMS AMONG POST-PARTUM WOMEN IN BANGLADESH.

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

B36

PRE-CONCEPTION RISK FACTORS ASSOCIATED WITH PRENATAL SMOKING AND LOW BIRTH WEIGHT. Jennifer B. Kane* (University of North Carolina, Chapel Hill, NC)

Prenatal smoking is the leading preventable cause of perinatal morbidity and mortality. Considerable evidence also suggests it has a causal effect on birth weight. Yet prevention efforts to reduce prenatal smoking demonstrate modest results, reflecting difficulties in changing smoking behavior—-particularly among heavy smokers. This study examines pre-conception factors (childhood socioeconomic status (SES); along with adolescent human capital, smoking, depression, self-esteem, self-efficacy, and obesity) that may contribute to prenatal smoking and birth weight, with the goal of increasing the efficacy of future prevention efforts. Data are drawn from a population-based, prospective, longitudinal study of young adults—the National Longitudinal Study of Adolescent Health; the analytic sample includes women who transitioned to motherhood during the study (n = 3,364). This study develops and tests a path model linking early life conditions to prenatal smoking and birth weight. Instrumental variables that identify prenatal smoking are validated and incorporated. Results are robust across structural equation models and propensity score matching models. Findings demonstrate the salience of early life conditions. Childhood SES directly affects prenatal smoking (odds ratio = 0.14), which in turn affects birth weight. Both childhood SES and adolescent attitudes and behaviors have long-reaching effects on prenatal smoking—-with adolescent smoking exhibiting the strongest effect (odds ratio = 5.05). These pre-conception factors explain 40% of the variance in prenatal smoking, providing evidence that early life experiences shape prenatal smoking behavior. Future policy and prevention programs should redouble efforts to prevent adolescent smoking as these efforts may also generate benefits for perinatal health.

B37

A PROSPECTIVE COHORT STUDY OF TIME-TO-PREGNANCY AND ADVERSE PREGNANCY OUTCOMES. *Wise LA, Mikkelsen EM, Sorensen HT, Riis A, Rothman KJ, Hatch EE (Boston University)

We used data from a Danish prospective cohort study to examine the relation between TTP and selected pregnancy outcomes (2007-2011). TTP was ascertained prospectively from self-administered questionnaires. Outcomes were derived from the National Danish Birth and Patient Registries and included preterm birth (PTB; <37 weeks' gestation), low birth weight (<2500 g), preeclampsia, placental disorders (placenta previa, abruptio placenta, placenta accreta, placental insufficiency), and caesarean delivery. The cohort was restricted to women with singleton births (N=3,630). We used log-binomial regression to estimate risk ratios (RR) and 95% confidence intervals (CI), adjusting for maternal and paternal age, maternal body mass index (kg/m2), maternal smoking, infant sex, and parity. RRs (95% CIs) for risk of PTB in relation to TTP of 3-5, 6-11, and ≥12 versus <3 cycles were 1.69 (0.99, 2.87), 1.07 (0.61, 1.86), and 1.69 (1.01, 2.86). When PTB was defined as <36 weeks, the respective RRs were 1.46 (0.68, 3.12), 1.63 (0.78, 3.40), and 2.08 (1.02, 4.25). Longer TTP was associated with increased risk of placental disorders (TTP ≥12 vs. <3: RR=2.22, CI: 0.99, 5.00), caesarean delivery (TTP ≥12 vs. <3: RR=1.89, CI: 1.34, 2.67), and low birth weight (TTP ≥12 vs. <3: RR=1.92, CI: 1.01, 3.65). However, the latter association was attenuated after control for PTB (RR=1.52, CI: 0.88, 2.63). TTP was not appreciably associated with preeclampsia. Control for fertility treatment use, prepregnancy hypertension, or diabetes made little difference in the RRs. These data suggest that delayed conception is a marker of increased risk of some adverse pregnancy outcomes.

B38

THE CLINICIAN'S PERSPECTIVE: DECISION-MAKING FOLLOWING SUSPICION OR DIAGNOSIS OF A SEVERE CONGENITAL ANOMALY. LK Smith* (University of Leicester, Leicester, UK), R Lotto (University of Leicester, Leicester, UK), E Draper (University of Leicester, Leicester, UK), J Budd (University of Leicester, Leicester, UK), E Brewster (University of Leicester, Leicester, UK), N Armstrong (University of Leicester, Leicester, UK)

Objectives: To explore the experiences of clinicians involved in counselling women following suspicion or diagnosis of a suspected fetal anomaly to aid understanding of socioeconomic variation in rates of termination for congenital anomalies. Methods: Qualitative study of 18 clinicians involved in the care of women following suspicion of a congenital anomaly, using semi-structured interviews. Data analysed using constant comparative method to identify key themes. Results: Two key themes emerged: 1) risk and uncertainty; 2) active decision-making. Clinicians highlighted that uncertainty relating to prognosis was difficult to manage. Parents' ability to understand and accept risk is influential in the decision-making process and was perceived to vary between socioeconomic and cultural groups. Despite consensus on a theoretical definition of 'severe' in terms of anomaly, there was individual clinician variation in relation to when a termination would be offered after the 24 week legal threshold. The same variation is not apparent prior to 24 weeks. With regard to active decision-making, some clinicians expressed concerns regarding the ability of some parents to make an active decision, continuing an affected pregnancy being perceived as the "default" position. Conclusions: The findings emphasise difficulties faced by both clinicians and parents when managing a pregnancy affected by a severe congenital anomaly. Issues relating to clarity and application of legislation, and its potential to perpetuate variations are also discussed.

B39

NEIGHBORHOOD DEPRIVATION AND UTILIZATION OF PRECONCEPTION CARE IN LOS ANGELES. Lujing Zhan*, Jihong Liu, Stella Yu, Shin M Chao, Anwar Merchant, Bo Ca (University of South Carolina, Columbia, SC, 29208)

Preconception care is recommended by the American Academy of Pediatrics and the American College of Obstetricians and Gynecologists to improve pregnancy outcomes. Yet no study has examined whether women living in deprived neighborhood were less likely to use preconception care. Data from the 2007 Los Angeles Mommy and Baby Project (LAMB) study were used, restricting to those living in Los Angeles county and with complete data (n=2,372). Women's residential addresses were geocoded at census tract level. Eight census-tract-level socio-demographic characteristics were used to compute Neighborhood Deprivation Index (NDI) score and categorize into quartiles. Multilevel logistic regression models with random intercept were used. About 28% of women reported using preconception care at 6 months before conception. Women who lived in the less deprived neighborhood (1st and 2nd quartiles) were 2.9 times (95% confidence interval (CI): 2.1, 4.2) and 1.7 times (95% CI: 1.2, 2.2) more likely to attend preconception care compared to the women who lived in the most deprived neighborhood (4th quartile of NDI), respectively. This association became insignificant after adjusting for individual-level characteristics. Significant individual-level characteristics for using preconception care were older maternal age ($\geq$35 years old), being parous, having health insurance, having college education, being married, and living in families with at least $60K annual income. Results suggested that preconception care attendance was low and women living in deprived neighborhood were less likely to receive preconception care. Our findings shed light on the risk factors associated with the utilization of preconception care, which can be used for the programs aiming at improving this recommended care.

B40

RELATIONSHIP BETWEEN LUTEAL PHASE ADVANCED LIPOPROTEIN PARTICLES AND OVARIAN HORMONES IN HEALTHY, EUMENORRHEIC
WOMEN. Zarek S.M.*(The National Institutes of Health, Bethesda, MD), DeCherney A.H., Segars J.H., Browne R.W., Schisterman E.F., Perkins N.J., Sjaarda L.A., Schliep K.C., Ahrens K.A., Wactawski-Wende J, Mumford S.L.

Introduction: Although increased low density lipoprotein cholesterol (LDL-C) has been associated with cardiovascular disease, other subclasses of lipoprotein particles (LPP) have been found to be more sensitive markers. Although traditional lipid profiles vary across timing of the menstrual cycle, few studies have characterized LPP timed to specific menstrual cycle phases. Our objective was to evaluate the association of ovarian hormones and luteal phase LPP. Methods: The BioCycle study was a prospective cohort of 259 healthy, premenopausal women, aged 18–44 years. Fasting serum samples were collected and estradiol and progesterone were measured at eight visits per menstrual cycle for up to 2 cycles. LPP were measured only during the luteal phase using nuclear magnetic resonance spectroscopy (LipoScience, Raleigh, NC). Three very low density lipoprotein (VLDL) particle subclasses, four LDL particle subclasses and three high density lipoprotein (HDL) particle subclasses were evaluated. Linear mixed models, with cumulative exposure to ovarian hormones before the luteal phase measurement, adjusted for age and body mass index, were used. Results: Of the ten subclasses evaluated, only total VLDL (β=0.12, SE 0.17, 95% confidence interval [CI] 0.02, 0.20) and large VLDL particles (β= -0.22, SE 0.10, 95% confidence interval [CI] -0.42, -0.02) demonstrated both positive and negative significant association with peri-ovulatory estradiol. No significant associations were seen with progesterone. Conclusions: LPP subclasses do not demonstrate a consistent pattern of association with estradiol and progesterone in the menstrual cycle, although significant associations are seen in the VLDL subclasses with peri-ovulatory estradiol

B41

THE ASSOCIATION BETWEEN NEONATAL HOSPITAL READMISSION AND THE LENGTH OF STAY FOR CHILDBIRTH. Amy Metcalfe*, Matthews Mathai, Shiliang Liu, Juan Andres Leon, KS Joseph (University of British Columbia, Vancouver, British Columbia, Canada)

Length of stay (LOS) for childbirth has been steadily decreasing in recent decades in Canada, because of efforts to decrease costs and demedicalize pregnancy. We attempted to determine the optimal LOS following delivery by examining the incidence pattern of neonatal readmission for different LOS. Data on all term, singleton live births without congenital anomalies in Canada (except Quebec) were obtained from the Canadian Institute for Health Information Discharge Abstract Database for years 2003 to 2010. Temporal trends in neonatal readmission rates were quantified and a Kitagawa decomposition analysis was used to determine the proportion of the temporal increase in readmission due to decreasing LOS. 1,875,322 live births met eligibility criteria. Neonatal LOS peaked at day 1 (47.3%) after vaginal birth and day 3 (49.3%) following cesarean section; 4.2% of infants were readmitted following vaginal birth and 2.2% after cesarean section. The readmission rate for vaginal deliveries increased with increasing LOS and plateaued after an LOS of four days, while the opposite pattern was observed for cesarean deliveries. Readmissions increased from 4.1% in 2003-2005 to 4.6% in 2008-2010 among vaginal births and from 2.0% to 2.4% among cesarean deliveries. Decreases in LOS were responsible for 48.5% of the increase in readmissions following vaginal delivery and 40.5% of the readmissions following cesarean delivery. Readmission rates have increased over time in Canada but remain low indicating that a short LOS may be appropriate given community support. Patterns of readmission can be used to determine optimal length of stay in communities with less support.

B42

POSTNEONATAL CAUSE OF DEATH AMONG ADOLESCENT AND ADULT MOTHERS: A US COHORT 1999-2006. Solivan AE,* Harville EW,* Buekens P* (Department of Epidemiology, Tulane University School of Public Health and Tropical Medicine, New Orleans, LA 70122)

Objective: To examine causes of death of infants in the postneonatal period (days 28-365) in adolescent mothers compared to adult mothers. Methods: All successfully matched postneonatal deaths from the linked birth-infant death data from the National Center for Health Statistics from 1999-2006 were analyzed with standardized weights applied. Underlying cause of death was grouped into 11 broad categories. Women were divided into adolescent (less than 20 years old) or adult (more than 19 years old). Logistic regression was used to compute adjusted odds ratios (aORs), adjusted a priori for race and maternal education. Results: Postneonatal deaths accounted for 33% of infant deaths (n=74,289). Of those deaths, 19% were to adolescent mothers (n=13,960) and 81% were to adult mothers (n=60,329). The leading cause of death to postneonates was SIDS (26.5% adolescent; 22.0% adult). Postneonates of adolescent mothers were more likely to die from SIDS (aOR 1.28, 95% CI 1.21-1.36), accidents (aOR 1.28, 95% CI 1.21-1.36), and assault (aOR 1.59, 95% CI 1.44-1.74) than adult mothers. Postneonates of adolescent mothers were less likely to die of a non-infectious disease (aOR 0.76, 95% CI 0.72-0.80), a complication of the perinatal period (aOR 0.79, 95% CI 0.73-0.85), or a birth defect (aOR 0.63, 95% CI 0.60-0.67) then postneonates of adult mothers. There were no significant differences based on maternal age for cause of death due to infections, including respiratory infections; and other external causes not previously classified. Conclusions: Research should focus on identifying the underlying causes of preventable deaths in adolescent mothers.

B43

SEVERE MATERNAL MORBIDITY IN IRELAND. Edel Manning* (National Perinatal Epidemiology Centre, University College Cork, Ireland), Jennifer Lutomski, Leanne O'Connor, Paul Corcoran, Richard Greene, on behalf of the Irish Severe Maternal Morbidity Advisory Group

OBJECTIVE: To assess the incidence of severe maternal morbidity (SMM) and examine associated factors in Ireland. METHODS: In 2011, 67,806 maternities were reported from 19 maternity units, representing 93% of maternities in Ireland. SMM was classified as the presence of one or more of 15 categories of morbidity including: major obstetric haemorrhage (MOH), eclampsia, renal/liver dysfunction, cardiac arrest, pulmonary oedema, acute respiratory dysfunction, coma, cerebrovascular accident, status epilepticus, septicaemic shock, anaesthetic complications, pulmonary embolism, peripartum hysterectomy, ICU admission and interventional radiology. MOH criteria included an estimated blood loss of $\geq$2,500ml, a transfusion of $\geq$5 units of blood or documented coagulopathy treatment. The methodology was based on the Scottish Confidential Audit of Severe Maternal Morbidity (SCASMM). RESULTS: Overall, 260 women experienced SMM, a national rate of 3.8 per 1,000 maternities. Almost half (42.3%) experienced two or more severe morbidities. The perinatal mortality rate for women experiencing SMM was five times the national rate (32.6 versus 6.6 per 1,000 births). MOH was the most frequent SMM (61.2%, 2.3/1000maternities) followed by ICU admission (42.7%, 1.6/1000maternities), renal/liver dysfunction (10.0%, 0.4/1000maternities) and peripartum hysterectomy (8.8%, 0.3/1000maternities). MOH was associated with Caesarean section and peripartum hysterectomy was associated with a history of Caesarean section and a morbidly adherent placenta. CONCLUSION: The incidence of SMM in Ireland compares favourably to international figures.2-4 However, the current trend of increasing Caesarean section rates in Ireland may lead to an increase in SMM. Ongoing national audit of SMM is critical to assessing trends and informing clinical practice.

B44

PERINATAL MORTALITY IN IRELAND: A NATIONAL CLINICAL AUDIT. Paul Corcoran* (National Perinatal Epidemiology Centre, University College Cork, ireland), Edel Manning, Sarah Meaney, Richard Greene, on behalf of the Irish Perinatal Mortality Group

Background: Perinatal mortality has decreased in high-resource countries but cause of death, especially for stillbirths, is often unexplained. The Irish National Perinatal Epidemiology Centre (NPEC) established a national clinical audit on perinatal deaths to better identify causes of death and associated risk factors. Methods: After piloting the NPEC Perinatal Death Notification Form and Classification System in three maternity units in 2010, the national audit was initiated and all 20 Irish maternity units have provided anonymised data on perinatal deaths since 2011. Results: For 2011, 491 perinatal deaths were reported - 318 (65%) stillbirths, 138 (28%) early neonatal deaths and 35 (7%) late neonatal deaths - giving a perinatal mortality rate of 6.1/1,000 births, stillbirth rate of 4.3/1,000 births and early neonatal death rate of 1.9/1,000 live births. Fourfold variation in the perinatal mortality rate was observed across the 20 maternity units. The common causes of death in stillbirth were congenital anomaly (26%), placental conditions (17%) and ante/intrapartum haemorrhage (11%), 20% were unexplained. Early neonatal deaths were generally due to congenital anomaly (51%) or respiratory disorder (33%) - primarily severe pulmonary immaturity. Just 4% were unexplained. Low birthweight was common, below normal range for 53% of stillbirths and 40% of early neonatal deaths. In most cases of early neonatal death, spontaneous respiratory activity was absent or ineffective five minutes following delivery (63%) and death occurred within 24 hours (62%). Conclusion: This audit enhances clinical interpretation of perinatal deaths which will inform clinical practice, public health interventions and counselling of prospective parents.

B45

GENITOURINARY CONDITIONS REQUIRING MEDICAL INTERVENTION IN A POPULATION-BASED COHORT OF MALES WITH DUCHENNE/BECKER MUSCULAR DYSTROPHIES. Zhu Y*, Romitti PA, Conway KM, Mathews KD, Kim S, Zhang Y, Yang M, and the Muscular Dystrophy Surveillance, Tracking, and Research Network (MD STARnet)

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

B46

INFANT SEX-SPECIFIC PLACENTAL CADMIUM AND DNA METHYLATION ASSOCIATIONS: THE OMEGA STUDY. *Mohanty AF, Farin FM, Bammler TK, MacDonald JW, Afsharinejad Z, Burbacher TM, Siscovick DS, Williams MA, Enquobahrie DA (University of Washington, Seattle, USA)

Background: Recent evidence suggests that maternal cadmium (Cd) burden and fetal growth associations may vary by fetal sex. However, mechanisms contributing to these differences are unknown. Methods: Among 24 maternal-infant pairs, we measured placental Cd using inductively coupled mass spectrometry and profiled placental genome-wide DNA methylation using the Infinium HumanMethylation 450 BeadChip. We used ANOVA models to examine sex-stratified associations of placental Cd (dichotomized into high/low Cd, from sex-specific Cd medians) and DNA methylation at each CpG site or region. Statistical significance was defined as false discovery rate p-value cutoff (<0.1). Results: Placental Cd medians among females and males were 5 and 2 ug/g, respectively. For females, three sites (near ARL9, SIAH3, HS3ST4) and one region on chromosome 7 (including CROT, TP53TG1) were hypomethylated in high Cd placentas. For males, high placental Cd was associated with methylation of three sites, two (hypomethylated) near MECOM, one (hypermethylated) near SALL1, and two hypomethylated regions (one on chromosome 3 and one on chromosome 8, including MECOM and ARHGEF10, respectively). Differentially methylated sites were at or close to transcription start sites of genes involved in cell damage (SIAH3, HS3ST4, TP53TG1) in females and cell differentiation, angiogenesis and organ development (MECOM, SALL1) in males. Conclusion: Our preliminary study supports infant sex-specific placental Cd-DNA methylation associations, possibly accounting for previously reported differences in Cd-fetal growth associations across fetal sex. Larger studies are needed to replicate and extend these findings and may further our understanding of epigenetic mechanisms underlying maternal Cd burden and suboptimal fetal growth associations.

B47

APPLICATION OF THE WORLD HEALTH ORGANIZATION (WHO) INTERNATIONAL CLASSIFICATION OF FUNCTIONING, DISABILITY AND HEALTH (ICF) TO INDIVIDUALS WITH DUCHENNE/BECKER MUSCULAR DYSTROPHIES: THE MUSCULAR DYSTROPHY SURVEILLANCE, TRACKING, AND RESEARCH NETWORK (MD STARNET). Caspers Conway K*, Westfield C, Ciafaloni E, Yang M, Matthews D, James K, Paramsothy P, Romitti P, and the Muscular Dystrophy Surveillance, Tracking, and Research Network (MD STARnet) (The University of Iowa, College of Public Health, Department of Epidemiology, Iowa City, IA, United States of America)

To identify domains and categories from the WHO ICF body function component clinically relevant to Duchenne/Becker muscular dystrophies (DBMD) among a population-based sample of males identified by the MD STARnet. The hierarchical coding structure of the ICF consists of 8 first-level body function domains and additional categories of greater granularity (Levels 2-4). Two MD STARnet neuromuscular clinicians reviewed all ICF body function component domains and categories to identify those affected by DBMD; discrepancies within categories were resolved by consensus. The domains and highest category level (Level 2) selected and agreed upon by the clinicians were compiled. Six of 8 domains with 24 of 79 Level 2 categories were selected as clinically relevant. The function domains with corresponding number of Level 2 categories were: 'Mental Functions' (5 of 20); 'Sensory Functions and Pain' (1 of 12); 'Voice and Speech Functions' (0 of 4); 'Functions of the Cardiovascular, Hematological, Immunological and Respiratory Systems' (6 of 10); 'Functions of the Digestive, Metabolic, and Endocrine Systems' (7:10); 'Genitourinary and Reproductive Functions' (0 of 7); 'Neuromusculoskeletal and Movement-Related Functions' (4 of 10), and 'Functions of the Skin and Related Structures' (1 of 6). This first phase of reviewing clinically relevant ICF body functions identified a comprehensive set of domains and categories that represent compromised functions among those affected by DBMD. Subsequent phases will link MD STARnet surveillance data with selected ICF function categories to develop patient profiles, determine severity of disability and evaluate the impact of disability on ICF Activity Limitations and Participation components.

B48

MENTAL HEALTH PROBLEMS AMONG MALES WITH DUCHENNE/BECKER MUSCULAR DYSTROPHIES USING POPULATION-BASED SURVEILLANCE DATA FROM THE MUSCULAR DYSTROPHY SURVEILLANCE, TRACKING, AND RESEARCH NETWORK (MD STARNET). Caspers Conway K*, Mathews KD, Paramsothy P, Oleszek J, Trout C, Romitti PA, and the MD STARnet. (The University of Iowa, College of Public Health, Department of Epidemiology, Iowa City, IA)

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

B49

PERINATAL OUTCOMES IN TWIN PREGNANCY IN IRELAND. O' Mahony A, Meaney S, O' Donoghue K. (Department of Obstetrics and Gynaecology, University College Cork, Ireland)

Introduction: Over the past two decades multiple births have been increasing in Ireland, in 2011 17.9 sets of twins per 1,000 live births were born. This study aims to investigate adverse perinatal outcomes in twin pregnancies. Methods: A retrospective study of all twin pregnancies delivered from 2009 to 2011 in a large, tertiary hospital (~8,000 deliveries per annum) in the Republic of Ireland was conducted. Birth registers, neonatal intensive care unit and clinic records were reviewed to examine perinatal outcomes. Results: Of the 523 twin pregnancies included in the study mean gestational age at delivery was 35.1 ± 3.8 (weeks). 79.1% (n=413) delivered preterm (<37weeks) of which 75.8% (n=313) were classified as late preterm infants, delivering between 34-37 weeks. Among the 523 twins 47.5% (n=247) were nulliparous and 16.3% (n=87) were monochorionic (MC). Nulliparity and MC were both significantly associated with preterm delivery (p=0.02 and p<0.001, respectively). Both had lower mean gestational ages (p=0.007 and p<0.001, respectively) with significant lower birth weights (p<0.001) compared to parous and dichorionic (DC) pregnancies. Intra-uterine fetal death (11.9% vs. 1.3%; p<0.001), twin-to-twin transfusion syndrome (24.1% vs. 0.1%; p<0.001) and perinatal mortality (p=0.002) were higher in MC pregnancies compared to DC. Mean maternal age was 33.2 ± 4.9 years and fetal anomalies increased with advanced maternal age; <40 years of age, (p=0.01). Conclusion Our findings show that monochorionicity and nulliparity are associated with adverse perinatal outcomes in twin pregnancies, and confirm that these pregnancies warrant close antenatal surveillance.

B50

PREVALENCE OF RAYNAUD'S SYNDROME, VASOSPASM, AND ASSOCIATED PAIN AND DAMAGE. E Chetwynd* (University of North Carolina, Chapel Hill, NC) R Costello A Stuebe

Breastfeeding-associated pain is common and frequently leads to unplanned weaning. Nipple vasospasm is one cause of persistent breastfeeding-associated pain. Although limited to case studies and review articles, the current literature often associates nipple vasospasm with Raynaud's syndrome, which presents as vasospasm of arterioles in hands and feet. This was a pilot prospective cohort study of 30 breastfeeding women. In a secondary analysis, we explored prevalence of nipple vasospasm (blanching) and Raynaud's Syndrome, and we conducted a longitudinal analysis of the association between nipple blanching and pain as compared to damage. No participants reported a history of Raynaud's Syndrome, but we found a high prevalence (66%) of nipple blanching. The odds of any blanching among fifteen women followed longitudinally was 0.4, (95% CI = 0.2, 0.9 p=0.03). Blanching was almost five times more likely if damage was present (OR 4.7, 95% CI 1.3, 16.5, p = 0.02) than if damage was absent, while blanching was not associated with pain (OR 1.2, 95% CI = 0.4, 3.8, p = 0.8, for blanching in the setting of pain vs. no pain). We found a high prevalence of nipple vasospasm in asymptomatic breastfeeding women, suggesting vasospasm may be a normal, non-clinical finding. The association with damage rather than pain suggests that transient blanching may occur as part of a healing process. Reducing breastfeeding problems prevents disrupted nursing. Counter to the current literature, we found a high prevalence of blanching and an association with nipple damage which demonstrates the need for further research.

B51

COMMUNICATION DISORDERS IN U.S. CHILDREN, AGED 3–17 YEARS: THE 2012 NATIONAL HEALTH INTERVIEW SURVEY (NHIS). Li CM, Hoffman HJ*, Jones L, Vahratian A, Rice ML (The National Institute on Deafness and Other Communication Disorders, National Institutes of Health, Bethesda, MD)

Background: Healthy People 2020 (HP2020) included objectives to increase the proportion of children with communication disorders (CCD) receiving evaluation/treatment. However, reliable prevalence and service information for CCD is lacking. Methods: The National Institute on Deafness and Other Communication Disorders funded a Child Voice, Speech and Language Supplement to NHIS. Parents reported on VSL disorders, age at onset, duration, severity, and healthcare for evaluation/treatment. Multivariable logistic regression was used with data for 10,954 children aged 3–17 years to estimate nationally representative odds ratios (OR) and 95% confidence intervals (CI). Results: Prevalence of CCD lasting 1+ week during the last 12 months was 7.7% (4.7 million [M] U.S. children). The most prevalent disorder was speech (5.0%, 3.1M), then language (3.3%, 2.0M), voice (1.4%, 0.8M), and swallowing (0.9%, 0.6M). Younger children had increased risk (vs. 12-17 years): 3-5 years (OR=4.0; CI:2.9-5.5) and 6-11 years (OR=2.2; CI:1.7-2.29). Boys (OR=1.5; CI:1.2-2.0) and non-Hispanic black children (OR=1.5; CI:1.1-2.3)) were more likely to have CCD, but only if aged 3–11. Risk factors across all age groups were: first spoken word >15 months, OR=2.5 (CI:1.5-3.0); anemia, OR=2.8 (CI:1.4-5.6); chronic ear infections, OR=1.8 (CI:1.2-2.6); learning disability, OR=5.7 (CI:4.1-7.9); strep/tonsillitis in past year, OR=1.8 (CI:1.4-2.3); and dental pain, OR=1.9 (CI:1.4-2.7). Among CCD, 55.2% received treatments last year, increasing to 71.1% among those with "moderate-to-severe" problems. Speech-language pathologists provided most treatment services (46.5%), followed by early intervention specialists (22.3%). Discussion: CCD are common, which is why objectives were included in HP2020 to increase the proportion of CCD receiving evaluation/treatment.

B52

TO ESTABLISH TRENDS IN NEONATAL AND INFANT MORTALITY RATES (NMR AND IMR) IN TEXAS IN LAST DECADE. V Govande*, J Song J, A Muthusamy, M Koneru, MR Beeram, DV Dharmapuri (Scott and White Hospital, Temple, TX)

Hypothesis : IMR/NMR in Texas could be explained by changes in ethnicity, income and hospital resources. Methods: Births and death linked mortality data were obtained from Texas DHHS in 11 health regions formed according to regional and local health services for years 2000-2009. Deaths were analyzed by county of residence. Demographics were compared. Multivariable Negative Binomial regression analysis was utilized to estimate effects of ethnicity, median income, and year on NMR/IMR. Results: During years 2000-09, NMR dropped from 4.37 in 2003 to 3.77 in 2009, and IMR dropped from 6.58 to 5.96. Both peaked in year 2003. There was no significant trend detected regarding birth weight, gestational age (GA), gender, and smoking. C-section rate increased from 32 to 45%. Median income and NICU beds increased during study period. NMR/IMR remained significantly higher (6.61 to 6.57) among Black babies (P<.001) during the study period and remains high even after adjusting county and median income. After adjusting different variables, prenatal care, GA, median income in multivariable models became insignificant. Conclusion: Both NMR/IMR decreased during study period in 11 health regions of Texas, mainly in White and Hispanic population. Decrease could be associated with higher income and greater access to tertiary care services. Our study provides a model to analyze NMR/IMR data in different health regions and available health services to better understand the factors contributing to high NMR/IMR. Higher mortality rates among the Black population underscore the need for improved maternal and neonatal health care services for this population across the state.

B53

UNDERSTANDING DECLINES IN STILLBIRTH AND NEONATAL MORTALITY IN EUROPE. Ashna Mohangoo*, Jennifer Zeitlin, The Euro-Peristat Research Group

Background: Fetal and neonatal mortality rates declined in most countries of Europe between 2004 and 2010. We investigated the contribution of changing gestational age distributions and gestational-age specific mortality rates to these declines. Methods: Aggregate data on live births, fetal and neonatal deaths by gestational age were collected using a common protocol from countries and regions in the Euro-Peristat project in 2004 and 2010. Overall mortality rates were computed using inclusion thresholds of 28+ weeks for fetal deaths (N=25 countries) and 24+ weeks for neonatal deaths (N=22 countries). Rate ratios (RR) for mortality in 2010 versus 2004 were computed overall and by gestational age subgroups (24-27, 28-31, 32-36, 37+ weeks); pooled RR were derived using random-effects models. Results: Changes in the gestational age distribution contributed little to declines in mortality between 2004 and 2010. Mortality declined in all gestational age sub-groups. For fetal mortality, RR were 0.81 [95% CI: 0.79 - 0.84] for all births, 0.88 [95% CI: 0.79-.1.03] at 28 to 31 weeks of gestation, 0.84 [95% CI: 0.77-0.91] at 32 to 36 weeks and 0.81 [95% CI: 0.72-0.92] at 37+ weeks. The corresponding RR for neonatal mortality were 0.72 [95% CI: 0.67-0.79], 0.75 [95% CI: 0.67-0.83], 0.78 [95% CI: 0.67-0.91] and 0.75 [95% CI: 0.64-0.85] respectively. Conclusions: Recent declines in fetal and neonatal mortality have been driven by a reduction in gestational-age-specific mortality with gains at all gestational ages. Because of the distribution of births by gestational age, absolute declines in number of deaths were highest for births at term.

B54

PREGNANCY OUTCOMES FOR NEURAL TUBE DEFECT AFFECTED PREGNANCIES IN DIFFERENT ETHNIC GROUPS IN THE UK. Peake JN*, Knowles RL, Shawe J, Copp AJ (Institute of Child Health, University College London, UK)

Approximately 1 in 1000 pregnancies in the UK are affected by neural tube defects (NTDs); severe congenital abnormalities caused by failed closure of the embryonic neural tube. There is a paucity of research on the epidemiology and natural history of NTD affected pregnancies in different ethnic communities within this setting. This study sought to explore differences between South Asian, Black and White women in pregnancy outcomes (late miscarriage, stillbirth, termination for fetal anomaly or live birth) for NTD cases from congenital anomaly registers in the UK. Due to aetiological and phenotypic differences, NTD cases occurring in isolation and cases with associated malformations were analysed separately for individual NTDs: spina bifida, anencephaly and encephalocele. Evidence of an association between ethnicity and pregnancy outcome was found for spina bifida cases in the isolated NTD group (p=0.002), with the proportion of terminations higher in White than Black women. Very weak evidence of an association was found for encephalocele cases in the multiple malformation NTD group (p=0.16). No statistical evidence of association, likely due to small numbers, was found between ethnicity and pregnancy outcome for anencephaly cases in the multiple malformation group; however, all cases from South Asian and Black mothers were terminated in contrast to 79% from White mothers. These results suggest that ethnicity of mother has the biggest impact on pregnancy outcomes for cases with an isolated spina bifida defect. However, there are other important factors, such as deprivation, that could influence the results and will be included in the multivariable analyses.

B55

IS MATERNAL REPORT OF DIETARY FOLATE INTAKE AND FOLIC ACID SUPPLEMENT USE ASSOCIATED WITH CORRESPONDING RED BLOOD CELL FOLATE DURING PREGNANCY? Cordero C*, Daniels JL, Mendez MA, Murphy SK, Hoyo C (The University of North Carolina-Chapel Hill, Chapel Hill, NC)

Research about the impact of folic acid (FA) during pregnancy often relies on maternal report of diet or supplement use to estimate FA intake, but it's unclear whether these adequately reflect circulating folate. During 2005-2011, the Newborn Epigenetics Study collected 24-hour dietary recall, supplement use, and blood specimens from 353 pregnant women in Durham County, North Carolina. Folate was measured in red blood cells (RBCs). 149 (42%) women reported they did not take FA supplements, while 137 (39%) reported taking >400 mcg/day of FA. Red blood cell folate concentration was lower among women reporting no supplement use (mean=188.4 mcg/L SD=76.5), compared to those who reported taking >400 mcg/day of FA (232.3 mcg/L, SD=70.3). Reported FA supplement use and dietary folate intake were not highly correlated ($r=0.12$). Both were positively associated with RBC folate. Compared to no use, FA supplement use of ≥400 mcg/day was associated with increased RBC folate ($\beta=40.6$; 95% Confidence Interval (CI) 22.7, 58.5), adjusted for maternal smoking, dietary folate intake, and gestational week at blood draw. Dietary folate intake (comparing >800 mcg to <400 mcg) was more strongly associated with RBC folate concentration among those who did not use supplements ($\beta=30.9$; 95%CI: 3.0, 64.7) than among supplement users ($\beta=5.4$; 95%CI: -29.1, 40.0). Self-report of FA supplementation provides stronger indication of long-term maternal folate status than self-reported dietary folate. If women took supplements, further data regarding dietary folate intake did not help inform folate status. However, dietary information was useful for women who did not take FA supplements.

B56

PRIORITIZING BIRTH DEFECTS RESEARCH: A REVIEW OF REVIEWS. AP Case*
A Hoyt MA Canfield

In the past 20 years, large-scale, etiologically-focused birth defects studies have burgeoned, including findings from the National Birth Defects Prevention Study, EUROCAT, the China Birth Defects Monitoring Program, as well as collaborative studies from the National Birth Defects Prevention Network and the International Clearinghouse for Birth Defects Surveillance and Research. These groups each prioritize potential study topics differntly, but broader research gaps have not been systematically identified. The present study aims to address that gap. A synthesis of systematic reviews serves as a logical starting place for prioritizing future research, including identifying neglected defects and teratogens. We identified and synthesized findings from 123 published systematic reviews that looked at parental characteristics/exposures associated with increased risk of structural or chromosomal anomalies in humans. Seventy-six studies met our inclusion criteria. Of these, 31 reported on only non-specific defect groupings (e.g. "major malformations). Meta-analyses and narrative reviews were examined separately. Among meta-analyses, cardiac defects were most frequently addressed, with anti-epileptic drugs, diabetes, and twinning-related risk factors identified as the most strongly associated risk factors. Few reviews addressed defects of the digestive system (n=2) or ears (n=1). Among non-meta-analyses, neural tube defect studies were most common, with at least moderate effects published for low maternal B12 levels, as well as exposures to tetrachlorodibenzo-p-dioxin, water disinfection byproducts, nitrates/nitrites, and hazardous waste products (no folic acid studies were found among non-meta-analyses). Summaries of additional defects and risk factors studied will be presented with notable gaps identified. Suggestions for developing coherent research agendas will be provided.

B57

DENTAL UTILIZATION FOR MEDICAID-ENROLLED CHILDREN WITH CYSTIC FIBROSIS IN IOWA. EW Sarvas*, DL Chi (University of Washington, Seattle, WA)

Objective: To compare dental utilization for Medicaid-enrolled children with cystic fibrosis (CF) to those without CF. Background: Improving the oral health of children remains an important goal of Healthy People 2020. Patients with CF are at an increased risk for dental caries because they need a therapeutically high cariogenic diet and frequent use of inhaled medications that decease salivary pH to promote respiratory health. Paradoxically, past literature has reported that they present with a lower caries prevalence than the general population. Use of preventive dental care is an important factor, but no studies to date have examined dental care use for children with CF. Methods: We analyzed Iowa Medicaid dental claims submitted during calendar year 2012 for a cohort of children ages 3-17. Utilization rates were compared for the two groups. Crude and covariate-adjusted odds ratios were estimated using Poisson regression modeling. Results: A significantly lower proportion of children with CF (N = 145) than children without CF (N = 288, 066) used any type of dental care in 2012 (38.6% versus 55.5%; P <0.0001). Conclusion: Medicaid-enrolled children with CF are at risk for poor access to dental care compared to other children in Medicaid, which could contribute to their already higher risk for dental caries.

B58

MATERNAL OCCUPATIONAL PESTICIDE EXPOSURE AND RISK OF CARDIOVASCULAR MALFORMATIONS IN THE NATIONAL BIRTH DEFECTS PREVENTION STUDY. Carissa M. Rocheleau*, Steven J. Bertke, Christina C. Lawson, Paul A. Romitti, Wayne T. Sanderson, Sadia Malik, Philip J. Lupo, Tania A. Desrosiers, Erin M. Bell, Charlotte Druschel, Adolfo Correa, Jennita Reefhuis (National Institute for Occupational Safety and Health, Cincinnati, OH 45226)

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

B59

PRECONCEPTION MATERNAL AND PATERNAL EXPOSURE TO PERSISTENT ORGANIC POLLUTANTS AND BIRTH SIZE, THE LIFE STUDY. Robledo CA*, Yeung E, Mendola P, Sundaram R, Maisog J, Sweeney AM, Barr, DB, Buck Louis GM (Division of Intramural Population Health Research, Eunice Kennedy Shriver National Institute of Child Health and Human Development, National Institutes of Health, Rockville, MD, USA)

Persistent organic pollutants (POPs) are developmental toxicants but the impact of joint parental exposures on offspring birth size is unexplored. We examined associations between preconception maternal and paternal serum concentrations of 63 POPs, comprising five major classes of pollutants, with birth size measures. Parental serum concentrations of 9 organochlorine pesticides, 1 polybrominated biphenyl (PBB), 7 perfluorochemicals (PFCs), 10 polybrominated diphenyl ethers (PBDEs) and 36 polychlorinated biphenyls (PCBs) were measured prior to conception for 234 couples. Differences in birth weight, length, head circumference, and ponderal index were estimated using multiple linear regression per 1-standard deviation (SD) increase in log-transformed chemicals. Models were estimated separately for each parent and adjusted for maternal age, BMI (kg/m2) and other confounders with an interaction term between infant gender and each chemical. Reductions in birth weight (range: 84-195 grams) among girls (n=117) were seen for each 1-SD increase in log-transformed maternal serum concentrations of DDT, PBDE congeners 28 and 183 and paternal serum concentrations of PBDE-183 and PCB-167. Among boys (n=113), maternal (PCBs: 138, 153, 167, 170, 195, and 209, PFOSA) and paternal (PCBs: 172 and 195) serum concentrations of several POPs were associated with lower birth weight (range: 98-170 grams), while paternal levels of PBDEs (66, 99) were associated with higher birth weight. Differences in offspring head circumference, length and ponderal index were also observed in association with parental exposures. Preconceptional maternal and paternal levels of several POPs were associated with differences in birth size among offspring.

B60

"WILL MY WORK AFFECT MY PREGNANCY?" RESPONDING TO PUBLIC INQUIRIES. B Grajewski*, CM Rocheleau, CC Lawson, CY Johnson, EA Whelan (National Institute for Occupational Safety and Health (NIOSH), Centers for Disease Control and Prevention, Cincinnati, OH)

Reproductive epidemiologists at NIOSH answered over 200 requests for health information from the public during 2009-2013. Authoritative information on specific occupational reproductive hazards is scarce and complex because exposure levels can vary and multiple exposures may be present. We reviewed the occupational reproductive health requests received by NIOSH to determine who requested information and which issues were of most concern. Requests were primarily (54%) from currently pregnant workers, but also from employers (16%), family/friends/colleagues (9%), healthcare providers (6%), and other sources. The most frequent occupations held by requestors were laboratory work (18%), nursing (13%) and other healthcare occupations (18%). Requestors most commonly asked about specific occupational exposures, but information about workplace policies or assistance with development of guidelines was sought by 12% of the requestors. The most common requests for information were for potential occupational exposure to solvents (14%), anesthetic gases (10%), formaldehyde (7%), infectious agents in laboratory environments (7%) or healthcare settings (7%), and ionizing radiation (6%). The effects of occupational exposures on breastfeeding are an increasing concern among working women, and little information is available. Information on exposure-specific respiratory protection and other personal protective equipment in pregnancy were included in most replies. By sharing these requests and responses we intend to identify those most at risk, inform research priorities, assist the development of workplace reproductive health policies, and help health practitioners ask the right questions of their clients to improve workers' reproductive health.

B61

HAIR MERCURY AND CLINICAL OUTCOMES AMONG WOMEN UNDERGOING IN VITRO FERTILIZATION. MC Afeiche* (Department of Nutrition, Harvard School of Public Health, Boston, MA) DL Wright (Vincent Memorial Obstetrics and Gynecology Service, Massachusetts General Hospital, Boston, MA) K Smith (Department of Environmental Health, Harvard School of Public Health, Boston, MA) AJ Gaskins (Department of Nutrition, Harvard School of Public Health, Boston, MA) S Ehrlich (Department of Environmental Health, Harvard School of Public Health, Boston, MA) PL Williams (Department of Biostatistics, Harvard School of Public Health, Boston, MA) T Toth (Vincent Memorial Obstetrics and Gynecology Service, Massachusetts General Hospital, Boston, MA) JE Chavarro (Department of Nutrition, Harvard School of Public Health, Boston, MA) R Hauser (Department of Environmental Health, Harvard School of Public Health, Boston, MA)

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

B62

HAIR MERCURY AND SEMEN PARAMETERS AMONG MEN ATTENDING A FERTILITY CLINIC. MC Afeiche*(Department of Nutrition, Harvard School of Public Health, Boston, MA) AJ Gaskins (Department of Nutrition, Harvard School of Public Health, Boston, MA) PL Williams (Department of Biostatistics, Harvard School of Public Health, Boston, MA) J Petrozza (Vincent Obstetrics and Gynecology, Massachusetts General Hospital and Harvard Medical School, Boston, MA) D Wright (Vincent Obstetrics and Gynecology, Massachusetts General Hospital and Harvard Medical School, Boston, MA) C Tanrikut (Department of Urology, Massachusetts General Hospital and Harvard Medical School, Boston, MA) R Hauser (Department of Environmental Health, Harvard School of Public Health, Boston, MA) JE Chavarro (Department of Nutrition, Harvard School of Public Health, Boston, MA)

Introduction We have previously reported that fish intake is related to higher total sperm count and sperm morphology. However, fish is a source of methyl-mercury, a reproductive toxicant. In this study, we examined whether hair mercury was associated with semen parameters. Methods A total of 126 men (227 semen samples) participating in a cohort study at the Massachusetts General Hospital Fertility Center were included in this analysis. Total hair mercury was measured in the proximal 3 cm of hair using a Direct Mercury Analyzer 80 (Milestone Inc, Monroe, CT). Median (interquartile range (IQR)) time between hair sample and semen sample was -13days (-44,4).We used linear mixed regression models to examine the relation between hair mercury and semen parameters (total sperm count, sperm concentration, progressive motility, morphology, and semen volume) while adjusting for age, body mass index, smoking status, abstinence interval, race, calorie, and alcohol intake. Results: Men had a median (IQR) hair mercury of 0.70 ppm (0.37, 1.26) and age of 36.4 years (33.0, 39.2). The adjusted (95%CI) sperm concentration was 42.0 $\times 10^6$ sperm/mL (30.0, 59.0) among men in the lowest quartile of hair mercury (0.03-0.34ppm), and 56.9 $\times 10^6$ sperm/mL (42.7, 75.9) among men in the highest quartile of hair mercury (1.26-8.00ppm) (p,trend=0.23). Men whose hair mercury was above the Environmental Protection Agency safety limit of 1ppm (36%) had 27.3% (1.5, 46.3%) higher total sperm count than men below the safety limit. Conclusions: Higher hair mercury was associated with higher total sperm count among men presenting to a fertility clinic.

B63

PRENATAL LEVELS OF PERSISTENT ORGANOCHLORINE POLLUTANTS (POPS) AND BIOMARKERS OF ALLERGIC AIRWAY DISEASE IN THE OFFSPRING: RESULTS FROM 20 YEARS FOLLOW-UP. S Hansen* (Centre for Fetal Programming & Statens Serum Institut, Copenhagen, Denmark) M Strøm (Centre for Fetal Programming & Statens Serum Institut, Copenhagen, Denmark) E Maslova (Centre for Fetal Programming & Statens Serum Institut, Copenhagen, Denmark) SF Olsen (Centre for Fetal Programming & Statens Serum Institut, Copenhagen, Denmark, Havard School of Public Health, Boston, USA) R Dahl (University of Southern Denmark, Odense, Denmark) HJ Hoffmann (Aarhus University Hospital, Aarhus, Denmark) P Rantakokko (National Institute for Health and Welfare, Kuopio, Finland) H Kiviranta (National Institute for Health and Welfare, Kuopio, Finland) A Linneberg (Research Centre for Prevention and Health, Glostrup, Denmark) TI Halldorsson (Centre for Fetal Programming & Statens Serum Institut, Copenhagen, Denmark, University of Iceland, Reykjavik, Iceland)

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

B64

AMBIENT FINE PARTICULATE MATTER, NITROGEN DIOXIDE, AND HYPERTENSIVE DISEASES OF PREGNANCY IN NEW YORK CITY. *Savitz DA, Elston B, Bobb JF, Carr JL, Clougherty JE, Dominici F, Ito K, Ross Z, Mcalexander, T, Matte TD, Wellenius GA

Along with growing evidence of a possible effect of urban air pollution on fetal growth and preterm birth, there is increasing interest in a possible role in the etiology of hypertensive disorders of pregnancy. Some but not all recent studies have yielded evidence suggesting an impact of both fine particulate matter and nitrogen dioxide. To address limitations in exposure and outcome assessment and study size, we analyzed a unique data resource from New York City. Birth certificate information on 268,601 New York City residents delivering 2008-2010 was linked to hospital discharge data to more accurately identify gestational hypertension and preeclampsia (classified as mild or severe). Exposure to air pollution was assigned based on residential location linked to monitoring data from the New York City Community Air Survey, conducted specifically to characterize air pollution exposure to residents. Adjusting for covariates available in the birth records, we analyzed the association between first and second trimester fine particulate matter and nitrogen dioxide in relation to hypertensive disorders using multinomial logistic regression. Both continuous and categorical measures of first and second trimester fine particulate matter and nitrogen dioxide yielded positive associations for gestational hypertension, weak inverse associations for mild preeclampsia, and null associations for severe preeclampsia. Adjusted odds ratios in the highest quartile of exposure (compared to the lowest) were on the order of 1.3-1.6 for gestational hypertension and 0.8-0.9 for mild preeclampsia. The possible impact of ambient air pollution on shift in blood pressure, but not necessarily preeclampsia, warrants further evaluation.

B65

SMALL FOR GESTATIONAL AGE INFANTS BORN TO ASTHMATIC MOTHERS IN ASSOCIATION WITH FIRST TRIMESTER AIR POLLUTION. P Mendola*, C Robledo, E Yeung, K Leishear, D Liu, T Mannisto, S Sherman, KL Grantz (Eunice Kennedy Shriver National Institute of Child Health and Human Development, Rockville, MD)

Both asthma and air pollution have been associated with fetal growth restriction. We assessed the joint impact of air pollution and maternal asthma on the risk of small for gestational age (SGA, ≤10th percentile of birthweight for age and gender). The Consortium on Safe Labor (2002-2008) provided gestational age and birth weight for 220,853 singleton infants including 16,896 deliveries with maternal asthma. Adequate birthweight for age/gender (>10th to ≤90th percentile) was the reference group. A modified Community Multi-scale Air Quality model fused with ambient air monitor data estimated exposure. Log linear models with an interaction term for asthma and average interquartile range for each pollutant were used to calculate the relative risk (RR) and 95% confidence interval for SGA associated with first trimester exposure among asthmatics and non-asthmatics adjusting for site, demographic and clinical factors. Compared to women without asthma in the lowest exposure quartile, infants of asthmatic mothers had higher risk for SGA associated with ozone exposure in the 25-75th percentile RR=1.12 (1.05-1.19) and above the 75th percentile RR=1.13 (1.03-1.24); carbon monoxide exposure in the 25-75th percentile RR=1.10 (1.03-1.17) and the highest quartile RR=1.16 (1.05-1.28); nitrogen oxides exposure in the 25-75th percentile RR=1.09 (1.02-1.17) and the highest quartile RR=1.15 (1.04-1.28); and sulphur dioxide (SO2) exposure in the 25-75th percentile RR=1.17 (1.09-1.25) and the highest quartile RR=1.16 (1.05-1.28). Only SO2 exposure was associated with increased SGA risk for infants of non-asthmatic mothers (25-75th percentile RR=1.06 (1.01-1.11) and highest quartile RR=1.07 (1.00-1.14)). SGA risk may be influenced by maternal asthma.

B66

CONGENITAL HEART DEFECTS AND RESIDENTIAL PROXIMITY TO AGRICULTURAL PESTICIDE APPLICATIONS IN THE SAN JOAQUIN VALLEY OF CALIFORNIA. Carmichael SL*, Yang W, Roberts EM, Kegley SE, Padula AM, Lammer EJ, English PB, Shaw GM (Stanford University School of Medicine, Stanford, CA)

We examined the potential association of selected congenital heart defect phenotypes with residential proximity during the periconceptional period to commercial agricultural pesticide applications in the San Joaquin Valley, California. Study subjects included 569 heart defect cases and 785 non-malformed controls whose mothers participated in a population-based case-control study. Associations with any versus no exposure to physicochemical groups of pesticides and specific chemicals were assessed using logistic regression adjusted for relevant covariates, for heart defect phenotypes with ≥50 cases and pesticide exposures with ≥5 exposed cases and controls, which resulted in 235 comparisons. 37% of cases and 38% of controls were classified as exposed to pesticides within a 500 m radius of mother's address. Adjusted odds ratios (AORs) with 95% CIs excluding one were observed for 19 comparisons and ranged from 1.9-7.1. They included tetralogy of Fallot (n=101 cases) and neonicotinoids; hypoplastic left heart syndrome (n=59) and strobins; coarctation of the aorta (n=74) and pyridazinones; pulmonary valve stenosis (n=53) and dichlorphenoxy acid or esters, bipyridyliums and organophosphates; ventricular septal defects (n=93) and avermectins; and atrial septal defects (n=132) and dichlorphenoxy acid or esters. No AORs met this criterion for d-transposition of the great arteries (n=58) or heterotaxia (n=53). Most pesticides were not associated with increased risk of specific heart defect phenotypes. For the few that were associated, results should be interpreted with caution until replicated in other study populations.

B67

MATERNAL URINARY BISPHENOL A DURING PREGNANCY AND MATERNAL AND NEONATAL THYROID HORMONE CONCENTRATIONS. M.E. Romano*, G.M. Webster, A. Vuong, R. Zoeller, A. Hoofnagle, A. Chen, K. Yolton, B.P. Lanphear, and J.M. Braun (Brown University, Providence, RI, 02912)

Bisphenol A (BPA) is an endocrine disruptor found in many consumer products and is suggested to perturb thyroid function. The only prior epidemiologic study of prenatal BPA exposure suggests sex-specific effects on thyroid hormones (THs). We used multivariable linear regression to examine the associations between maternal urinary BPA and maternal or cord serum THs in the Health Outcomes and Measures of the Environment Study, a prospective birth cohort (2003-2006, Cincinnati, Ohio). We measured BPA concentration in maternal urine collected at 16±3 and 26±2 weeks gestation and thyroid stimulating hormone (TSH), and free and total thyroxine (T4) in maternal serum at 16±3 weeks (n=185) and cord serum (n=252). We found no significant associations between 16-week BPA and maternal THs or between BPA and cord T4. Each 10-fold increase in average maternal BPA was associated with decreased cord TSH in female newborns (percent change= -31%; 95% CI:-49,-8%) but not males (3%; 95% CI:-26,42; p-for-effect measure modification(emm)=0.04). No association was observed between 16-week BPA and TSH (females:-6%; 95% CI:-31,28%; males:-3%; 95% CI:-33,42%; p-for-emm=0.87). Whereas, 26-week BPA was associated with reduced TSH for females (-43%; 95% CI:-60,-18%) but not males (-1%; 95% CI:-20,24%; p-for-emm=0.01). Our findings do not suggest an association between BPA and maternal early pregnancy THs. In contrast with one prior study reporting reduced TSH among male newborns only, our findings suggest that prenatal BPA exposure may reduce cord TSH among females. Maternal BPA exposure later in pregnancy may have greater influence on newborn TSH than early pregnancy exposure.

B68

EXPERIENCE OF THE DEEPWATER HORIZON OIL SPILL AND MENTAL HEALTH IN PREGNANT AND REPRODUCTIVE-AGED WOMEN. EW Harville*, A Shankar, M Jacobs (Tulane University, New Orleans, LA)

Experiencing natural or technological disasters can be associated with worsened mental health. 614 pregnant and reproductive-aged women were recruited from southern Louisiana areas affected by the Deepwater Horizon oil spill. Women were interviewed about their exposure to oil and personal effects of the oil spill, and completed the Edinburgh Depression Scale. Log-linear models were used to assess the relative risk of worse mental health associated with oil spill experiences, with adjustment for age, BMI, education, race, and marital status. Most strongly associated with mental health were spending time in an area where oil, oily materials, or chemicals were being used (adjusted relative risk [aRR], 2.30, 95% CI 1.42-3.70); having someone close to you injured or killed in the explosion (aRR 4.13, 2.28-7.49); having property lost or damaged (aRR 2.37, 95% CI 1.17-4.81) and coming into contact with oil during activities such as fishing (aRR 1.93, 1.26-2.96). There were no associations with being involved in cleanup work, damage to areas where they fished commercially, or a household member having contact with oil. Involvement in legal proceedings was, if anything, protective against mental health problems (aRR for "believe legal representation is needed", 0.84, 0.72-0.97; "there have been a lot of demands made by litigation" 0.81, 0.70-0.94). Direct and severe experience of the oil spill was associated with depression, but other indicators of oil spill exposure were not. Unlike some previous studies, involvement in legal proceedings did not worsen mental health.

B69

VARIATION IN REPORTING OF OIL SPILL EXPERIENCE BY PREGNANCY STATUS. EW Harville*, A Shankar, M Jacobs

Women who are pregnant often reduce exposure to environmental hazards, but pregnancy status could also alter reporting. 613 reproductive-aged women were interviewed in 2012-2013, 1.5 to 3 years after the Deepwater Horizon Gulf of Mexico spill. Women were asked about the timing of four pregnancies and the physical, social, and economic effects of the oil spill. Chi-square tests and logistic regression adjusting for confounders were used to assess the relationship between pregnant/postpartum status and oil spill exposure. Reproductive statuses were: pregnant, 32 women at time of the spill, 176 at time of interview; <12 months postpartum, 222 and 102; >12 months postpartum, 260 and 288; and never been pregnant, 99 and 47. The pregnant-at-spill women were more likely to report that they had changed plans due to the spill (compared to women with no pregnancies, aOR 4.06, 95% CI 1.25-13.25) and considered moving from the region (4.77, 1.52-15.00). Pregnancy status at the time of the interview predicted avoiding the coast (pregnant 2.48, 1.21-5.09; postpartum 2.46, 11.4-5.28; older child 2.30, 1.14-4.65); a similar pattern was found for pregnancy status at time of spill. Pregnancy status at the time of the interview also predicted avoiding seafood, a pattern not as strong for those pregnant-at-spill. There were no differences in reported direct exposure to oil in either within or between the pregnant-at-spill and pregnant-at-interview groups. Pregnant women may be more likely to avoid certain hazards, but the fact of being pregnant does not appear to alter reporting of objective exposures.

B70

LABOR PATTERNS IN WOMEN ATTEMPTING VAGINAL BIRTH AFTER CESAREAN (VBAC) FROM THE CONSORTIUM ON SAFE LABOR STUDY. *Grantz KL, Gonzalez-Quintero VH, Troendle J, Reddy UM, Hinkle SH, Kominiarek M, Zhang J (Eunice Kennedy Shriver National Institute of Child Health and Human Development, NIH, Bethesda, MD, USA)

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

B71

LABOR INDUCTION AND CESAREAN DELIVERY: IMPLICATIONS IN THE CHOICE OF COMPARISON GROUP. Danilack VA*, Triche EW, Dore D, Muri JH, Phipps MG, Savitz DA (Brown University School of Public Health, Providence, RI)

Although many studies have explored the impact of labor induction on cesarean delivery (CD), the evidence remains inconclusive because studies have addressed inherently different questions. The question "Does induced or spontaneous labor more often lead to CD?" is answered by comparing type of labor onset, whereas the question "Does the decision to induce versus not induce at a given point in gestation affect risk of CD?" addresses the impact of a clinical decision between induction and expectant management. We examined the influence of comparison group choice on the risk ratio (RR) for labor induction and CD among 208,915 mother-newborn dyads from fourteen member hospitals of the National Perinatal Information Center, 2007-2012. We included singleton births between 34 and 42 completed weeks' gestation, and excluded those with contraindications to vaginal delivery. Women induced at 39 weeks had the lowest incidence of CD (14%), while women induced at 42 weeks had the highest (37%). When comparing induced labor to spontaneous labor, induction had a lower risk for CD at 34-36 weeks (RR 0.6-0.8), but a higher risk at 37-42 weeks (RR 1.5-2.4). However, when comparing induction to expectant management (all future deliveries), the risk for CD after induction was lower at every gestational week (RR 0.4-1.0). RRs were slightly lower (0.5-0.8) when the expectant management group started the week after induction and ranged from 1.0-1.8 when pre-labor cesarean deliveries were excluded. Comparison group choice and composition influences observed relationships between labor induction and CD and informs different clinical questions.

B72

HOW DOES A SEVERE, ADVERSE CLINICAL EVENT IMPACT OBSTETRICAL DECISION MAKING AT A HOSPITAL? UTERINE RUPTURE AND THE MANAGEMENT OF PATIENTS WITH PREVIOUS CESAREAN DELIVERY. Riddell CA*, Kaufman JS,Strumpf ES, Abenhaim HA,Hutcheon JA (McGill University, Montreal, QC)

Introduction The rate of vaginal birth after previous cesarean delivery (VBAC) has declined over time and is below 10%. The fear of a uterine rupture during a VBAC attempt has contributed to this decline. The extent to which a rupture influences decision making in the care of subsequent patients with a previous cesarean (CS) has not been studied. Objective To determine whether the occurrence of a rupture at a hospital impacts: i) the trial of labour (TOL) attempt rate, or ii) the TOL success rate, in women with a previous cesarean delivery. Methods We use the Nationwide Inpatient Sample, 1998-2010, and extract the delivery admissions of women with a previous cesarean. Using the Difference-in-Differences design, we compare rates of each outcome at hospitals with severe uterine rupture before and after the event and use hospitals without ruptures to adjust for common time trends. Results 385 hospitals with a rupture and 2219 hospitals without rupture are analysed. Approximately 1 million women with a previous CS are included: 25% attempt labour, 61% of whom deliver vaginally. After a rupture, the hospital TOL success rate decreases from 61.0% to 58.4% (p=0.003). On the population level, this implies that about 2.6/100 labours that would have resulted in vaginal deliveries are diverted to emergent CS, after accounting for downward time trends. Conclusion In the month after a uterine rupture, the threshold at which clinicians at the hospital opt to perform an intrapartum CS in women with a previous CS may be lowered.

B73

EXPERIENCE MATTERS: DIFFERENCES IN CESAREAN DELIVERY RATES BETWEEN RESIDENT AND ATTENDING PHYSICIAN PRACTICES. Modest AM, Hacker MR, Royce C (Beth Israel Deaconess Medical Center)

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

B74

A PRELIMINARY EXAMINATION OF ASPHYXIA-RELATED RACIAL DISPARITIES IN CEREBRAL PALSY (CP) USING GENE EXPRESSION AND CLINICAL DATA. Slaughter JC*, Li Q, Thornton K, Wei C, Francis M, Khoo SK, Lenski M, and Paneth, N (*College of Nursing & Health Professions, Drexel University, Philadelphia, PA; Department of Epidemiology & Biostatistics, Michigan State University, East Lansing, MI; Department of Cell & Molecular Biology, Grand Valley State University, Grand Rapids, MI)

Prevalence and severity of CP in the U.S. are higher in Black than White children. This disparity may reflect differential exposure to perinatal asphyxia. We investigated clinical factors indicative of perinatal asphyxia as well as sets of newborn mRNA transcripts (obtained from archived newborn blood spots) representing asphyxial/hypoxic pathways in singleton children with CP residing in Michigan. We matched 13 Black children with CP with 13 White children with CP on birth year, gestational age grouping (<28, 28-32, 33-36, and >37 weeks), and CP type (uni, di- or quadriplegic). McNemar's Test and Wilcoxon signed-rank test were conducted to compare the two groups on demographic and clinical factors, and the Generally Applicable Gene-Set Enrichment (GAGE) method for gene set analysis was utilized to compare differences in gene expression at birth. One-half of Black children had severe gross motor function limitations (GMFCS of IV or V) compared to 15.4% of controls ($p=0.046$). Differences between cases and controls in severe fine motor and communication function limitations were moderately significant ($p=0.10$). There were no significant difference in labor complications ($p=1.0$) and signs of neonatal encephalopathy ($p=0.25$), however, these findings may be underpowered with 13 pairs. The empirical hypoxic gene set was significantly up-regulated in Black children, compared to White children ($p = 0.038$). Preliminary results, suggest perinatal asphyxia may be one pathway through which Black-White disparities in CP operate.

B75

THE IMPACT OF MATERNAL AGE AND CHORIONICITY ON OBSTETRIC OUTCOME IN TWIN PREGNANCY. O' Mahony A, Meaney S, O' Donoghue K (Department of Obstetrics and Gynaecology, University College Cork, Ireland)

Introduction: The number of twins born in Ireland has increased from 11.8 sets per 1,000 live births in 1988 to 17.9 in 2011. This study aims to investigate the impact of advanced maternal age and chorionicity on obstetric outcome in twin pregnancies. Methods: A retrospective study of all twin pregnancies delivered from 2009 to 2011 in a large, tertiary hospital (~8,000 deliveries per annum) in the Republic of Ireland was conducted. Birth registers and clinic records were reviewed to examine obstetric outcomes. Results: Of the 523 twin pregnancies included in the study 9.6% (n=50) of mothers were >40 years and 47.5% (n=247) were nulliparous. Advanced maternal age, mother aged >40 years, was associated with increased assisted reproductive technology (52% vs. 25.2%; $p<0.001$) and increased caesarean delivery (78.0% vs. 60.9%; $p<0.001$). Differences between the age groups were noted for gestational diabetes (9.8% vs. 3.1%; $p=0.007$) and preeclampsia (30.8% vs. 13.8%; $p<0.001$). 16.3% (n=87) of twins were monochorionic who had a higher incidence of PTD (65.1% V 47.9%, $p = <0.001$) and iatrogenic reasons for preterm delivery (69.4% V 52.4%, $p = 0.006$) than dichorionic twins. Conclusion As a greater number of women are delaying childbearing, and with advances in assisted reproductive technology, there are considerable more first time births, including sets of twins, to older women. The findings of this study indicate that advanced maternal age and nulliparity were associated with adverse obstetric outcome in twin pregnancies.

B76

USE OF CERVICAL PESSARIES TO PREVENT PRETERM DELIVERY AMONG TWIN GESTATIONS: PRELIMINARY STUDIES FOR A PRIORI SUB-GROUP ANALYSES TARGETING PRECOCIOUS CERVICAL RIPENING IN A PROSPECTIVE META-ANALYSIS. Q Li*, Reeves M, You Z, Keith L (Department of Epidemiology & Biostatistics, Michigan State University, East Lansing, MI 48824)

To evaluate whether use of cervical pessaries is more effective in preventing spontaneous preterm delivery (SPD, before 34 weeks) in subgroups of patients with PreCocious Cervical Ripening (PCCR). While planning a prospective meta-analysis (PMA), we conducted retrospective subgroup analyses and sample sizes estimation of a partially published nonrandomized concurrent control study of twin gestations (Arabin et al., 2003). Cervical length (CL) and funneling (CF) were assessed at a Dutch center (1994-2001). Forty mothers with cervical pessaries were matched with 40 mothers without pessaries. Paired t-Test, McNemar's Test and conditional logistic regression were conducted. SPD was 77% less frequent in the pessary group (OR=0.23, 95% CI 0.07-0.81) and 83% less in a subgroup of 34 pairs with short cervices (CL<38 mm) (OR=0.17, 95% CI 0.04-0.75). Among 34 women with pessary treatment and short cervices, those with CF had 3% less SPD compared to those without CF (1/14 [7.1%] vs 2/20 [10.0%], OR=0.97, 95% CI 0.79-1.19). We specified the design parameters based on the Dutch data, and estimated the required sample sizes using an approach proposed by Demidenko (2008). A total of 1,628 mothers with twin gestations (i.e., 814 per group) will provide 80% power with a one-sided type I error of 0.05 to detect an interaction effect at the OR of 0.5. Mothers of twins with cervical pessaries had less SPD. Subgroups with short CL appear amenable to pessaries. These preliminary studies can help a priori biologic justification for subgroup analyses considering PCCR in the PMA of new pessary trials.

B77

NEONATAL SEIZURES AND VAGINAL BREECH DELIVERIES AT HOME COMPARED TO THEIR COUNTERPARTS IN HOSPITAL. Q Li* (Department of Epidemiology & Biostatistics, Michigan State University, East Lansing, MI 48824)

Home birth has increased in the U.S. since 2004 and been associated with a higher risk of neonatal seizures (NS). However, vaginal breech delivery (VBD), one of the most useful indicator conditions which predispose to asphyxia and can easily be mismanaged in home birth, was unspecified or excluded from recent studies. We hypothesized that VBD at home had both more and unknown NS than their counterparts in hospital. In a secondary analysis of VBD in 2010-2012 from the National Center for Health Statistics Natality File, we excluded multiple gestations and deliveries at <37 weeks or <2,500 grams. Maternal race/ethnicity and age were adjusted in Logistic regressions. Among 87,139 VBDs, 1,065 (1.22%) were delivered at home; both recorded and unknown NS were significantly higher at home birth (7/986 vs 17/80,704; 95% CI: 33.9; 14.0, 82.0; 9/986 vs 166/80,704; 95% CI: 4.5; 2.3, 8.8). NS were significantly higher at both unintended (2/169) and intended (5/715) VBD at home (17/80,704; 95% CI: 52.9; 8.3, 188.2; 33.4; 12.3, 90.8); unknown NS were higher in unintended home births (95% CI: 7.8; 1.9, 21.0). NS at intended home births by other midwife (4/255) were significantly higher than those by medical doctors in the hospital (13/67,277; 95% CI: 73.9; 20.1, 220.0). NS were more likely to be recorded or unknown among VBD at home. Further research is needed for the Institute of Medicine's call to evaluate the effects of maternal care services in diverse settings on birth outcomes, and to improve the data quality of birth certificates.

B78

WOMEN'S PERCEPTION OF PRE-HOSPITAL LABOUR DURATION AND OBSTETRICAL OUTCOMES: A PROSPECTIVE COHORT STUDY. Janssen Patricia A, Weissinger, Sandra (School of Population and Public Health, Faculty of Medicine, University of British Columbia, Vancouver, BC, Canada)

Background: Progress during early labour may impact subsequent labour trajectories. Women admitted to hospital in latent phase (<3 cm cervical dilation) labour have been shown to be at higher risk of obstetrical interventions. Methods: We conducted a secondary analysis of data from a randomized controlled trial of 1247 healthy nulliparous women in spontaneous labour at term with a singleton fetus in cephalic presentation at seven hospitals in Southwestern British Columbia. We computed relative risks and their 95% confidence intervals to examine rates of obstetrical interventions and maternal and newborn outcomes according to women's perception of length of pre-hospital labour. Results: Women indicating that they had been in labour for more than 24 hours at the time of hospital admission were at elevated risk for cesarean birth, relative risk 1.40, (95% Confidence Intervals 1.15-1.72), admission with a cervical dilation of 3 cm or less, RR 1.21 (1.07-1.36), more obstetrical interventions including continuous electronic fetal monitoring RR 1.11 (1.03-1.20), augmentation of labour, RR 1.33 (1.23-1.44), use of narcotic, RR 1.21 (1.06-1.37) and epidural analgesia RR 1.18 (1.09-1.28). They more often experienced postpartum hemorrhage, RR 1.28 (1.08-1.51). Adverse neonatal outcomes did not differ apart from a significant increase in meconium-stained amniotic fluid, RR 1.60 (1.09-2.35) among women who reported more than 24 hours of prodromal labour. Conclusions: A single question asked of women on presentation to hospital was an important predictor of cesarean birth and may have utility in identifying women who would benefit from close observation and more active management of labour.

B79

CHANGING LEVELS OF DELIVERY INTERVENTIONS AND THE TIMING OF BIRTHS: U.S. SINGLETONS, 1990-2010. Disare KR*, Dias T, Alter CC, Russell R, Carrino G (March of Dimes, White Plains, NY)

Between 1990 and 2006, the preterm birth rate in the U.S. increased by 20.8%, while obstetrical interventions (Induction of Labor and Cesareans) increased by 70.1%. Since 2006, the preterm birth rate has been declining, with little understanding as to why. Data were examined from the U.S. National Center for Health Statistics natality files. Analyses were performed among singletons with gestational age (based on the mother's last menstrual period) between 23 and 44 weeks, known delivery method and induction status, and birthweight of at least 500 grams. Interventions were classified based on the first to occur (inductions preceding cesareans), regardless of outcome. Between 1990 and 2006, births shifted towards earlier gestational ages, with declines at 40 weeks or greater (48.2% in 1990, 33.4% in 2006). While the preterm birth rate climbed, interventions increased by 63.4%; between 1996 and 2006 interventions increased across gestational ages less than 42 weeks. In contrast, between 2006 and 2010, births at 40 weeks or greater remained stable, while births at less than 39 weeks declined, resulting in a dramatic increase in births at 39 weeks. Simultaneously, the increase in interventions slowed to 4.1%. Unlike prior to 2006, interventions were increasing only among full and late term births (3.6%); interventions declined among late preterm (-0.2%) and early term births (-1.3%). 2006 was a pivotal year in the shifting dynamics between delivery method and timing of births. Since 2006, interventions have been leveling off and are delayed to later gestational ages, while the preterm birth rate is declining.

B80

THE IMPACT OF HOSPITAL OBSTETRIC VOLUME ON MATERNAL OUTCOMES IN TERM, NON-GROWTH-RESTRICTED PREGNANCIES. Snowden JM*, Cheng YW, Emeis C, Caughey AB (Oregon Health & Science University, Portland, OR)

Objective: The impact of hospital obstetric volume specifically on maternal outcomes remains under-studied. We examined the impact of hospital obstetric volume on maternal outcomes in low-risk women delivering non-growth-restricted infants at term. Study Design: We conducted a retrospective cohort study of term, singleton, non-growth-restricted live births in 2008 in the California. Deliveries were categorized by hospital obstetric volume categories. Maternal outcomes were compared using the chi-square test and multivariable logistic regression. Results: There were 427,582 births in 265 hospitals that met study criteria. There were significant differences between obstetric volume categories in unadjusted analyses, most of which did not remain significant after adjustment for maternal factors. In non-rural hospitals, only VBAC success was lower in hospitals with 1,200 – 2,399 annual deliveries (adjusted odds ratio, 0.56; 95%CI, 0.33 – 0.98). In rural hospitals, postpartum hemorrhage was more common in the smallest hospitals (50 – 599 deliveries, aOR 2.75; 95% CI 1.06 – 7.09), and VBAC success was lower in hospitals with low and intermediate volume. Conclusion: Although there was a small number of differences in maternal outcomes across hospitals of varying obstetric volume, the majority of maternal outcomes did not differ by volume. These findings suggest that from the perspective of maternal outcomes, low-risk women can safely choose hospitals regardless of volume.

B81

EVALUATION OF NON-RESPONSE IN THE WOMEN'S HEALTH COHORT STUDY.
Meaney S*, Lutomski JE, Corcoran P, Spillane N, O'Dongohue K(National Perinatal Epidemiology Centre,University College Cork, Ireland)

Background: The Women's Health Study was designed to examine associations between maternal and paternal reproductive histories, behavioral and lifestyle risk factors and miscarriage.The objective of this study was to examine underlying differences in characteristics and pregnancy outcome between responders and non-responders. Methods: A cohort study was conducted in a large, tertiary hospital (8,500 deliveries per annum) in the Republic of Ireland in 2012. Women were randomly selected at their first booking visit (10-14wks) and were asked to complete a detailed lifestyle postal questionnaire containing common risk factors for miscarriage. Basic demographic data and pregnancy status at 20 weeks gestation were collected for all recruited women. Chi-square tests were performed to assess differences in characteristics and pregnancy status. Results: 715 women agreed to participate in the study of which 61.3% (n=431) completed the detailed questionnaire. Responders and non-responders were similar in terms of the proportions who were primiparous (39.1% versus 38.5%) and multiparous (25.0% versus 21.1%). Average age was the same (32.8 (5.6) versus 32.1 (5.3) years; p=0.441). Non-responders were slightly more likely to be nulliparous (40.5% versus 35.9%; P=0.256) and married (65.4% versus 62.6%). In terms of the outcome, non-responders had a higher rate of miscarriage (40.4% versus 32.1%; p=0.025). Conclusions: While basic demographics were broadly similar between responders and non-responders, the discrepancy between miscarriage rates may be a result of unobserved factors. Participation bias towards healthier individuals is frequent in clinical and public health studies, and thus subsequent results should be interpreted with caution.

B82

MEASURING EXPLAINED VARIATION IN ACCELERATED FAILURE TIME MODEL WITH APPLICATIONS. Chan PH*, Xu R, Chambers CD (University of California, San Diego, La Jolla, CA)

We generalize the well-known R2 measure for linear regression to accelerated failure time (AFT) model, which is also a linear model of the regression effect but can accommodate right censoring. Our work was motivated by right-censored data from a cross-sectional screening study conducted Collaborative Initiative on Fetal Alcohol Spectrum Disorders, to evaluate the prevalence and predictors of alcohol consumption by pregnant women in Ukraine. We quantify the variation in the response that is explained by the predictors under AFT model, and calculate it from estimated parameters obtained from software programs that fit AFT model. We study the performance of the measure under single and two predictor(s) cases through Monte Carlo simulation and compare it with the linear regression R2 at zero censoring under different censor types, predictor distributions, and error term distributions. The measure shows overall desirable performance in simulation studies and affirms its usefulness in case studies.

B83

VALIDITY OF DATA IN A POPULATION-BASED PERINATAL DATABASE ROUTINELY USED FOR SURVEILLANCE AND RESEARCH. Frosst GO* (Perinatal Services BC, Vancouver, British Columbia, Canada), Joseph KS (Perinatal Services BC), Hutcheon JA (Perinatal Services BC), Kinniburgh BA (Perinatal Services BC), Lee L (Perinatal Services BC)

The British Columbia Perinatal Data Registry (BCPDR) contains individual-level obstetrical and neonatal medical chart data for all deliveries in British Columbia (BC), Canada. These data are routinely used for surveillance and research to improve fetal, neonatal and maternal health and health services. While components of the database have been validated, a comprehensive review has not previously been conducted. The objective of this quality assurance study was to evaluate the overall validity of data contained in the BCPDR. A two-stage stratified random sampling design (by region and obstetrical delivery volume) was used to select 2,274 maternal and newborn charts in 17 facilities from deliveries between 2010 and 2012. Charts from low volume, referral hospitals and complex cases, as determined by total length of stay and hospital transfer, were oversampled. Data were re-abstracted by health information management professionals who underwent training and an assessment of inter-rater reliability. Variables were re-abstracted and compared with previously-entered BCPDR data. Validity was assessed by calculating proportions of missing values, sensitivity and specificity with 95% confidence intervals, kappa statistics and intra-class correlation coefficients. Qualitative data were also collected for each variable using a separate tool. Validity of the BCPDR data elements varied. Many fields showed high validity (e.g., demographics, pregnancy history), while others showed moderate to poor validity (e.g., indication for cesarean delivery, delivery position and presentation). Results continue to inform strategies to increase validity of the data by improving definitions and abstracting guidelines and to educate perinatal database administrators and researchers.

B84

CUSTOMIZED VARIANCE FOR DETERMINING CUSTOMIZED BIRTHWEIGHT PERCENTILES. Sjaarda LA*, Albert PS, Hinkle SN, Mumford SL, Grantz KL (Eunice Kennedy Shriver National Institute of Child Health and Human Development, Bethesda, MD)

Customized birthweight percentiles are appealing for personalized definitions of small and large birthweight. The Gardosi method customizes mean birthweight for a pregnancy's characteristics, but makes assumptions about the variance used for calculating percentile cutoffs (e.g. 90th). Specifically, this method assumes that variance is proportional to the customized mean. We aimed to evaluate this assumption in a U.S. cohort of 122,647 singleton pregnancies. We first examined the empirical (raw) variance of the residuals from a multiple regression with six customization characteristics (gestational age, maternal prepregnancy weight, height, race, parity, infant sex) corresponding to Gardosi's method. Plots of the empirical variance across each of the characteristics suggested the variance assumption imposed by Gardosi's method may be invalid, particularly for gestational age and maternal weight. Thus, as an alternative method, we customized both the mean and variance separately using a heteroscedastic regression model, where the variance is customized for the six characteristics used in customizing the mean. We compared our customization method with that of Gardosi, finding for example, that for a pregnancy with otherwise identical characteristics, these differences resulted in the 90th percentile cutoff for Gardosi's versus our custom variance method to be 3309g vs. 3500g at 37 weeks' gestation, compared to nearly equal cutoffs of 4102g vs. 4103g at 41 weeks. This new method to customize variance in conjunction with the mean birthweight more accurately reflects the actual relationship between mean and variance than Gardosi's method, which affects cutoffs used to define small or large birthweight.

B85

THE SELECTION OF MODEL PARAMETERS WHEN USING THE CUSUM TO MONITOR CLINICAL OUTCOMES. Manktelow BN,* Spata E, Evans TA, Jones DR, Draper ES, Baker R

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

B86

RECRUITMENT FOR LONGITUDINAL PREGNANCY STUDIES INITIATED PRECONCEPTION: LESSONS LEARNED FROM THE EAGER TRIAL. Matyas RA* (Epidemiology Branch, Division of Intramural Population Health Research, Eunice Kennedy Shriver National Institute of Child Health and Human Development, Rockville, MD) Lesher LL (Department of Obstetrics and Gynecology, University of Utah, Salt Lake City, UT) Newman SL (Department of Obstetrics and Gynecology, University of Utah, Salt Lake City, UT) Silver RM (Department of Obstetrics and Gynecology, University of Utah, Salt Lake City, UT) Galai N (Department of Statistics, University of Haifa, Haifa, Israel) Hovey KM (Department of Social and Preventive Medicine, University at Buffalo, Buffalo, NY) Wactawski-Wende J (Department of Social and Preventive Medicine, University at Buffalo, Buffalo, NY) Emerick L (Department of Obstetrics and Gynecology, University of Colorado, Denver, CO) Lynch AM (Department of Obstetrics and Gynecology, University of Colorado, Denver, CO) Mead B (Department of Family, Community and Rural Health, Commonwealth Medical College, Scranton, PA) Townsend JM (Department of Family, Community and Rural Health, Commonwealth Medical College, Scranton, PA) Perkins NJ (Epidemiology Branch, Division of Intramural Population Health Research, Eunice Kennedy Shriver National Institute of Child Health and Human Development, Rockville, MD) Mumford SL (Epidemiology Branch, Division of Intramural Population Health Research, Eunice Kennedy Shriver National Institute of Child Health and Human Development, Rockville, MD) Schisterman EF (Epidemiology Branch, Division of Intramural Population Health Research, Eunice Kennedy Shriver National Institute of Child Health and Human Development, Rockville, MD)

Many obstetric studies recruit women during prenatal care or delivery. Far fewer longitudinal studies follow women from attempted conception through pregnancy because most women attempting to conceive do not seek medical care during this period. We conducted a longitudinal randomized clinical trial (RCT) of the effects of aspirin on gestation and reproduction (EAGeR). Eligible women who had 1-2 prior pregnancy losses and were actively trying to become pregnant were recruited for the trial. Over 49 months of recruitment in the EAGeR trial, 5485 women completed the initial screening questionnaire; 42.4% of those screened were initially eligible and 22.4% were randomized. Ultimately, 1228 women enrolled and 1078 (87.8%) completed the trial. Provider and clinic-based recruitment methods yielded the most randomized participants overall (40.3%), as well as the highest yield of enrolled to screened (30.1%). The next most successful methods were direct mail and brochures/flyers (13.1% and 12.5% of those randomized respectively). However, recruitment rates were very low when compared to the number of people contacted by these methods (thousands of women received mailings, but mailings yielded only 161 participants). No other recruitment method yielded more than 10% of randomized participants. Recruitment and retention in complex RCTs and longitudinal population-based studies is time-consuming, expensive, and frequently unsuccessful. In an era of declining research funding, it is imperative to recruit in the most cost efficient manner. Overall, recruitment from the EAGeR trial showed that preconception recruitment is plausible and provider and clinic-based recruitment is the most effective and targeted method of preconception recruitment.

B87

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

In perinatal epidemiology, many exposures act on relevant endpoints directly and through preterm birth. Strong unmeasured factors causing both preterm birth and the outcome are generally assumed in this setting, yielding biased estimates of direct effects. VanderWeele (2010) proposed a formula to correct estimates, given assumptions on the unmeasured factors. The formula's behavior was examined in simulations, where a measured exposure, E, and an unmeasured factor, U, independent of one another, reduced gestational length and increased outcome risk. In the examined scenarios, babies with E had a lower prevalence of U at preterm and term weeks. Odds ratios (OR) at term were higher than the "truth", but slightly lower than those estimated in babies without U (due to residual confounding by gestational length). Among preterm births, estimates were strongly biased, and mildly influenced by factors causing early birth but not the outcome. Different patterns of risk for E (constant across gestation, or increasing with gestational age) could result in similar observed ORs. Plugging the empirical parameters for U into the formula yielded corrected ORs very close to those among babies without U, but estimates at 39-40 weeks were closer to the true direct effect of E. In large datasets, ORs estimated in a narrow stratum of term babies may serve as the upper limit for the direct effect of interest, setting a lower limit based on the –generally underestimated- observed estimates at earlier weeks. A range of possible direct effects of E may then be obtained without assumptions on U.

B88

MATERNAL RECALL OF METABOLIC CONDITIONS FROM THE PRENATAL PERIOD AND MEDICAL RECORDS: A VALIDATION STUDY. *P Krakowiak (University of California, Davis) CK Walker (University of California, Davis) DJ Tancredi (University of California, Davis) I Hertz-Picciotto (University of California, Davis)

Background: Maternal metabolic dysfunction during pregnancy has been associated with many adverse outcomes for mothers and children. Few studies have validated retrospective self-reported metabolic conditions in the periconceptional and pregnancy periods. Methods: We evaluated validity of self-reported diabetes and hypertensive disorders, and reliability of self-reported pre-pregnancy BMI in mothers of 2-5 year old children with and without neurodevelopmental disorders from the CHARGE (CHildhood Autism Risks from Genetics and the Environment) Study. Sensitivity and specificity of self-report in telephone interview was assessed by comparison with medical records; agreement was evaluated by kappa statistics. Deviations in reported BMI were evaluated with Bland-Altman plots and concordance correlation coefficient (CCC). Results: Mothers of affected children reported metabolic conditions more accurately than control mothers. For diabetes, sensitivity ranged from 73% to 87% and specificity was $\geq$98% across groups. For hypertensive disorders, sensitivity ranged from 57% to 77% and specificity from 93% to 98%. Reliability of BMI was high (CCC=0.930); when grouped into BMI categories, a higher proportion of mothers of delayed children were correctly classified (kappawt=0.93) compared with the autism group and controls (kappawt=0.85 and kappawt=0.84, respectively; P=0.05). Education level and parity were associated with higher discrepancies in BMI and overreporting of hypertensive disorders. Case status was associated with overreporting of hypertension. Conclusions: Self-reported diabetes and hypertensive disorders during the periconceptional and pregnancy periods are valid among mothers of children irrespective of case status although reporting accuracy was higher among case mothers. Recall of pre-pregnancy BMI is reliable compared with self-reported values in medical records.

B89

**EARLY-LIFE ASTHMA CLASSIFICATION IN AN ELECTRONIC MEDICAL
RECORD SETTING**. Flak AL*, Strickland MJ, DeMuth K, Hansen C, Darrow LA (Emory
University, Atlanta, GA)

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

B90

ESTIMATING THE GAP BETWEEN TIME OF GESTATIONAL ARREST AND CLINICAL SYMPTOMS OF MISCARRIAGE. Mukherjee S.*, Velez-Edwards D., and Hartmann KE. (Vanderbilt University, Nashville, TN)

Approximately 15% of recognized pregnancies end in miscarriage before 20 weeks. Traditionally, gestational age is estimated from the first day of a woman's last menstrual period (LMP). However, embryologic development may stop days to weeks prior to onset of clinical symptoms of miscarriage. Women from southeastern United States (North Carolina, Texas and Tennessee) were enrolled in Right from the Start(RFTS) from 2000-2012, a prospective community-based pregnancy cohort. RFTS conducts uniform early first-trimester transvaginal ultrasounds, as well as detailed interviews for all participants. Developmental stage of arrest prior to loss was estimated from ultrasound and used to calculate the mean gap between embryologic arrest and clinical loss. Ultrasounds, conducted between 40 and 95 days gestation from LMP, were available for nearly three-quarters of women who experienced miscarriage (n=509, 73.0%). Mean gestational age at clinical loss based on LMP was 71.7±22.2 days. Gestational arrest prior to miscarriage was observed in 38.7% of losses (n=197). Estimated mean gestational age at arrest of development was 58.1±16.1 days. The mean gap between LMP and estimated gestational age at arrest did not differ by race or pregnancy intention. Basing timing of miscarriage from LMP to clinical recognition of loss ignores the developmental state of the embryo prior to the loss in cases in which the pregnancy arrested earlier. In models that estimate risk of time-varying exposures in early pregnancy, this gap has the potential to bias effect estimates by over-estimating exposure time.

B91

CHANGING RESIDENCE DURING PREGNANCY: IMPLICATIONS FOR STUDIES OF GEOGRAPHICALLY-BASED EXPOSURES. M Pearl* (Sequoia Foundation), M Kharrazi, S Graham, C Sacramento, J Ahern.

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

B92

A VALIDATION STUDY OF NEONATAL SEIZURE REPORTS IN BIRTH CERTIFICATES COMPARED TO MATERNAL INTERVIEWS AND HOSPITAL DISCHARGE FILES. Q Li*, N Paneth, M Francis, M Lenski, A Brovont (Department of Epidemiology & Biostatistics, Michigan State University, East Lansing, MI)

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

B93

HURRICANE EXPOSURE AND COUNTY FETAL MORTALITY RATES, UTILIZATION OF A COUNTY ENVIRONMENTAL QUALITY INDEX FOR CONFOUNDING CONTROL. Grabich SC*(University of North Carolina, Chapel Hill, NC, 27599), Gray CL, Rappazzo KM, Messer LC, Jagai JS, Lobdell DT

The effects of natural disasters on public health are a rising concern, with climate change and increasing severity of disaster events. Many disaster studies utilize county-level analysis, however most do not control for county level environmental factors. Hurricane exposure during pregnancy could influence fetal death through mechanisms related to access to care, nutrition, injury and disruption of infrastructure and health facilities. Among Florida women pregnant in 2004 during the hurricane season, we investigated the association between hurricane exposure and county fetal mortality rates. We categorized county hurricane exposure by maximum wind speed during each hurricane. Confounding and additive effect measure modification was assessed with linear models using the county-level Environmental Quality Index (EQI) developed by the Environmental Protection Agency. We adjusted for the overall EQI and by specific environmental domains (air, water, land, built, socioeconomic). The relationship between hurricane and fetal mortality was not consistent among hurricanes. However, analysis of the most severe hurricane, Charley, suggested increase in wind category was associated with increased fetal mortality rate (Rate Difference (RD) from 1.36(95% CI:-2.14, 4.85) to 1.65(-1.85, 5.38)) reliably among models. The addition of the EQI domains adjusted estimates towards the null value consistently across all models. The socioeconomic (SES) domain interacted antagonistically with hurricane estimates across all models (e.g. for Charley crude estimate hurricane RD (1.65), and estimate interaction with SES RD 1.39 (95% CI: -2.14, 4.85)). This analysis demonstrates the need to include ambient environment in modeling county level analysis. This abstract does not necessarily reflect EPA policy.

B94

ASSESSING GENERAL HEALTH CHARACTERISTICS AMONG PRENANT WOMEN: WEB-BASED QUESTIONNAIRES VERSUS OBSTETRICAL RECORDS. Van Gelder MM, Schouten NP, Merkus PJ, Verhaak CM, Roukema J, Roeleveld N* (Radboud university medical center, Nijmegen, The Netherlands)

Although the use of Web-based questionnaires (WBQs) in medical research is increasing, data on the validity of WBQs are scarce. Therefore, self-reported WBQ data were compared with obstetrical records for 519 pregnant women participating in the Pregnancy and Infant Development (PRIDE) Study in the Netherlands, who completed WBQs around their first prenatal care visit in 2011-2012. We calculated kappa statistics and proportions of positive and negative agreement between WBQ and obstetrical records for chronic conditions and allergies. In case of inconsistencies between these data sources, medical records from the woman's general practitioner (GP) were consulted as reference standard. In the WBQ and/or obstetrical record, 146 women (28.1%) reported one or more chronic conditions resulting in kappa and proportions of positive and negative agreement of 0.61, 0.69, and 0.92, respectively, while 259 women (49.9%) reported allergies with kappa and agreements being 0.51, 0.70, and 0.81. The majority of kappa values for specific diseases or allergies ranged within +/- 0.10 of the overall kappa, but values as low as 0.21 and 0.30 were seen for insect sting allergies and migraine, while kappa was 0.90 for thyroid disorders. Comparison with GP records revealed that the sensitivity of the WBQ was mostly higher than that of obstetrical records (p<0.05 in half) with values of 1.00 versus 0.44 for migraine, but 0.67 versus 0.83 for polycystic ovarian syndrome. For most chronic conditions and allergies, valid data can be collected with a WBQ, which seems to have higher sensitivity than obstetrical records with almost equal specificity.

B95

PREVALENCE OF INFANT RAPID WEIGHT GAIN DIFFERS SIGNIFICANTLY DEPENDING ON GROWTH REFERENCE AND AGE INTERVAL USED FOR EVALUATION. CL Eckhardt* (School of Community Health, Portland State University, Portland OR), H Eng (Graduate School of Public Health, University of Pittsburgh, Pittsburgh, PA), KL Wisner (Feinberg School of Medicine, Northwestern University, Chicago, IL)

Rapid weight gain (RWG) in infancy, defined as an increase of >0.67 in weight-for-age z-score, shows promise as a predictor of subsequent obesity risk. However, there are concerns regarding method of evaluation. First, most RWG research uses Centers for Disease Control and Prevention (CDC) z-scores rather than the newly recommended World Health Organization (WHO) growth references, which differ in growth trajectory. Furthermore, there is little agreement on the appropriate age interval for RWG evaluation. We used longitudinal data from an analytic sample of n=175 full-term singleton infants born to mothers enrolled in the Antidepressant Use during Pregnancy observational study. McNemar's test was used to determine whether RWG prevalence differed by growth reference used (CDC v. WHO) within commonly evaluated age intervals: 0-3, 0-6, and 0-12 months. The prevalence of RWG differed significantly (p<.001) by growth reference used when evaluating the 0-3 month interval: 23% using the CDC, versus 9% using the WHO reference. All infants categorized as RWG by the WHO reference were also RWG based on the CDC reference; 25 additional children were categorized as RWG by the CDC reference alone. RWG prevalence did not differ by growth reference for the 0-6 month interval, but differences similar to those from 0-3 months were seen for the 0-12 month interval. Further research is needed to define RWG with respect to growth reference and age interval to best predict subsequent obesity risk. Caution is advised when comparing RWG prevalence measures arising from different methods.

B96

SOCIAL ENVIRONMENTS, GENETICS, AND BLACK-WHITE DISPARITIES IN INFANT MORTALITY. AM El-Sayed* (Columbia University, NY, NY) M Paczkowski (Columbia University, NY, NY) KM Keyes (Columbia University, NY, NY) S Galea (Columbia University, NY, NY)

Genes and environments act in tandem to produce population health. However, in some instances, the scientific literature has leaned toward one explanation, underplaying the other without rigorous testing. For example, infant mortality among Blacks in the US is 3 times higher than among Whites. Most scientific writing about this disparity has attributed it to genetic differences between Blacks and Whites despite no direct evidence to this end, and very little literature in general attempting to compare genetic versus environmental drivers of this disparity. We built on an approach used in other areas to indirectly assess whether genetics do indeed explain racial disparities in infant mortality by analyzing the risk of infant mortality among Black-Black, White-White, and interracial couples over time between 1989-1997 and 1998-2006 and calculated the degree of modification of the relation between maternal race and infant mortality by paternal race. After adjusting for age, education, parity, prenatal care and insurance status, odds of infant mortality among interracial couples decreased with time relative to White-White couples. Odds among Black mother-White father couples decreased from 1.62-1.40, and decreased among White mother-Black father couples from 1.51-1.20. By contrast, the risk of infant mortality among Black-Black couples increased with time from 2.11-2.48. We also found that paternal race modified the relation between maternal race and infant mortality (synergy index=1.49), and the degree of this modification increased with time throughout our study. Genetic explanations for these observations are implausible, suggesting that environmental factors, such as structural or individual discrimination, are likely to play the greater role. Careful testing of potential mechanistic hypotheses is critical to guide inference about whether particular racial differences are driven by genetic factors or shaped principally by environmental exposures.

B97

SOCIODEMOGRAPHIC AND HISPANIC ACCULTURATION FACTORS AND ISOLATED ANOTIA/MICROTIA.
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BACKGROUND: It has been observed in several studies that anotia/microtia is more common among Hispanics compared with other racial/ethnic groups. We examined the association between Hispanic ethnicity and selected acculturation factors and anotia/microtia in the National Birth Defects Prevention Study (NBDPS). METHODS: We examined data from mothers of 351 infants with isolated anotia/microtia and 8,435 unaffected infants from the NBDPS with an expected delivery date from 1997 to 2007. Sociodemographic and Hispanic acculturation factors (e.g. age, maternal education, household income, BMI, gestational diabetes, folic acid, smoking, alcohol intake, study center, parental birthplace and years lived in the United States, maternal language) were assessed as overall risk factors and also as risk factors among subgroups of Hispanics based on nativity status (US- and foreign-born). Adjusted odds ratios (aORs) and 95% confidence intervals (CIs) were estimated from logistic regression models. RESULTS: Compared to non-Hispanic whites, both US- and foreign-born Hispanic mothers demonstrated substantially higher odds of delivering infants with anotia/microtia across nearly all strata of sociodemographic and other maternal factors ((aORs) range: 2.3-8.3). The odds of anotia/microtia were particularly elevated among Hispanic mothers who emigrated from Mexico after age five (aOR=5.7, 95% CI=3.5-9.1) or who conducted the interview in Spanish (aOR=5.7, 95% CI=3.6-9.2). CONCLUSIONS: We observed that certain sociodemographic and acculturation factors are associated with higher risks of anotia/microtia among offspring of Hispanic mothers.

B98

RACIAL/ETHNIC DIFFERENCES IN ASSOCIATIONS BETWEEN YOUNG MATERNAL AGE, AND PRETERM BIRTH AND INFANT MORTALITY IN THE U.S.

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Purpose: To determine if race/ethnicity modifies the associations between young maternal age and preterm birth (PTB) and infant mortality (IM). Methods: Using 2000-2010 U.S. period-linked birth and infant death files, late, moderate, and early PTB (34-36, 28-33, and <28 weeks gestation, respectively) and IM rates among live-singleton births to non-Hispanic white (NHW), non-Hispanic black (NHB), and Hispanic teens (15-17 and 18-19) were compared to women 20-25 years old. After confirming our a priori hypothesis (observing a statistically significant interaction between age and race, $p<0.0001$), 6 logistic regression models generated race/ethnicity-specific odds ratios (aOR) for the association between age and PTB and IM, adjusted for birth year, education, marital status, parity, prenatal care, and smoking status. Results: Within the three racial/ethnic groups, odds of PTB (e.g., early PTB, NHW 15-17 years, aOR: 1.37, 95%CI:[1.31, 1.43]; and NHW 18-19 years, aOR: 1.13, 95%CI:[1.09, 1.16]) and IM (e.g., NHW 15-17 years, aOR: 1.34, 95%CI:[1.28, 1.39] and NHW 18-19 years, aOR:1.21, 95%CI: [1.17, 1.24]) were higher among 15-17 and 18-19 year olds, compared to 20-25 year olds. However, the associations between age and PTB and IM were weakest among NHB (early PTB: 15-17 years, aOR: 1.05, 95%CI:[1.01, 1.09]; 18-19 years, aOR:0.95, 95%CI: [0.92, 0.98]; IM: 15-17 years, aOR: 1.07, 95%CI:[1.02, 1.12] and 18-19 years, aOR: 1.04, 95%CI: [1.01, 1.08]). Conclusion: Young maternal age is associated with PTB and IM; however, the relationship magnitude differs by race/ethnicity. Future analyses on PTB and IM among young women should examine possible reasons for effect modification by race/ethnicity.

B99

DIRECT EFFECTS OF WOMEN'S EARLY LIFE SOCIOECONOMIC STATUS ON THE BIRTH WEIGHTS OF THEIR CHILDREN. Huang JY*, Gavin AR, Rowhani-Rahbar A, Enquobahrie DA (University of Washington, Seattle, WA)

Background: Birth weight inequities may be caused by socioeconomic and biological stressors across a mother's life course. Distinguishing maternal early life from proximal determinants of birth weight is challenging. We tested the effect of a mother's own in utero socioeconomic status (SES) on the birth weight of her child using structural methods. Methods: Using the National Longitudinal Study of Adolescent Health, we identified women who delivered ≥ 1 live singleton (N = 1,680). Maternal in utero SES was defined by educational attainment ($\leq$ 8th grade, trade, < high school (HS), HS, GED, post-HS trade, < college, college, > college) of the biological grandmother (GM). Using structural equation models (SEM), we explored relationships between maternal life course factors. Using marginal structural models (MSM), we tested the controlled direct effect of GM education on weights of children born to a population of women at low risk of maltreatment, overweight, maternal smoking, and low adult SES. Results: Average birth weight was higher among GM with greater education (3,309 grams (g) and 3,224 g amongst college graduates versus < HS, respectively). SEM suggested a direct effect of 16 g increased birth weight (95% confidence interval: -0.837, 32.6) per level higher GM education. MSM and naïve adjustment produced similar results: Inverse probability weighting estimated a controlled direct effect of 21 g increased birth weight (95% CI: 3.02, 38.9) per level high GM education in a marginal population of healthy women. Conclusions: Various models suggest a small but direct effect of GM education on birth weight.

B100

UNDERSTANDING SOCIOECONOMIC RISK FACTORS FOR LATE AND MODERATELY PRETERM BIRTH: A POPULATION-BASED COHORT STUDY. LK Smith (University of Leicester, Leicester, UK), E Draper (University of Leicester, Leicester, UK), D Field (University of Leicester, Leicester, UK), S Johnson (University of Leicester, Leicester, UK), B Manktelow (University of Leicester, Leicester, UK), N Marlow (University of Leicester, Leicester, UK), S Petrou (University of Leicester, Leicester, UK), S Seaton (University of Leicester, Leicester, UK), E Boyle (University of Leicester, Leicester, UK)

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

B101

THE IMPACT OF MATERNAL RACE/ETHNICITY ON PERINATAL OUTCOMES ASSOCIATED WITH MATERNAL ASTHMA. KF Flores* (Eunice Kennedy Shriver National Institute of Child Health and Human Development, DIPHR, Epidemiology Branch) C Robledo (Eunice Kennedy Shriver National Institute of Child Health and Human Development, DIPHR, Epidemiology Branch) K Leishear (Food and Drug Administration Center for Drug Evaluation and Research) SK Laughon, (Eunice Kennedy Shriver National Institute of Child Health and Human Development, DIPHR, Epidemiology Branch) M Kiely (Eunice Kennedy Shriver National Institute of Child Health and Human Development, DIPHR, Epidemiology Branch) BS Hwang (Eunice Kennedy Shriver National Institute of Child Health and Human Development, DIPHR, Biostatistics and Bioinformatics Branch) UM Reddy (Eunice Kennedy Shriver National Institute of Child Health and Human Development, DER, Pregnancy and Perinatology Branch) P Mendola (Eunice Kennedy Shriver National Institute of Child Health and Human Development, DIPHR, Epidemiology Branch)

Obstetric and perinatal complications are increased among women with asthma and also differ by maternal race/ethnicity. Given that asthma prevalence differs by race/ethnicity, we sought to examine the risk of obstetric and perinatal complications by race/ethnicity among women with asthma. Data were obtained from the Consortium on Safe Labor, a retrospective cohort of 223,512 singleton deliveries from 12 clinical centers across the US between 2002 and 2008. We restricted our analyses to 208,899 singleton deliveries where mothers race/ethnicity was reported as White (n=110,603), Black (n=50,284), Hispanic (n=38,931) or Asian/Pacific Islander (n=9,181). Generalized linear models including an interaction between asthma and race/ethnicity were used to determine odds ratios for maternal and neonatal complications associated with race/ethnicity after controlling for demographic, clinical factors and pre-existing conditions. White women with/without asthma were the reference group. Significant interactions were observed for preeclampsia, neonatal apnea and intensive care unit (NICU) admission but not for other complications studied. Black women with asthma and their infants had a lower odds of preeclampsia (OR=0.98, 95% CI: 0.84,1.15) and NICU admission (OR=1.10, 95% CI: 0.99,1.21) than those without asthma (OR=1.40, 95% CI: 1.31, 1.49; OR=1.28, 95% CI: 1.22,1.33, respectively). Apnea was lower for the infants of Black women with asthma (OR=0.79, 95% CI: 0.63, 0.99) and without asthma, and similar to Whites (OR=0.99, 95% CI: 0.90,1.08). In general, there were no additional risks for obstetric and neonatal complications for minority women with asthma.

B102

PERIPARTUM DEPRESSIVE SYMPTOMS AND SUICIDAL IDEATION AMONG MOTHERS OF PRETERM AND TERM INFANTS. Sanchez SE*, Mascaro P, Qiu C, Garcia P, Barrios YB, Gelaye B, Hwang SS, Williams MA (*Hospital Nacional Dos de Mayo, Lima, Peru)

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

B103

POSTTERM BIRTH AS A RESPONSE TO ENVIRONMENTAL STRESS: THE CASE OF SEPTEMBER 11, 2001. Margerison-Zilko CE*, Goodman JM, Anderson E, Catalano RA (Michigan State University, East Lansing, MI)

Background. Despite growing interest in the role of maternal psychosocial stress as a determinant of preterm birth, no existing work has examined the relation between maternal stress and postterm birth (≥42 completed weeks). Methods. We examined the relationship between exposure to the September 2001 terrorist attacks and odds of postterm birth in California. We calculated the expected odds of postterm birth among singleton male and female gestations reaching at least 37 weeks in California between July 1997 and November 2005. We then used time series analysis to compare the observed and expected odds of postterm birth at each month in the series. Results. The observed odds of postterm delivery among gestations reaching term in September 2001 were 25.2% and 24.0% higher than statistically expected for males and females, respectively. This difference exceeded any other over the 101 month test period. Conclusions. Our finding that odds of postterm birth were higher than expected among term gestations exposed to the September 2001 terrorist attacks supports the hypothesis that exposure to psychosocial stress during pregnancy may result in prolonged gestation. Mechanisms may include biological responses to stress or changes in health care delivery.

B104

CORRESPONDENCE BETWEEN MATERNAL AND OFFSPRING BIRTHWEIGHT, RACIAL/ETHNIC BIRTHWEIGHT DISPARITIES, AND PRECONCEPTION STRESS IN A NATIONAL U.S. COHORT. Strutz KL*, Siega-Riz AM, Hogan VK, Suchindran CM, Halpern CT, Hussey JM (University of North Carolina, Chapel Hill, NC; Michigan State University, East Lansing, MI)

Birthweight is correlated across generations, but specific environmental (i.e., non-genetic) contributors to maternal-offspring birthweight concordance have not been established. Stress has been hypothesized as a potential factor. In addition, maternal low birthweight is more predictive of offspring low birthweight in Blacks vs. Whites, suggesting that well-documented racial/ethnic disparities in birthweight may be exacerbated across generations. To explore these phenomena, we estimated the contribution of maternal birthweight to disparities in offspring birthweight, and whether preconception stress modifies this association. We included singleton live first (n=3512) and second (n=1901) births to non-Hispanic White and Black, and Mexican- and other-origin Latina women reported at Wave IV of the National Longitudinal Study of Adolescent Health (Add Health). Linear regression models were run to estimate the effects on offspring birthweight of maternal race/ethnicity, maternal birthweight, and latent variables for acute and chronic stressors, controlling for potential confounders. For first births, maternal birthweight was correlated with offspring birthweight (r=0.21, p<0.001) and partially explained the -192g Black-White disparity in offspring birthweight, attenuating it to -152g (95%CI: -227,-77). It did not attenuate the more modest Latina-White disparities in offspring birthweight. However, although chronic stressors were associated with a 140g decrease in offspring birthweight (95%CI: -241, -40), neither chronic nor acute stressors modified the positive association between maternal and offspring birthweight. Results were similar for second births. The findings suggest that the persistence of low birthweight across generations, contributing to the Black-White disparity in offspring birthweight, is not easily altered by the presence or absence of stressors.

B105

NEIGHBORHOOD CRIME, INTIMATE PARTNER VIOLENCE, AND BIRTH OUTCOMES IN PREGNANT WOMEN IN A DISASTER RECOVERY ENVIRONMENT. Barcelona de Mendoza V*(Tulane University), Harville EW (Tulane University), Giarratano GP (Louisiana State University Health Sciences Center), Savage JS (Loyola University New Orleans)

In post-disaster environments such as New Orleans, neighborhood disruption, crime and intimate partner violence persist. The effects of crime and violence on low birthweight and preterm birth were studied. Women were interviewed at prenatal and community clinics, and those who had singleton births and complete records for at least one exposure, outcome and covariates (n=296) were included in this analysis. Low birthweight and preterm birth were observed in 6.4% and 6.6% of the sample, respectively. Participants who perceived illegal drug use to be a very serious problem in their neighborhood were significantly more likely to have a preterm birth (aOR 5.64, 95% CI 1.2-26.6) than those who did not see it is a serious problem. Women who would not report a crime to police were more likely to have a preterm birth (aOR 9.36, 95% CI 2.2-41.2) and low birthweight baby (aOR 5.98 95%CI 1.5-24.7) than those who would report a crime. The perception that their neighborhood had become less safe in the last year was also associated with increased risk for preterm birth (aOR 3.11 95% CI 1.1-9.0) for participants. Reported domestic violence was not associated with adverse outcomes in this sample. Perceptions of neighborhood crime and safety predicted adverse birth outcomes in this sample and may be considered as areas for intervention for community-based programs.

B106

PRECONCEPTION CARDIOVASCULAR HEALTH, RACIAL DISPARITIES, AND BIRTH OUTCOMES: A VITAL RECORDS LINKAGE ANALYSIS WITH THE BOGALUSA HEART STUDY. M Jacobs*, EW Harville, M Wallace, G Berenson, W Chen; (Tulane University, New Orleans, LA)

The relationship between preconception cardiovascular health and poor birth outcomes is not well understood. To assess any association, Louisiana births that occurred from 1990-2009 were linked to 1,616 white and 979 black women participating in a longitudinal study of cardiovascular health. Logistic regression was used to evaluate the association between cardiovascular risk factors, measured closest to the earliest linked birth, and low birth weight (LBW, < 2500 g) and preterm birth (PTB, < 37 weeks gestation), both overall and by race. All analyses adjusted for maternal age, age at cardiovascular measure, education, BMI, tobacco use, and race, when applicable. Increasing triglycerides were associated with elevated risk of LBW (aOR = 1.02 (5-unit increase), 95% CI 1.01 – 1.03). Systolic blood pressure (BP) showed a J-shaped relationship with LBW (p = 0.03), with higher odds ratios seen at the higher end of BP (5-unit increase at 120 (pre-hypertension): aOR = 1.19, 95% CI 1.05 – 1.76; 5-unit increase at 140 (hypertension): aOR = 1.38, 95% CI 1.08 – 1.76). After stratifying by race, triglycerides remained significant among white women only (aOR = 1.01, 95% CI 1.00 – 1.03), while systolic BP trended in the same manner among black women only (aOR at 120 = 1.19, 95% CI 1.03 – 1.37; aOR at 140 = 1.39, 95% CI 1.04 – 1.86). No associations were seen for PTB, or for cholesterol, diastolic BP, HDL, or LDL cholesterol. These results suggest that preconception cardiovascular health may be an important, modifiable risk factor for LBW among both white and black women.

B107

EFFORTFUL COPING, MATERNAL EDUCATION, AND ADVERSE BIRTH OUTCOMES. Q Li, B Bullen, C Holzman (Department of Epidemiology & Biostatistics, Michigan State University, East Lansing, MI 48824)

The John Henryism Scale for Active Coping (JHAC) has been used to measure effortful coping in African Americans, and high scores have been associated with health indices such as high blood pressure. We hypothesized that effortful coping might modify the inverse relation between maternal education and adverse birth outcomes. We tested this hypothesis in a community-based cohort study of 1,952 White and 707 African-American mothers enrolled in their 16th -27th weeks of gestation in the Pregnancy Outcomes and Community Health (POUCH) study. JHAC was assessed by self-recorded questionnaire using an eight item scale adopted from James, Hartnett, and Kalsbeek (1983). Women rated each item ranging from 1 (not true) to 2 (somewhat true) to 3 (very true), with higher scores reflecting more effortful coping. Maternal years of education were categorized into three groups (i.e., ≤ 12, $13 \leq$ and <16, and ≥ 16 years). Race-specific logistic and linear regression models for birth weight and preterm delivery (< 37 weeks' gestation) were fit to examine associations. Results showed that John Henryism did not modify the association between maternal education and birth weight in either African-American mothers (P for interaction=0.12) or White mothers (P for interaction=0.35). It also did not modify associations between maternal education and preterm delivery for both racial groups (P for interaction =0.69 and 0.82). Our findings suggest that effortful coping, as measured by the JHAC, does not help explain the relation between maternal education and adverse birth outcomes such as birth weight and preterm delivery.

B108

ACCULTURATION AND LIFESTYLE: A PILOT STUDY OF LOW INCOME, PREGNANT ARAB AMERICAN WOMEN IN METRO DETROIT. Shukr, G * (Michigan State University, East Lansing, MI) Haggerty, DK Kerver, JM PhD, MSc, RD Mudd L, PhD

Acculturation of US immigrants can have a profound influence on dietary intake and physical activity (PA), important factors in pregnancy health. Arab Americans are one of the fastest growing immigrant groups, but little is known about their lifestyle habits during pregnancy. We conducted a pilot study at a WIC clinic in Dearborn, MI to test the feasibility of recruiting low income pregnant Arabic speaking women into a research study on lifestyle habits in relation to pregnancy outcomes. Interviews were conducted in the Arabic language and included the validated Arab American Acculturation scale, the International PA Questionnaire, and a single 24-hour dietary recall. Dietary intake was assessed using the Supertracker interface developed by USDA. Participants (n=30) were primarily foreign born (90%) with 10y mean length of residence, married (100%), with low formal educational (40% < high school education), and a mean age of 26y. Participants reported high fruit (mean=2.5 cups/day) and vegetable intakes (mean=2.8 cups/day). Mean PA was low at 31.4 min/wk. Vegetable intake, which can be a marker of good overall diet quality, was negatively correlated with the acculturation subscale representing separation vs. assimilation and positively correlated with the acculturation subscale representing integration vs. marginalization. PA was also positively correlated with integration. Results support the feasibility of conducting a larger study in this setting and suggest a generally good diet quality, with a higher vegetable intake, and greater PA was associated with greater integration among low income pregnant Arab American women.

B109

RACIAL DISPARITIES IN CALCIUM INTAKE AMONG PREGNANT AND NON-PREGNANT WOMEN OF CHILDBEARING AGE. F Morrison* (Tulane University, New Orleans, LA), F Rabito (Tulane University, New Orleans, LA)

Introduction: Racial disparities in pregnancy outcomes are well established. Inadequate calcium intake is known to be associated with many pregnancy outcomes and historically, calcium intake has differed by race. The goal of this study is to determine if racial disparities in calcium intake still exist in more recent years and if these disparities differ in pregnant and non-pregnant women of child-bearing age. Methods: Total calcium intake was calculated from dietary and supplementation information using 4 survey cycles from the National Health and Nutrition Examination Survey data collected from 2003 to 2010. Inadequate calcium was defined as intake less than 1,000 mg/day for both pregnant and non-pregnant women. Results: The study included 7,267 women of childbearing age. Inadequate calcium intake ranged from 55% in 2005-2006 to 62% in 2003-2004 (no statistically significant differences). African American women were 3.8 (p<0.0001) and 2.0 (p<0.0001) times more likely to have inadequate calcium intake compared to whites during 2003-2004 and 2009-2010, respectively. Disparities remain among pregnant women: in most recent survey cycles, 83% and 76% of African-Americans had inadequate calcium intake, versus 26% and 21% of whites. African-Americans were 3.3 (p=0.002) times more likely to have inadequate intake in 2009-2010, compared to whites. Racial disparities were not significant for Hispanic versus white women. Conclusion: Consistent with historical data, racial disparities in calcium intake persist among both pregnant and non-pregnant women. More than half of women of child-bearing age have inadequate daily diet and supplemental intake of calcium. Inadequate calcium intake remains high in pregnant African-Americans.

Plenary Session 3

Tuesday, June 24th
2:00 – 3:15 pm

Meditation on Mediation Matters

LABOR COMPLICATIONS, BIRTH DEPRESSION, AND SIGNS OF NEONATAL ENCEPHALOPATHY IN THE ASPHYXIAL PATHWAY TO CEREBRAL PALSY AMONG TERM BIRTHS: AN APPLICATION OF G-ESTIMATION IN A MATCHED CASE-CONTROL STUDY. Q Li*, Z Luo, N Paneth, M Francis, M Lenski, A Brovont (Department of Epidemiology & Biostatistics, Michigan State University, East Lansing, MI 48824)

We investigated the relationship of labor complications, birth depression, and signs of neonatal encephalopathy in the asphyxial pathway to cerebral palsy. We performed a case-control study in Michigan of 197 children with cerebral palsy (ages 2 – 15, born 1993-2010) recruited from specialty clinics and matched with 197 controls on birth year, gender, and gestational age (< 28; 28-32; 33-36; >=37 weeks). This analysis is restricted to 97 term-born (>=37 week) pairs. Exposure information was collected from birth certificates, maternal and child hospital discharge files and maternal phone interviews. Following the approach in Berzuini et al (Genet Epidemiol 2012), we estimate the causal controlled direct effect of labor complications on cerebral palsy while the neonatal encephalopathy pathway is blocked and the post-exposure intermediate confounding effect of birth depression is adjusted, incorporating the G-estimation formula in this matched case-control design. Cases were more likely to be exposed to labor complications ($p<0.01$), to have lower birthweight, and to experience birth depression and signs of neonatal encephalopathy ($p \leq 0.02$). The causal controlled direct effect of labor complications on cerebral palsy, which is the risk ratio for labor complications if the mediating pathway through neonatal encephalopathy is blocked, was 1.73 (95% CI: 0.73, 4.10). The estimate for the OR describing the total causal effect of labor complications on cerebral palsy, by contrast is 4.57 (95% CI: 1.20, 17.49). We conclude that most of the effect of labor complications on cerebral palsy is mediated through neonatal encephalopathy.

THE ROLE OF MATERNAL EXPOSURE TO ANTIRETROVIRAL THERAPY AS A MEDIATOR FOR THE EFFECT OF HIV ON BIRTH OUTCOMES. Phiri K*, Shapiro RL, Tchetgen Tchetgen EJ (Harvard School of Public Health, Boston, MA)

Background: Both HIV infection and exposure to combination antiretroviral treatment (ART) during pregnancy have been associated with adverse birth outcomes, but the contribution of each risk factor remains largely unexplored. Methods: Using data from a study conducted in Botswana, we evaluated the natural direct (NDE) and natural indirect (NIE) effects of HIV on birth outcomes mediated through ART; outcomes included stillbirths (SBs), small for gestational age (SGA) and preterm delivery (PTD). We used a recently proposed inverse-probability weighting mediation technique that leverages the fact that ART is not used by HIV negative mothers therefore making it possible to identify the NDE and the NIE under weaker assumptions than previously stated in the literature. Results: 3,911 HIV-infected and 12,151 HIV-uninfected pregnancies were identified. The adjusted total effect of HIV on birth outcomes was, SB (risk ratio (RR) = 2.1; 95% confidence interval (CI), 1.7, 2.6), SGA (RR = 1.9; 95% CI, 1.7, 2.1), and PTD (RR = 1.5; 95% CI, 1.3, 1.7); the adjusted NDE was, SB (RR = 1.6; 95% CI, 1.2, 2.2), SGA (RR = 1.5, 95% CI, 1.3, 1.6), and PTD (RR = 1.1; 95% CI, 0.9, 1.2); the adjusted NIE was SB (RR = 1.3, 95% CI, 1.1, 1.6), SGA (RR = 1.2, 95% CI, 1.1, 1.4), and PTD (RR = 1.4, 95% CI, 1.2, 1.5). Conclusions: Overall, our results show that some of the effect of HIV on birth outcomes is mediated through ART. This finding suggests the possibility that both ART and other factors associated with HIV infection may contribute to adverse birth outcomes.

IS THE RISK FOR NEURAL TUBE DEFECTS FROM CLOMIPHENE AND ASSISTED REPRODUCTIVE TECHNOLOGIES MEDIATED THROUGH MULTIPLE BIRTHS?

Benedum CM*, Yazdy MM, Parker SE, Mitchell AA, and Werler MM (Slone Epidemiology Center at Boston University, Boston MA)

Using data from the Slone Epidemiology Center Birth Defects Study (1993-2012), we sought to disentangle direct and indirect effects of assisted reproductive technology (ART) and clomiphene in relation to neural tube defect (NTD) risk considering multiple births as a mediator. Mothers of 5,422 controls and 261 cases were interviewed within 6 months after delivery about pregnancy events, including fertility treatments. We evaluated clomiphene and ART exposures during the periconceptional period. Logistic regression models were used to calculate odds ratios (aORs) and 95% confidence intervals (CIs) adjusted for folic acid intake, maternal age, and study center. For NTDs, the estimated total effect for clomiphene without ART was aOR:2.6, 95%CI:1.3-5.4; for ART with or without clomiphene, it was aOR:2.0, 95%CI:1.1-3.6. We used a mediation analysis seated within the counterfactual framework to calculate the adjusted direct effect OR (ORDE), indirect effect OR (ORIE), and percent mediated as a result of multiple births. For clomiphene exposure without ART, the ORDE was 2.37 and the ORIE was 1.04, indicating that 6.7% of the observed association was mediated through multiple births. Conversely, for ART exposure with or without clomiphene, the direct effect was small (ORDE:1.17) and the indirect effect was larger (ORIE:1.75), suggesting that 83.7% of the ART-NTD association was mediated through multiple births. We found the total effect of these two infertility treatments were at least twofold for NTDs. However, if the association between ART and NTDs is indeed mostly due to multiple births, that effect may decrease if fewer embryos are transferred.

SERUM LEPTIN MEASURED IN EARLY PREGNANCY IS HIGHER IN WOMEN WITH PREECLAMPSIA COMPARED TO NORMOTENSIVE PREGNANT CONTROLS. *Taylor BD, Ness RB, Olsen J, Hougaard DM, Skogstrand K, Roberts JM, Haggerty CL (University of Pittsburgh, Pittsburgh, PA)

Adiponectin derived protein leptin plays an important role in endocrine function, reproduction, and angiogenesis. Studies examining leptin in preeclampsia are inconsistent, due to small sample sizes and variability in sampling and outcome. We examined associations between serum leptin (measured: 9-26 weeks gestation) and preeclampsia among 430 preeclamptic women and 316 normotensive controls from the Danish National Birth Cohort. All women were primiparous with singleton pregnancies. Median [interquartile range] leptin concentrations were calculated. Associations between leptin and mild (blood pressure $\geq$140/90mmHg and proteinuria $\geq$3g/24h), severe (blood pressure $\geq$160/110mmHg, proteinuria $\geq$5g/24h, or evidence of complications), preterm (birth < 37 weeks gestation), and term (birth >= 37 weeks gestation) preeclampsia were examined using generalized linear models adjusting for body mass index, gestational age at blood draw, maternal age, smoking, and socio-occupational status. As leptin is increased in obese women and the risk of preeclampsia increases with body mass index, we used Sobel test to examine if leptin is a mediator of this relationship. After adjustments, leptin concentrations were significantly higher in women with mild [36.6(21.2) p=0.04], severe [35.4(23.5) p=0.03], and term [30.4(24.9) p=0.02] preeclampsia compared to controls [20.9(28.3)] but not preterm preeclampsia [30.6(23.4) p=0.22]. Leptin significantly mediated the association between body mass index and preeclampsia (p=0.0276) accounting for 19.6% of the total effect. In early pregnancy, leptin concentrations are higher in preeclamptic women compared to normotensive controls and may mediate some of the relationship between body mass index and preeclampsia. The ability of leptin to predict preeclampsia should be explored.

DO THE CAUSES OF INFERTILITY PLAY A ROLE IN THE ETIOLOGY OF PRETERM BIRTH? C Messerlian*[1], RW Platt[1], B Ata[2], SL Tan[1], R Gagnon[1], O Basso[1] ([1]McGill University, Montreal, Canada) ([2]Uludag University, School of Medicine, Turkey)

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

Plenary Session 4

Tuesday, June 24th

3:45 – 5:00 pm

Childhood Matters

PERICONCEPTUAL AND PREGNANCY FOLIC ACID SUPPLEMENTATION AND CHILD ALLERGIC DISEASE – EVIDENCE FROM THE DANISH NATIONAL BIRTH COHORT.

Maslova, E*(Centre for Fetal Programming, Department of Epidemiology Research, Statens Serum Institut, Copenhagen, Denmark), Hansen, S, Granstrom, C, Petersen, S, Olsen, SF

Background: Early evidence suggested that maternal folic acid supplementation during pregnancy increases the risk of child wheeze and asthma; this has not been substantiated by later studies. Furthermore, potential trimester-specific effects have not been investigated. Objective: We examined maternal folic acid supplementation periconceptually and by trimester in relation to child allergic disease. Methods: We calculated folic acid intake from supplements starting 4 weeks prior to conception until gestational week 44 using maternal self-report (n=33,918). Dietary folate was quantified using a validated mid-pregnancy FFQ. Mothers reported on doctor-diagnosed child asthma at 18 months and 7 years; and allergic rhinitis at age 7. Information on asthma diagnosis and medication was extracted from national registries. We used multivariable log-binomial models to calculate risk ratios (RR) and 95% CI. Results: Mean(SD) intake of folic acid was 196(164)µg/day in the periconceptual period; 8% reported no use of supplements. The means(SDs) were 259(148)µg/day, 276(153)µg/day, and 242(140)µg/day for first, second, and third trimester, respectively; and 351(68)µg/day for dietary folate. We found no associations for any of the time periods with the outcomes. However, children of mothers who were in the highest quintile (Q5) of folic acid intake in all trimesters had a non-significant increased risk of hospitalization for asthma (RR(vs. Q2-Q4): 1.33, 95%CI: 0.92, 1.91). Dietary folate was inversely associated with asthma at 18 months only (Q5 vs. Q1: RR: 0.90, 95%CI: 0.82, 0.99). Conclusions: We found no associations of maternal folic acid intake with child allergic disease. Intake source may be of importance for early asthma.

A PROSPECTIVE STUDY OF N-3 AND N-6 POLYUNSATURATED FATTY ACIDS AND WEIGHT GAIN IN SCHOOL-AGE CHILDREN. W Perng*, E Villamor, M Mora-Plazas, C Marin, A Baylin (Harvard Medical School and Harvard Pilgrim Health Care Institute)

Background: Studies in adults indicate that dietary polyunsaturated fatty acid (PUFA) composition may play a role in development of adiposity. Whether this is also the case in children is a critical research question because adipocyte quantity is established sometime been late childhood and adolescence. Design: Using gas-liquid chromatography, we quantified N-3 alpha-linolenic acid (ALA), eicosapentaenoic acid (EPA), and docosahexaenoic acid (DHA); and N-6 linoleic acid (LA), gamma-linolenic acid (GLA), dihomo-gamma-linolenic acid (DGLA), and arachidonic acid (AA) in serum samples of 668 Colombian schoolchildren aged 5-12 years at the time of recruitment into a cohort study. Children's anthropometry was measured annually for a median of 30 months. We used mixed-effects models with restricted cubic splines to construct population body mass index-for-age z-score (BMIZ) growth curves for age- and sex-specific quartiles of each PUFA. Results: N-3 ALA and N-6 GLA were each inversely related to BMIZ gain after adjustment for sex, baseline age and weight status, and household socioeconomic level. Compared to children in the lowest quartile of ALA, estimated BMIZ change between 6 and 14 years among those in the highest quartile was 0.41 (95% CI: 0.02, 0.79) z lower (P trend=0.02). We observed a similar inverse relation between GLA and BMIZ change during follow-up (P trend=0.01). None of the other PUFAs were related to BMIZ change. Conclusions: ALA and GLA may be protective against weight gain in school-age children. Whether improvement in PUFA status reduces adiposity in pediatric populations deserves evaluation in randomized trials.

NEUROBEHAVIORAL SCORES AT 5 WEEKS IN RELATION TO AUTISTIC TRAITS AT 4 AND 5 YEARS. K Bowers*, J Khoury, H Sucharew, S Donauer, Y Xu, K Yolton. (Cincinnati Children's Hospital Medical Center, Cincinnati, OH)

A majority of children diagnosed with autism spectrum disorder (ASD) have abnormalities present in the first year of life. However, it's not known whether behaviors identified in early infancy may be related to autistic symptoms evident later in childhood. Our objective was to determine whether neurobehavioral characteristics measured at 5 weeks are associated with autistic traits at 4-5 years. Analyses were conducted within the Health Outcomes and Measures of the Environment (HOME) Study, a prospective pregnancy and birth cohort study that enrolled women during pregnancy and followed the offspring through age 5 years (N=214).We evaluated neurobehavioral performance with standard summary scales from the NICU Network Neurobehavioral Scale (NNNS) that describe early infant neurobehavioral characteristics. Autistic traits were identified by the Social Responsiveness Scale (SRS)-2 at ages 4 and 5.Measures of association were estimated using generalized estimating equations to address correlation of the repeated outcomes. We explored effect modification with risk factors for ASD, including maternal depression and advanced maternal age. Overall, lower NNNS scores on the attention subscale were associated with higher total SRS T scores (β=-0.8, p=0.03). Among a subset of children born to mothers who were ≥35 years of age (n=55), lower attention (β=-2.3, p=0.04), higher lethargy (β=1.9, p=0.003) and higher arousal (β=4.9, p=0.048) were significantly associated with higher total SRS T scores, and greater excitability (β=1.4, p=0.07) and poorer regulation (β=-4.6, p=0.08) demonstrated borderline significance. In summary, poor NNNS performance at 5 weeks was associated with autistic traits at 4-5 years, especially among infants of older mothers.

EARLY LIFE DETERMINANTS OF CHILD COGNITIVE AND PSYCHOMOTOR DEVELOPMENT: RHEA MOTHER-CHILD COHORT IN CRETE, GREECE. Kampouri M, Kyriklaki A, Roumeliotaki T, Koutra K, Sarri K, Vassilaki M, Kogevinas M, Chatzi L*

(Department of Social Medicine, Faculty of Medicine, University of Crete, Heraklion, Greece)

Background: Fetal life and early infancy are critical periods for brain development. Environmental, psychological and social factors have effects on brain development during both pre-and postnatal periods. Methods: The study population includes 899 children from the "Rhea" Mother-Child cohort in Greece, Greece. Neurodevelopment at 4 years was assessed by means of the McCarthy Scales of Children's Abilities (MSCA). Principal Component Analysis was used to explore groups of potential determinants of child neurodevelopment. Associations between Identified components and neurodevelopmental scores were investigated by multivariable linear regression models after adjusting for confounders. Results: Four components were extracted, explaining 52.4% of the total variance. "High socio-economic status", "Family Structure", "Size at birth", and "Health life-style at 4 years". "High socio-economic status" characterized by high parental education, and maternal working status was associated with higher scores in all neurodevelopmental domains (indicatively Cognitive Performance: β 5.34, 95%CI: 4.40, 6.29). "Healthy Lifestyle at 4 years", characterized by nursery school attendance, watching TV/DVD less than 2 hours/day, and playing outside home during weekdays, was associated with higher scores in all neurodevelopmental domains (indicatively Perceptual Performance: β 3.49, 95%CI: 2.53, 4.44). "Family structure", characterized by parents being married and spending time with children during weekends, was associated with higher scores in memory, verbal and cognitive performance. "Size at birth" was not associated with any neurodevelopmental outcome. Conclusion: The study supports the importance of social and lifestyle factors on child's neurodevelopment. The findings could have several implications for both intervention target groups' selection and intervention objectives.

THE ASSOCIATION BETWEEN TRAJECTORIES OF GESTATIONAL WEIGHT GAIN AND CHILD IQ AT 5 YEARS OF AGE. SN Hinkle*, PS Albert, LA Sjaarda, J Grewal, KL Grantz (Eunice Kennedy Shriver National Institute of Child Health and Human Development, Rockville, MD)

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

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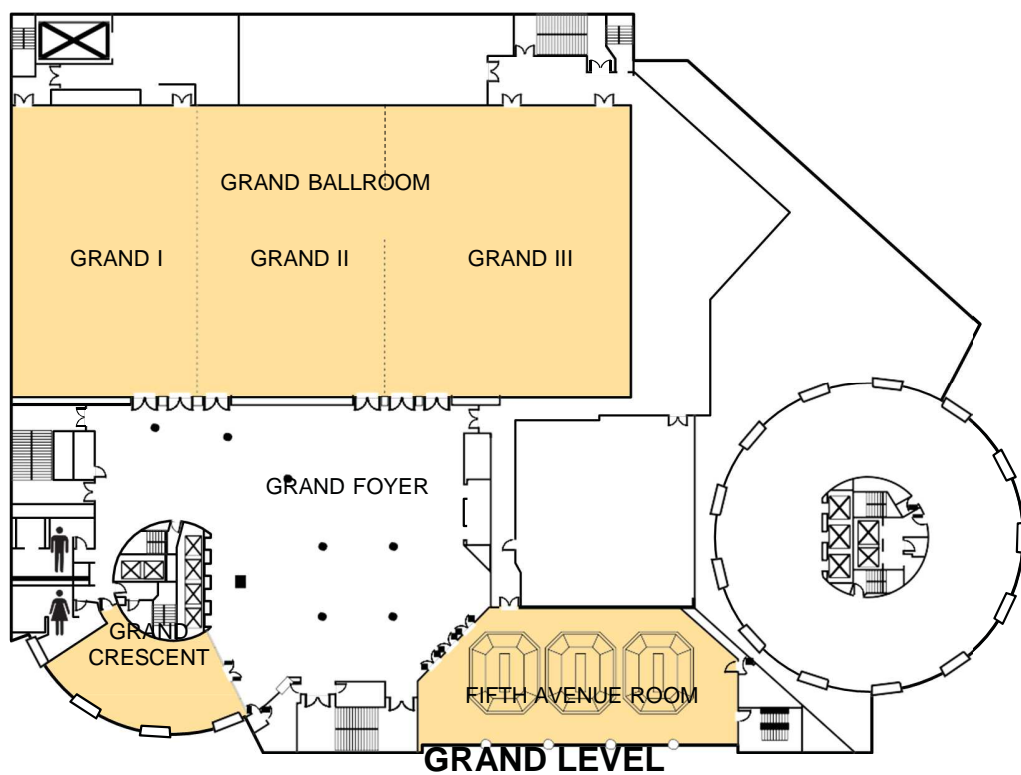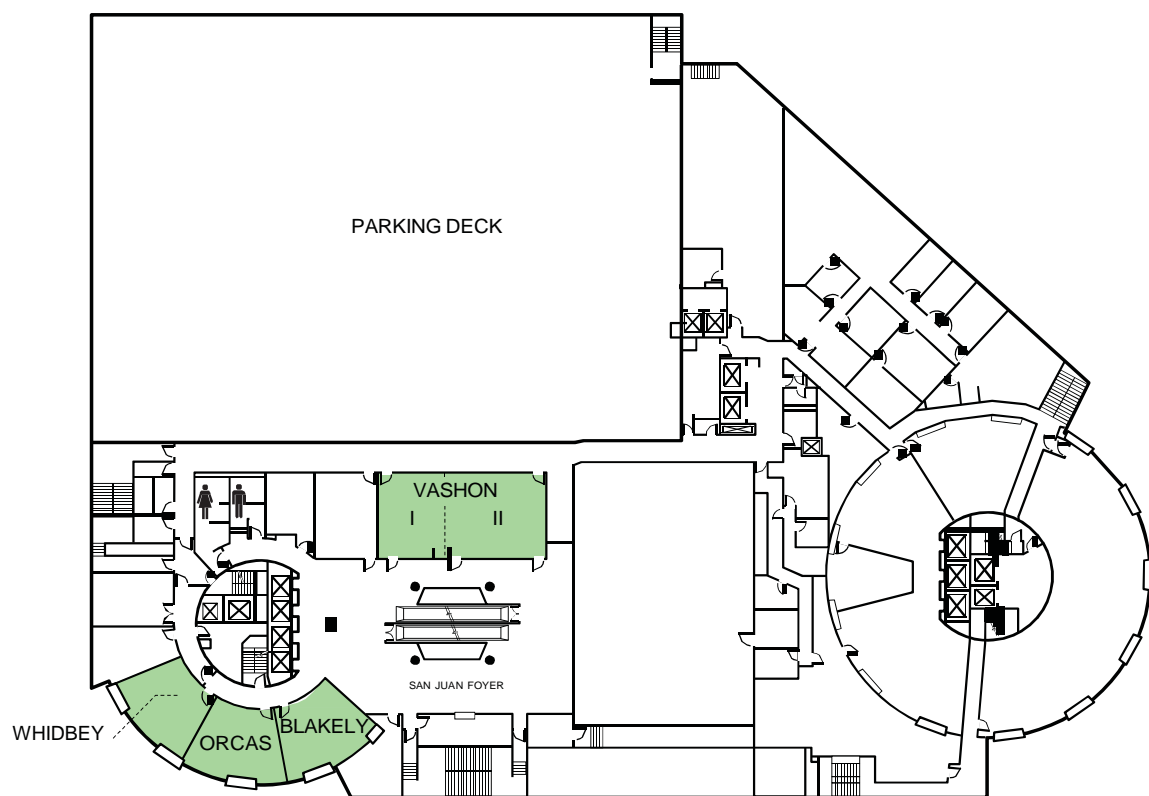
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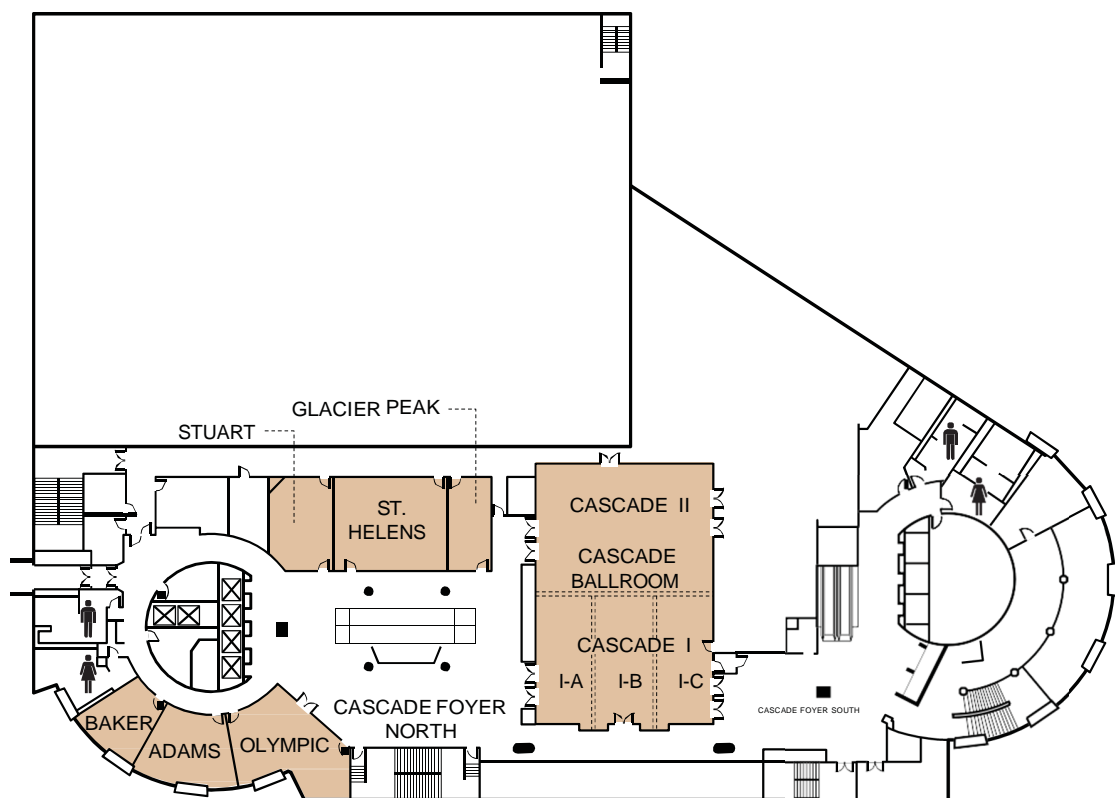
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