2014

The Total Picture: Multiple Chemical Exposures to Pregnant Women in the US – An NHANES Study of Data from 2003 through 2010

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The Total Picture:

Multiple Chemical Exposures to Pregnant Women in the US –

An NHANES Study of Data from 2003 through 2010

A thesis submitted in partial fulfillment of the requirements for the degree of Master of Science at Virginia Commonwealth University.

by

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M.S. Biostatistics Virginia Commonwealth University July 2014

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July 2014

Acknowledgement

The author wishes to thank several people. I would like to first thank my husband, Jason Cabana, for his love, support, and unwavering patience through the years of my graduate education. He supported my dream in every possible way so that I could do what I love. He has tip-toed around me while I studied, quizzed me before exams and even feigned interest in Statistics. I consider this degree our achievement. I also would like to thank my family for their sincere dedication to providing all things possible so that I could complete the thesis. They opened their doors to me during the writing process and never complained when I had to miss family events for scholarly ones. This degree reflects not an individual effort and sacrifice, but efforts and sacrifices from all members of my family. Through these years and this process, I have learned far more than statistics: I have learned what I can endure and overcome, who I strive to be, how to love better, and how much love I am surrounded by in my life. Thank you, my dear husband and family.

I also have great appreciation for my fellow graduate school student, Allison Dunning, who provided solid advice and pep talks at just the right moment. There are times when family cannot understand your classroom struggles (or even the Greek letters). Allison was there for me at those points, and we had some fun times along the way, too. I look forward to watching her shine.

Finally, I would like to thank Dr. Chris Gennings for her applied patience and caring during tough times. Her genuine kindness and drive for new research inspires generations of students to become better Biostatisticians.

This paper is dedicated to the life and memory of Mrs. Aura Maria Cabana (1946 - 2014) without whom this would not have been possible.

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Abstract

THE TOTAL PICTURE: MULTIPLE CHEMICAL EXPOSURES TO PREGNANT WOMEN IN THE US – AN NHANES STUDY OF DATA FROM 2003 TO 2010

By Teri L. Cabana, M.S.

A thesis submitted in partial fulfillment of the requirements for the degree of Master of Science at Virginia Commonwealth University.

Virginia Commonwealth University, 2014.

Major Director: Dr. Chris Gennings, Professor, Department of Biostatistics

INTRODUCTION: Chemical exposures to US pregnant women have been shown to have adverse health impacts on both mother and fetus. A prior paper revealed that US pregnant women in 2003-2004 had widespread exposure to multiple chemicals. The goal of this research is to examine how environmental chemical exposures to US pregnant women have changed from 2003 to 2010 and to look further at the extent of simultaneous exposure to multiple chemicals in US pregnant women using biomonitoring data available through NHANES (the National Health and Nutritional Examination Survey).

METHODS: Using available NHANES data from the following cycles (2003-2004, 2005-2006, 2007-2008, 2009-2010), we analyzed how environmental chemical exposures changed over time. Covariates were used and data was weighted to reflect the population of pregnant US women. Each cycle was then compared to the 2003-2004 cycle in order to assess how exposures have changed over time.

We then looked at the data in an entirely different fashion. We examined the total number of chemicals detected in a given pregnant woman by chemical group. Finally, we looked at the total number of detects across various chemical groups and used the Fisher Exact Test to study how the distribution of detections changed in 2009-2010 compared to 2003-2004.

RESULTS: While at least one-third of the chemicals analyzed showed one cycle that differed, exposure rates of individual chemicals were generally not increasing from 2003-2010. Median number of detections over chemical groups also did not show much difference over time. However, analysis of the change in frequency distributions revealed that, for some chemical groups, the frequency of detects in US pregnant woman significantly increased in 2010 compared to 2003.

CONCLUSIONS: Widespread chemical exposures were seen in US pregnant women from 2003 through 2010. The number of chemical analytes detected in US pregnant women's bodies is rising. Many chemicals studied had similar mechanisms of action and/or similar adverse health outcomes upon exposure which is known to result in a cumulative health effect. This research suggests that we need to focus not only on exposure rates of individual chemicals but also on the overall number of chemicals detected when assessing the overall picture of environmental chemical exposures to pregnant women in the US.

Chapter 1: Introduction

When it comes to chemicals, the world is growing ever more complex. The number of chemical compounds in the environment has risen steadily with the rapid improvements made in analytical chemistry[1]. With the deployment of new chemicals to our environment comes the desire and responsibility to understand how these chemicals interact with our bodies in both the short-term and the long-term. In addition, there is that same desire and responsibility to understand who in our population might be more susceptible to these chemicals than others and what that means to their health. This research project was designed to take a broad look at the state of environmental chemical exposures in a vulnerable segment of the US population.

What is an environmental chemical exposure? The US Environmental Protection Agency (EPA) broadly defines a chemical exposure as the contact of people and other organisms with a chemical pollutant for some duration of time[2]. An environmental chemical is defined by the US Centers for Disease Control and Prevention (CDC) as a chemical compound or element present in air, water, food, soil, dust, or other environmental media such as consumer products[3]. This definition, then, covers a wide array of chemicals, including things from pesticides used on food in the fields to chemicals used in everyday consumer goods such as deodorants and cosmetics.

One's typical interaction with environmental chemicals is therefore frequent and quite routine. For example, a British deodorant company surveyed 2,016 women in 2009 and found that, on average, they applied 515 different chemicals to their bodies every day[4]. The products used included moisturizers, deodorants, perfumes, and cosmetics. Each of these products may contain multiple chemicals, as they noted moisturizers contained up to 30 different chemicals and perfumes had up to 400. In fact, in another study that looked at the number of chemicals in

consumer products, researchers found that not all of the chemicals detected were even listed on the label[5]. Yet, it is not just beauty and drug store items that contain environmental chemicals.

As the EPA states, "chemicals surround us" as they are a part of most things that we associate with modern living[6]. The EPA estimates that by 2001 there were 19,533 pesticide products on the market and 79,120 existing chemicals on the Toxic Substances Control Act inventory[7]. Each year more chemicals are added. There are chemicals in the flame-retardants in our office and home furniture, chemicals in our toothpastes, pesticides on our store-bought foods, and chemicals sprayed on our fruits to lengthen shelf-life at the grocery store. Chemicals are in the air we breathe, as manufacturing processes and transportation fuel combustion emit pollutants, and in the water we drink, as lead pipes transport it to our faucets. Martina's study comparing chemical exposures in Old Order Mennonites (OOM) to US pregnant women in 2003 underscores how our modern behaviors and product choices lead to more chemical exposures[8]. In that study, they found significantly less endocrine-disrupting chemicals in the OOM group than in their more modern counterparts, indicating how our modern behaviors tend to increase the amount of chemicals to which we are exposed.

Clearly, we are inundated every day by environmental chemicals while leading the average modern lifestyle. While not every chemical exposure is necessarily harmful, it is the case that some environmental chemical exposures result in a negative health outcome. For example, exposures to BPA, found in the lining of many canned goods and in plastic products like drinking containers, compact disks, toys and plastic plates, and Triclosan, found in many toiletry items such as soaps, toothpastes, deodorants, cosmetics as well as in some fabrics, are related to resulting underlying immune and inflammatory dysfunction[9]. Phenomenon such as global DNA hypomethylation, a change in our DNA that is known to play some role in creation

of cancer in the body, is shown to be related to methylmercury exposure via inorganic exposure, such as fish consumption, as well as dental amalgams[10]. Furthermore, many studies show that exposure to environmental and occupational toxicants may be risk factors that lead to different types of cancer[11]. This is particularly the case for those who have high-risk occupations whereby they are regularly exposed to environmental chemicals, including farmhand field workers and beauticians.

Knowledge of the risk to the general population for adverse health outcomes due to chemical exposures warrants examination of the most vulnerable member of it: the unborn fetus. Environmental chemicals are known to cross over from the mother's placenta and go into the fetal bloodstream[12]. Furthermore, prenatal chemical exposure is shown to be detrimental to the fetus and can result in a variety of adverse health outcomes including neurodevelopmental, psychomotor problems, learning disorders, and behavioral issues[13]. For example, studies have shown that chronic arsenic exposure may increase the risk of adverse pregnancy outcomes such as fetal or infant death[14]. Just as consumption of fish contaminated with methylmercury has adverse health impacts on adults, research shows maternal consumption of such fish impacts fetal brain development[15]. Flame retardant exposure (polybrominated diphenyl ethers (PBDEs)) as measured by cord blood PBDE concentrations prenatally are correlated with later neurodevelopmental effects[16]. Thus, a mother's exposure to environmental chemicals clearly impacts the health of her unborn child both during the pregnancy and post-birth.

Research has shown that many chemicals, such as BPA, are omnipresent in terms of exposure[17,18]. Other chemicals, such as Triclosan, are detected in nearly 75% of people tested[19]. This suggests simultaneous exposure to multiple environmental chemicals for the majority population. When chemical exposures have similar mechanisms of action and exposures occur

concurrently, there is a cumulative effect whereby the resulting adverse consequences may be greater than the individual health outcome of a single exposure[20]. Even more, when exposures to different chemicals result in the same adverse health outcome, the effect of multiple exposures can also be cumulative[7]. For example, chemicals called phthalates, plasticizers used nearly ubiquitously in everyday common products such as cosmetics and personal care products, provide a good example of the multiple chemical exposures scenario. Phthalates are considered anti-androgens as they are known to disrupt the actions of androgens during fetal development causing later fertility issues in men[21]. There are more than 100 of these chemicals. Because exposures lead to the same health outcome, when a pregnant mother is exposed to multiple phthalates the likelihood for later fertility issues in the unborn son increases. In fact, in 2008 the National Research Council criticized the EPA for not fully accounting for the cumulative effect of being exposed to so many phthalates and other anti-androgens concurrently[20]. This is just one example of one group of chemicals. It is clear: multiple environmental chemical exposures can have a greater effect than exposure to just one chemical.

Biomonitoring studies are employed to study and track chemical exposures through the measurement of chemicals, their metabolites, or specific reaction products in biological specimens, such as blood or urine[22]. Since the early 1960s, the CDC has periodically conducted a large biomonitoring study called The National Health and Nutrition Examination Survey (NHANES). In 1999, this became a continuous program and now is conducted every two years. Each survey samples approximately 5,000 non-institutionalized US civilians who are representative of the country as a whole through the employment of a multi-stage, stratified, clustered survey sample. Counties from all across the country are included, but 15 are visited each year. The NHANES survey includes demographic, socioeconomic, dietary, and health-

related questions, taking medical, dental, and physiological measurements which allow for laboratory analysis of urine and blood samples. While the survey is not solely dedicated to the topic of chemical exposures, data collected provides insight into the current and past state of chemical exposures in the US population. The analysis of the two-year data set is added to prior years' results and made public in a report produced by the CDC called "The Fourth National Report".[23] This report provides an excellent summation on the statistics for the general US population and even provides results on certain sub-populations, such as breakdown by gender or ethnicity. However, it does not address one key sub-population of interest: pregnant women. The aim of this research is to provide that missing information so that we may better understand environmental chemical exposures to the unborn fetus.

A study by Woodruff on 2003-2004 NHANES data compared exposure rates to 163 chemical analytes between non-pregnant women of child-bearing age and pregnant women in the US. Large variation in exposure rates was seen among individual analytes in pregnant women. However, this research was particularly interesting in that it also took a different approach to the data. Rather than just look at the exposure rates of each chemical, they graphed the number of environmental chemicals detected per pregnant woman across many different chemical groups. In other words, rather than look at the amount of an individual chemical in the body, Woodruff looked at the number of overall chemicals in a given pregnant woman. The results show pregnant women in the US have "ubiquitous exposure to multiple chemicals during a sensitive period of development"[24]. The fact that numerous chemicals of many varieties was detected in these women led Betts[25] to highlight Woodruff's research and call for more on the topic.

In effort to extend Woodruff's research, we analyzed NHANES data on pregnant women from 2003 through 2010 to further elucidate multiple chemical exposure rates for this US

population (and their vulnerable fetuses). We hope to understand more about if and how these rates have changed over time. Finally, we look at the individual pregnant woman and examine the cumulative picture of chemical exposures at one point in time to provide insight into the exposures to their developing fetus.

As part of this research project, a paper suitable for journal publication was produced. This paper is intended to stand alone and may repeat some information contained in other chapters. The publishable paper follows in the next section. Only select tables and figures are provided in this section; the remainder is located in the Appendix.

The Total Picture: Multiple Chemical Exposures to Pregnant Women in the US – An NHANES Study of Data from 2003 to 2010

INTRODUCTION

Exposure to chemicals is linked to many adverse health outcomes in humans. For example, exposures to BPA and Triclosan are related to resulting underlying immune and inflammatory dysfunction[9]. Phenomenon such as global DNA hypomethylation is shown to be related to methylmercury exposure via inorganic exposure, such as fish consumption, as well as dental amalgams[10]. Other studies show that exposure to environmental and occupational toxicants may be risk factors that lead to different types of cancer[11].

Knowledge of the risk to the general population for adverse health outcome from chemical exposure warrants examination of the most vulnerable member of it: the unborn fetus. Environmental chemicals are known to cross over from the mother's placenta and go into the fetal bloodstream[12]. Furthermore, prenatal chemical exposure is shown to be detrimental to the fetus and can result in a variety of adverse health outcomes including neurodevelopmental, psychomotor problems, learning disorders, and behavioral issues[13]. For example, studies have shown that chronic arsenic exposure may increase the risk of adverse pregnancy outcomes such as fetal or infant death[14]. Just as consumption of fish contaminated with methylmercury has adverse health impacts on adults, research shows maternal consumption of such fish impacts fetal brain development[15]. Flame retardant (polybrominated diphenyl ethers (PBDEs)) exposure as measured by cord blood PBDE concentrations prenatally are correlated with later neurodevelopmental effects[16]. While the CDC (US Centers for Disease Control) publishes

environmental chemical detection rates for the general US population via the National Report[23], this report looks at data as it relates specifically to the US pregnant women population.

Biomonitoring studies reveal that many chemicals, such as BPA, are omnipresent in terms of exposure[17]. This suggests simultaneous exposure to multiple chemicals for the majority population. When chemical exposures have similar mechanisms of action and exposures occur concurrently, there is a cumulative effect whereby the resulting adverse consequences may be greater than the individual health outcome of a single exposure[20]. Phthalates, plasticizers used nearly ubiquitously in everyday common products such as cosmetics and personal care products, are an example of the multiple chemical exposures scenario. There are more than 100 chemicals identified as anti-androgens, such as phthalates, which are known to disrupt the actions of androgens during fetal development causing fertility issues in men[21]. In fact, in 2008 the National Research Council criticized the EPA for not fully accounting for the cumulative effect of being exposed to so many phthalates and other anti-androgens concurrently[20].

A study by Woodruff on 2003-2004 data from the National Health and Nutritional Examination Survey (NHANES) compared exposure rates to 163 chemicals between non-pregnant women of child-bearing age and pregnant women in the US. While large variation in exposure rates is seen among individual analytes, results show pregnant women in the US have "ubiquitous exposure to multiple chemicals during a sensitive period of development"[24]. Betts[25] discusses Woodruff's study and calls for further research.

In effort to extend Woodruff's research, we analyzed NHANES data on pregnant women from 2003 through 2010 to further elucidate multiple chemical exposure rates for this US population (and their vulnerable fetuses). We hope to understand more about if and how these rates have

changed over time. Finally, we look at the individual pregnant woman and examine the cumulative picture of chemical exposures at one point in time to provide insight into the exposures to their developing fetus.

METHODS

As this research is conducted to further that by Woodruff, every attempt has been made to follow the same methodology.

Study Population

The National Health and Nutrition Examination Survey (NHANES), conducted by the U.S. Centers for Disease Control and Prevention (CDC), National Center for Health Statistics (NCHS) is a multi-stage, stratified, clustered survey sample of non-institutionalized, US civilians. Designed to provide nationally representative data, NHANES covers topics of US health and nutrition with extensive data collection through interview, laboratory specimen analysis, and medical examination[26]. Detailed description of the NHANES sample design methodology is provided elsewhere[27]. Due to the nature of the design, sample weights are assigned to each respondent so that the data are reflective of the US population.

Although periodically run since 1971, NHANES has been conducting the survey in continuous two-year cycles since 1999. Data used for this study consisted of continuous NHANES data from the following two-year data cycles: 2003-2004, 2005-2006, 2007-2008, and 2009-2010.

Our data include pregnant women of child-bearing age, ages 15 to 44, as defined by the NCHS[28]. For confidentiality purposes, NHANES restricts public data availability with regard to urine pregnancy test results for respondents under age 20 for the cycles 2007-2008[29] and 2009-2010[30]. Thus, our study for these cycles include only women aged 20-44.

Pregnancy status was ascertained via urine analysis at the time of the initial medical examination. Our pregnancy status differs in definition from that used by NHANES, as NHANES considers self-report in addition to positive urine pregnancy test results. Self-report information was excluded as our aim is to study only women that were truly pregnant at the time of data collection.

To be included in this study, a respondent must have been measured for at least one chemical of interest.

Environmental Chemical Analyte Selection

Data collected by NHANES and used in this study include laboratory measurements of chemical analytes, here defined as chemicals and their metabolites. Laboratory data includes measurements on blood, urine, and serum specimens.

The majority of chemical analytes were not measured in all study respondents; rather, the population was broken into subsamples such that approximately one-third were tested for each chemical analyte. Sample weights, provided by NHANES, applied to such data were adjusted to reflect the subsample methodology.

Chemical analyte selection is largely based upon data availability at the time of analysis. Analytes with pooled data are excluded for simplicity. As we aim to understand the change in exposures over time, chemical categories lacking data for all of the cycles of interest are excluded. For each analysis method, selection of analytes differed slightly depending on data availability.

Chemical Analyte Analyses

Statistical software used for analysis includes SAS (version 9.3; SAS Institute Inc., Cary, NC, USA) and SUDAAN (SAS-callable version 11.0.1; Research Triangle Institute, Research Triangle Park, NC, USA). SUDAAN was used to calculate the descriptive statistics for each chemical analyte as well as for the demographic data by cycle. Proc SurveyFreq and Proc Surveymeans were used to obtain these statistics so that they were properly weighted and respected the complex two-stage, cluster design of the NHANES survey. Statistics gathered for each chemical analyte include the percent of US pregnant women with exposure levels greater than the limit of detection (LOD), geometric mean (GM), geometric standard error (GSE), median and 95th percentile, and the coefficient of variation (CV), defined as the GSE divided by the GM. Geometric mean and GSE were chosen over their arithmetic counterparts as they account for the fact that environmental chemical data is typically right-skewed (mean > median) and thus allow for comparison. Limit of detection (LOD) for each chemical analyte in each cycle was obtained from Appendix D in the Fourth National Exposure Report[23]. For exposures that were less than the LOD, NHANES used a fill-in value of LOD divided by the square root of two so as to differentiate them from missing data. Missing data was assumed to be missing completely at random. Following the methodology in the Report, if the percent of pregnant women with exposure levels less than the LOD was greater than 40%, the GM was not calculated.

Chemical Analyte Analyses: Cycle Analysis

We built a model to assess overall changes in detection rates through the four cycles of interest via regression analysis. We developed the following hypothesis: the difference of the mean detection rate of each chemical analyte in 2003-2004 compared to all others years was zero, given the covariates. Alternatively, there is at least one cycle that differed from 2003-2004 in

exposure rate for the given chemical analyte. Data were log-transformed to account for the fact that environmental chemical analyte data is typically distributed non-normally. Covariates for the model were selected to be consistent with those used in Woodruff's study[24]. The model for each chemical analyte used the same covariates except in the case of creatinine, which was only included when the chemical analyte was measured via a urinary specimen.

The following covariates were included in the model: cycle (2003-2004, 2005-2006, 2007-2008, 2009-2010), race/ethnicity (Mexican-American, Non-Hispanic White, Non-Hispanic Black, Other), education (high school diploma or less, more than a high school diploma), parity (number of pregnancies resulting in live births: nulliparous, one or more child), smoking status (never smoked, formerly smoked, current smoker), length of fasting (0-4.5 hrs, 4.5-8.5 hrs, 8.5-24 hrs), age in years (continuous), body mass index (continuous), serum albumin (continuous), and urine creatinine (continuous; only for urinary specimens).

Chemical Analyte Analyses: Cycle Effect

Satterthwaite's Adjusted F was chosen as the test statistic as it accommodates smaller sample sizes. This statistic adjusts the degrees of freedom (number of primary sampling units (PSUs) minus the number of strata), allowing for cells that were empty or had only one observation. Sudaan's Proc Regress was used to run the regression analysis while adjusting for the selected covariates. Adjusted least squares geometric means (LSGMs), GM estimates that are adjusted using covariates, and their confidence intervals (CIs) were also obtained for the model. Following Woodruff, p-values < 0.1 were considered evidence of relationship[24]. Other p-values were also reported.

Chemical Analyte Analyses: Contrasting Cycles to the 2003-2004 Cycle

To evaluate how chemical exposure detections changed over time compared to our reference cycle (2003-2004), we used an effects statement to obtain beta coefficients for each cycle with corresponding 90% CIs and Satterthwaite's adjusted F statistic, which was chosen for the same purposes. The same covariates were used and were the same for all analytes, except in the case of creatinine which was used only for urinary analytes. Analysis was not performed when a given chemical analyte did not have data collected for the reference cycle. Where data was not available for a cycle other than the reference cycle, it was not reported.

Detects by Pregnant Woman

We used frequency of chemical detects to understand the overall picture of chemical detects in an individual pregnant US woman. We examined this two ways. First, we studied detects of analytes within a given chemical group. Next, we looked at an individual pregnant woman's total number of detects across many chemical groups through subsample analysis.

Due to the nature of the data, there were specific requirements for inclusion in this section of analyses. First, the list of chemical analytes was narrowed to only those that had data available for all four cycles of interest. Next, pregnant women were only included if they had been measured for all chemical analytes in a given chemical group. Data in these analyses are not weighted and therefore are not representative of the US pregnant woman population as a whole.

Detects by Pregnant Woman: Analysis over Chemical Groups

Fisher's exact test was used to compare data from 2003-2004 to that in 2009-2010 to determine if the frequency distribution of chemical detects within a chemical class had shifted over time for these particular groups of pregnant women. Fisher's exact test was chosen as the test statistic because, unlike Wald's chi-square test, it does not hold the assumption that the expected value

for each cell must be at least five. The median number of detects per chemical group by cycle was examined.

Detects by Pregnant Woman: Analysis over Subsamples

The frequency data within the three subsamples (A, B, and C) were graphed in order to gain perspective on chemical detects in pregnant women over many different chemical groups. Despite the lack of available data for at least one cycle, the following chemical groups were included: urinary current use pesticides, cotinine, parabens, and PAHs.

RESULTS

Table 1 provides descriptive statistics of the demographics by cycle, weighted such that they reflect the US population of pregnant women. In general, the demographics across the four cycles of interest were similar. Most pregnant women never smoked, were in their late twenties, had some post-secondary education, and were married or living with their partner. Differences in race/ethnicity existed over the cycles, but this is likely explained by changes in the NHANES sampling methodologies that changed starting in the 2007-2008 cycle[31]. Prior to that cycle, NHANES intentionally over-sampled only the Mexican-American population; after, they over-sampled the entire Hispanic population.

The number of US pregnant women differed considerably between cycles. Sample sizes in 2007-2008 and 2009-2010 were roughly 5% of those in 2003-2004 and 2005-2006. Again, this is due to the NHANES sampling methodology changes that began in 2007[31]. Before 2007-2008, NHANES intentionally over-sampled pregnant women. This methodology was discontinued in 2007.

Table 1: Weighted Demographic Characteristics for US Pregnant Women by Cycle

Demographic	2003-2004 (n=268)	2005-2006 (n=366)	2007-2008 (n=57)	2009-2010 (n=68)
Age in Years (mean +/- SE)	27.29 +/- 0.82	26.81 +/- 0.24	28.18 +/- 0.82	29.72 +/- 0.72
Age Group (years (%))				
15-17	4%	2%	0%	0%
18-24	30%	34%	35%	26%
25-29	31%	32%	26%	22%
30-34	25%	19%	23%	23%
35-44	11%	12%	17%	28%
Race / Ethnicity (%)				
Non-Hispanic White	56%	58%	35%	47%
Non-Hispanic Black	18%	15%	17%	14%
Mexican American	18%	19%	22%	19%
Other Hispanic	2%	3%	11%	3%
Other Race, Incl Multi-Racial	6%	5%	15%	16%
Education (%)				
< High School Diploma	26%	22%	17%	25%
High School Diploma	15%	18%	25%	18%
> High School Diploma	59%	60%	58%	57%
Marital Status (%)				
Married or Cohabitating	79%	79%	79%	74%
Divorced, Separated, or Widowed	2%	2%	3%	4%
Never Married	19%	19%	18%	22%
Refused / Don't know	0%	0%	0%	1%
Parity (%)				
Zero	45%	36%	27%	18%
One	34%	33%	40%	51%
Two or More	22%	32%	33%	31%
Smoking Status (%)				
Never	59%	74%	79%	67%
Former	32%	19%	18%	15%
Current	9%	7%	3%	18%
Trimester (%)				
First	31%	25%	35%	20%
Second	32%	35%	32%	41%
Third	37%	40%	32%	39%
Other Measurements (mean +/- SE)				
Serum Albumin, g/dL	3.46 +/- 0.04	3.37 +/- 0.03	3.50 +/- 0.07	3.47 +/- 0.07
Urinary Creatinine, mg/dL	127.81 +/- 6.00	107.92 +/- 11.19	114.77 +/- 10.80	98.00 +/- 8.28
Duration of Fasting, hr	8.40 +/- 0.73	6.78 +/- 0.36	5.68 +/- 0.9	6.20 +/- 0.83

Chemical Analytes

Descriptive statistics for chemical analytes by cycle are shown in Table 2.

Table 2: Descriptive Statistics for Select Chemical Analytes by Cycle (Weighted)

Cycle	Sub-Sample	n	LOD	Percent > LOD	GM (GSE)	50th Percentile	95th Percentile	CV
Perfluorinated Compounds								
Perfluorobutane sulfonic acid (PFBuS)								
2003-2004	A	76	0.4	1	___*	< LOD	< LOD	___*
2005-2006	A	97	0.1	15	___*	< LOD	< LOD	___*
2007-2008	C	9	0.1	0	___*	< LOD	< LOD	___*
2009-2010	C	20	0.1	0	___*	< LOD	< LOD	___*
Perfluorodecanoic acid (PFDeA)								
2003-2004	A	76	0.3	8	___*	< LOD	0.3	___*
2005-2006	A	97	0.2	55	___*	< LOD	0.8	___*
2007-2008	C	9	0.2	36	___*	< LOD	0.3	___*
2009-2010	C	20	0.1	84	0.21 (0.03)	0.15	0.8	0.14
Perfluorododecanoic acid (PFDoA)								
2003-2004	A	76	1.0	0	___*	< LOD	< LOD	___*
2005-2006	A	97	0.2	1	___*	< LOD	< LOD	___*
2007-2008	C	9	0.2	0	___*	< LOD	< LOD	___*
2009-2010	C	20	0.1	4	___*	< LOD	< LOD	___*
Perfluoroheptanoic acid (PFHpA)								
2003-2004	A	76	0.3	11	___*	< LOD	0.4	___*
2005-2006	A	97	0.4	8	___*	< LOD	0.4	___*
2007-2008	C	9	0.4	0	___*	< LOD	< LOD	___*
2009-2010	C	20	0.1	3	___*	< LOD	< LOD	___*
Perfluorohexane sulfonic acid (PFHxS)								
2003-2004	A	76	0.3	90	1.14 (0.18)	1.13	5.0	0.16
2005-2006	A	97	0.1	84	0.76 (0.16)	1.03	3.8	0.22
2007-2008	C	9	0.1	76	0.57 (0.31)	0.82	1.9	0.55
2009-2010	C	20	0.1	100	0.70 (0.06)	0.65	1.7	0.09
Perfluorononanoic acid (PFNA)								
2003-2004	A	76	0.1	99	0.70 (0.03)	0.65	1.4	0.05
2005-2006	A	97	0.1	99	0.65 (0.07)	0.61	2.5	0.11
2007-2008	C	9	0.1	100	0.71 (0.07)	0.58	1.4	0.09
2009-2010	C	20	0.1	100	1.00 (0.09)	0.86	2.3	0.09
Perfluorooctanoic acid (PFOA)								
2003-2004	A	76	0.1	99	2.39 (0.23)	2.57	5.6	0.09
2005-2006	A	97	0.1	100	1.80 (0.27)	1.81	5.9	0.15
2007-2008	C	9	0.1	100	1.99 (0.15)	1.66	4.0	0.08
2009-2010	C	20	0.1	100	1.78 (0.33)	2.06	5.3	0.19
Perfluorooctane sulfonic acid (PFOS)								
2003-2004	A	76	0.4	99	12.29 (0.99)	11.96	21.6	0.08
2005-2006	A	97	0.2	100	7.64 (0.67)	6.90	19.1	0.09
2007-2008	C	9	0.2	100	5.00 (0.52)	5.69	12.8	0.10
2009-2010	C	20	0.2	100	5.35 (0.53)	5.64	13.0	0.10

Perfluorooctane sulfonamide (PFOSA)								
2003-2004	A	76	0.2	15	___*	< LOD	0.2	___*
2005-2006	A	97	0.1	14	___*	< LOD	0.2	___*
2007-2008	C	9	0.1	0	___*	< LOD	< LOD	___*
2009-2010	C	20	0.1	0	___*	< LOD	< LOD	___*
2-(N-Ethyl-perfluorooctane sulfonamido) acetic acid (Et-PFOSA-AcOH)								
2003-2004	A	76	0.4	0	___*	< LOD	< LOD	___*
2005-2006	A	97	0.2	4	___*	< LOD	< LOD	___*
2007-2008	C	9	0.2	0	___*	< LOD	< LOD	___*
2009-2010	C	20	0.1	0	___*	< LOD	< LOD	___*
2-(N-Methyl-perfluorooctane sulfonamido) acetic acid (Me-PFOSA-AcOH)								
2003-2004	A	76	0.6	16	___*	< LOD	1.0	___*
2005-2006	A	97	0.2	76	0.37 (0.05)	0.31	1.4	0.13
2007-2008	C	9	0.2	55	___*	0.30	0.7	___*
2009-2010	C	20	0.1	67	0.14 (0.01)	< LOD	0.4	0.11
Perfluoroundecanoic acid (PFUA)								
2003-2004	A	76	0.3	1	___*	< LOD	< LOD	___*
2005-2006	A	97	0.2	14	___*	< LOD	0.3	___*
2007-2008	C	9	0.2	0	___*	< LOD	< LOD	___*
2009-2010	C	20	0.1	55	___*	< LOD	0.7	___*
Phthalate Metabolites								
Mono-benzyl phthalate (MBzP)								
2003-2004	B	91	0.072	100	10.88 (2.73)	12.73	55.90	0.25
2005-2006	B	129	0.216	96	5.85 (1.08)	8.25	38.22	0.19
2007-2008	B	20	0.216	100	6.85 (1.46)	6.11	61.50	0.21
2009-2010	B	26	0.216	100	4.23 (0.83)	3.95	17.70	0.20
Mono-isobutyl phthalate (MiBP)								
2003-2004	B	91	0.3	99	3.47 (0.84)	4.34	17.83	0.24
2005-2006	B	129	0.3	88	3.41 (0.53)	3.17	26.18	0.15
2007-2008	B	20	0.3	100	8.68 (0.85)	7.14	39.03	0.10
2009-2010	B	26	0.2	100	5.82 (0.73)	5.10	23.35	0.13
Mono-n-butyl phthalate (MnBP)								
2003-2004	B	91	0.4	99	18.83 (4.11)	16.11	142.45	0.22
2005-2006	B	129	0.6	96	13.85 (2.29)	16.01	91.33	0.17
2007-2008	B	20	0.6	100	15.05 (2.08)	10.04	64.87	0.14
2009-2010	B	26	0.4	100	10.88 (1.81)	9.50	64.97	0.17
Mono-cyclohexyl phthalate (MCHP)								
2003-2004	B	91	0.402	8	___*	< LOD	0.62	___*
2005-2006	B	129	0.603	0	___*	< LOD	< LOD	___*
2007-2008	B	20	0.603	0	___*	< LOD	< LOD	___*
2009-2010	B	20	0.402	0	___*	< LOD	< LOD	___*
Mono-ethyl phthalate (MEP)								
2003-2004	B	91	0.264	100	149.51 (52.16)	174.57	1485.94	0.35
2005-2006	B	129	0.528	100	91.69 (16.10)	76.55	1998.00	0.18
2007-2008	B	20	0.462	100	67.61 (13.87)	55.80	512.25	0.21
2009-2010	B	26	0.462	100	51.61 (12.41)	33.21	1497.96	0.24
Mono-2-ethylhexyl phthalate (MEHP)								
2003-2004	B	91	0.9	89	3.34 (0.53)	3.20	38.53	0.16
2005-2006	B	129	1.2	63	3.24 (0.87)	2.12	161.00	0.27
2007-2008	B	20	1.1	82	5.86 (0.72)	3.27	55.84	0.12

2009-2010	B	26	0.5	61	0.97 (0.15)	0.84	4.46	0.16
Mono-(2-ethyl-5-hydroxyhexyl) phthalate (MEHHP)								
2003-2004	B	91	0.3	100	21.42 (3.34)	16.11	127.44	0.16
2005-2006	B	129	0.7	99	16.67 (4.42)	12.77	656.94	0.27
2007-2008	B	20	0.7	100	30.66 (4.28)	17.16	331.63	0.14
2009-2010	B	26	0.2	100	5.58 (0.96)	3.83	39.30	0.17
Mono-(2-ethyl-5-oxohexyl) phthalate (MEOHP)								
2003-2004	B	91	0.5	99	17.81 (2.79)	13.64	106.75	0.16
2005-2006	B	129	0.7	99	13.46 (3.26)	10.08	521.24	0.24
2007-2008	B	20	0.6	100	18.78 (2.65)	11.94	175.13	0.14
2009-2010	B	26	0.2	100	4.28 (0.80)	3.01	26.48	0.19
Mono-(2-ethyl-5-carboxypentyl) phthalate (MECPP)								
2003-2004	B	91	0.3	100	32.87 (4.36)	29.54	132.73	0.13
2005-2006	B	129	0.6	100	27.97 (6.20)	19.48	740.43	0.22
2007-2008	B	20	0.5	100	40.55 (7.75)	23.75	334.04	0.19
2009-2010	B	26	0.2	100	9.60 (1.60)	7.78	49.45	0.17
Mono-(carboxynonyl) phthalate (MCNP)								
2003-2004	--							
2005-2006	B	129	0.6	83	1.66 (0.27)	1.52	6.38	0.16
2007-2008	B	20	0.5	97	1.88 (0.18)	1.73	5.71	0.10
2009-2010	B	26	0.2	100	1.88 (0.14)	1.43	6.55	0.07
Mono-isononyl phthalate (MiNP)								
2003-2004	B	91	1.54	3	___*	< LOD	< LOD	___*
2005-2006	B	129	1.23	12	___*	< LOD	3.95	___*
2007-2008	B	20	1.23	3	___*	< LOD	< LOD	___*
2009-2010	B	26	0.77	25	___*	< LOD	4.76	___*
Mono-(carboxyoctyl) phthalate (MCOP)								
2003-2004	--							
2005-2006	B	129	0.7	92	3.12 (0.50)	2.63	22.88	0.16
2007-2008	B	20	0.7	94	5.38 (0.47)	5.82	18.32	0.09
2009-2010	B	26	0.2	100	7.53 (1.30)	5.96	27.69	0.17
Mono-methyl phthalate (MMP)								
2003-2004	B	91	1	46	___*	< LOD	14.64	___*
2005-2006	B	129	1.1	33	___*	< LOD	9.65	___*
2007-2008	B	20	1.1	31	___*	< LOD	8.37	___*
2009-2010	B	26	0.5	74	1.11 (0.19)	1.42	2.88	0.17
Mono-(3-carboxypropyl) phthalate (MCPP)								
2003-2004	B	91	0.2	99	2.16 (0.46)	2.18	11.13	0.21
2005-2006	B	129	0.2	88	1.33 (0.23)	1.56	6.23	0.17
2007-2008	B	20	0.2	97	1.70 (0.23)	1.28	11.50	0.14
2009-2010	B	26	0.2	96	1.40 (0.18)	1.30	3.54	0.13
Mono-n-octyl phthalate (MOP)								
2003-2004	B	91	1.68	1	___*	< LOD	< LOD	___*
2005-2006	B	129	1.85	0	___*	< LOD	< LOD	___*
2007-2008	B	20	1.85	0	___*	< LOD	< LOD	___*
2009-2010	B	26	0.84	0	___*	< LOD	< LOD	___*
Urinary Heavy Metals								
Barium								
2003-2004	A	84	0.31	96	2.22 (0.19)	2.26	8.46	0.09
2005-2006	A	98	0.12	99	2.04 (0.39)	2.11	8.33	0.19

2007-2008	A	27	0.12	100	2.18 (0.28)	2.73	6.11	0.13
2009-2010	A	22	0.12	100	2.34 (0.52)	2.23	9.48	0.22
Beryllium								
2003-2004	A	84	0.13	1	___*	< LOD	< LOD	___*
2005-2006	A	98	0.072	0	___*	< LOD	< LOD	___*
2007-2008	A	27	0.072	0	___*	< LOD	< LOD	___*
2009-2010	A	22	0.072	0	___*	< LOD	< LOD	___*
Cadmium (urinary)								
2003-2004	A	82	0.06	93	0.19 (0.02)	0.21	0.73	0.11
2005-2006	A	98	0.042	85	0.14 (0.03)	0.15	0.67	0.19
2007-2008	A	27	0.042	88	0.15 (0.02)	0.16	0.38	0.10
2009-2010	A	22	0.042	89	0.12 (0.004)	0.10	1.04	0.03
Cobalt								
2003-2004	A	84	0.08	99	0.54 (0.03)	0.47	1.84	0.07
2005-2006	A	98	0.041	94	0.63 (0.14)	0.70	3.25	0.23
2007-2008	A	27	0.066	100	0.47 (0.04)	0.47	1.34	0.09
2009-2010	A	22	0.041	100	0.50 (0.01)	0.49	1.06	0.02
Cesium								
2003-2004	A	84	0.2	100	4.91 (0.53)	5.76	15.66	0.11
2005-2006	A	98	0.066	100	4.62 (0.94)	4.90	13.98	0.20
2007-2008	A	27	0.041	100	5.15 (0.86)	6.97	10.13	0.17
2009-2010	A	22	0.066	100	3.90 (0.02)	3.64	9.90	0.01
Molybdenum								
2003-2004	A	84	1.5	100	45.03 (4.34)	56.93	104.47	0.10
2005-2006	A	98	0.92	100	48.99 (7.27)	53.24	149.69	0.15
2007-2008	A	27	0.92	100	65.20 (13.53)	72.53	290.29	0.21
2009-2010	A	22	0.92	100	37.09 (1.57)	33.99	96.62	0.04
Lead (urinary)								
2003-2004	A	84	0.33	83	0.63 (0.05)	0.58	1.80	0.08
2005-2006	A	98	0.1	92	0.46 (0.08)	0.50	1.57	0.18
2007-2008	A	27	0.1	100	0.46 (0.09)	0.48	1.26	0.19
2009-2010	A	22	0.1	100	0.48 (0.01)	0.46	1.14	0.03
Platinum								
2003-2004	A	84	0.07	0	___*	< LOD	< LOD	___*
2005-2006	A	98	0.009	4	___*	< LOD	< LOD	___*
2007-2008	A	27	0.009	2	___*	< LOD	< LOD	___*
2009-2010	A	22	0.009	0	___*	< LOD	< LOD	___*
Antimony								
2003-2004	A	84	0.07	57	___*	0.074	0.214	___*
2005-2006	A	98	0.032	75	0.06 (0.01)	0.071	0.264	0.19
2007-2008	A	27	0.032	85	0.07 (0.01)	0.066	0.249	0.15
2009-2010	A	22	0.032	58	___*	0.035	0.167	___*
Thallium								
2003-2004	A	84	0.02	100	0.16 (0.02)	0.192	0.369	0.11
2005-2006	A	98	0.015	100	0.16 (0.03)	0.177	0.460	0.12
2007-2008	A	27	0.015	97	0.17 (0.03)	0.191	0.399	0.17
2009-2010	A	22	0.015	100	0.12 (0.001)	0.111	0.328	0.01
Tungsten								
2003-2004	A	84	0.04	76	0.07 (0.01)	0.054	0.336	0.13
2005-2006	A	98	0.021	86	0.10 (0.02)	0.120	0.347	0.19

2007-2008	A	27	0.021	99	0.13 (0.02)	0.122	0.353	0.14
2009-2010	A	22	0.021	100	0.1 (0.0002)	0.084	0.315	0.002
Uranium								
2003-2004	A	84	0.005	67	0.01 (0.002)	0.006	0.017	0.12
2005-2006	A	98	0.002	85	0.01 (0.001)	0.005	0.033	0.23
2007-2008	A	27	0.002	97	0.01 (0.001)	0.007	0.017	0.16
2009-2010	A	22	0.0017	93	0.01 (0.001)	0.006	0.026	0.18
Mercury (urinary)								
2003-2004	A	82	0.14	88	0.55 (0.12)	0.33	7.22	0.22
2005-2006	A	98	0.11	90	0.58 (0.16)	0.55	7.75	0.28
2007-2008	A	27	0.08	95	0.52 (0.12)	0.43	2.41	0.23
2009-2010	A	22	0.08	90	0.38 (0.02)	0.40	2.31	0.06
Urinary Polycyclic Aromatic Hydrocarbons (PAHs)								
1-hydroxynaphthalene (ng/L) (1-Naphthol)								
2003-2004	B	92	46.7	100	1089.84 (180.19)	1019.04	4931.08	0.17
2005-2006	B	119	47.9	100	1533.45 (423.61)	1091.42	48065.17	0.28
2007-2008	B	20	44.7	100	814.96 (234.95)	536.12	5785.25	0.29
2009-2010	--							
2-hydroxynaphthalene (ng/L) (2-Naphthol)								
2003-2004	B	91	31.1	100	2488.67 (590.48)	2385.91	14578.55	0.24
2005-2006	B	123	13.2	100	2763.24 (520.69)	2586.50	28859.04	0.19
2007-2008	B	20	42.0	100	2580.60 (452.25)	1978.85	12428.94	0.18
2009-2010	--							
3-hydroxyfluorene (ng/L)								
2003-2004	B	88	5.0	100	51.30 (10.05)	49.66	310.48	0.20
2005-2006	B	119	5.0	99	37.71 (3.26)	34.39	255.24	0.09
2007-2008	B	19	5.0	100	45.03 (6.07)	33.09	261.16	0.13
2009-2010	--							
2-hydroxyfluorene (ng/L)								
2003-2004	B	89	5.0	100	175.19 (32.00)	193.69	881.94	0.18
2005-2006	B	122	5.0	100	147.60 (15.22)	139.04	1017.04	0.10
2007-2008	B	20	5.0	100	170.96 (21.96)	141.44	837.74	0.13
2009-2010	--							
3-hydroxyphenanthrene (ng/L)								
2003-2004	B	84	5.0	100	63.69 (8.97)	57.63	235.71	0.14
2005-2006	B	123	5.0	99	49.13 (5.65)	44.81	223.60	0.11
2007-2008	B	20	5.0	100	49.08 (2.50)	46.21	120.97	0.05
2009-2010	--							
1-hydroxyphenanthrene (ng/L)								
2003-2004	B	89	5.0	100	136.70 (19.47)	108.21	392.06	0.14
2005-2006	B	123	5.0	100	137.60 (16.98)	130.09	714.61	0.12
2007-2008	B	20	5.0	100	112.10 (11.82)	105.47	456.58	0.11
2009-2010	--							
2-hydroxyphenanthrene (ng/L)								
2003-2004	B	87	5.0	100	55.52 (7.15)	49.95	207.15	0.13
2005-2006	B	121	5.0	99	51.66 (7.54)	50.49	201.53	0.15
2007-2008	B	20	5.0	100	50.61 (4.79)	49.13	124.13	0.09
2009-2010	--							
1-hydroxypyrene (ng/L)								
2003-2004	B	86	5.0	100	78.17 (17.93)	72.78	506.60	0.23

2005-2006	B	120	5.0	99	79.45 (12.44)	80.25	369.71	0.16
2007-2008	B	20	5.0	100	121.30 (18.08)	102.66	339.76	0.15
2009-2010	--							
9-hydroxyfluorene (ng/L)								
2003-2004	B	85	5.0	100	207.64 (41.91)	176.10	841.14	0.20
2005-2006	B	121	5.0	100	244.46 (30.03)	253.76	1378.39	0.12
2007-2008	B	20	5.0	100	243.58 (29.99)	237.02	1030.91	0.12
2009-2010	--							
4-hydroxyphenanthrene (ng/L)								
2003-2004	B	86	5.0	96	23.43 (3.60)	26.36	132.18	0.15
2005-2006	B	103	5.0	94	26.05 (3.94)	31.70	93.57	0.15
2007-2008	--							
2009-2010	--							

KEY: ___* GM, GSE, CV could not be calculated as detection rate is <60%
-- Data was unavailable from NHANES
< LOD Percentile is less than the limit of detection

Chemical Analytes: Cycle Effect

Results from the ANOVA analysis are provided in Table 3. There was a cycle effect for a large number of chemical analytes. In fact, 31 chemical analytes of 92 tested, or 34%, showed some indication that chemical exposure rates changed over time. Thus, for approximately one-third of the chemicals analyzed, at least one of the cycles differed.

Almost all chemical groups had some chemicals that showed an effect of cycle, but no chemical group had all chemical analytes with cycle effect. An effect of cycle was seen in 75% of the perflourinated compounds analyzed. Of the total phthalate metabolites measured, 62% had a cycle effect. And, nearly half (46%) of the urinary heavy metals showed a cycle effect. Generally, cycle did not have an effect for many analytes in the polycyclic aromatic hydrocarbons (PAHs) chemical group. Some chemical groups, such as phytoestrogens, showed no cycle effect for any of the chemical analytes measured. Urinary current use pesticides were not included in the analysis as the amounts detected were all below the LOD.

Table 3: ANOVA Results for Select Analytes, Weighted and Adjusted for Covariates

Chemical	DF	Satterthwaite Adjusted DF	Satterthwaite Adjusted F	p-Value	Sig
Perfluorinated Compounds					
Perfluorobutane sulfonic acid (PFBuS)	3	1.51	780.93	0.0000	***
Perfluorodecanoic acid (PFDeA)	3	1.89	2.66	0.0880	*
Perfluorododecanoic acid (PFDoA)	3	1.20	931.49	0.0000	***
Perfluoroheptanoic acid (PFHpA)	3	1.64	72.33	0.0000	***
Perfluorohexane sulfonic acid (PFHxS)	3	2.70	1.37	0.2687	
Perfluorononanoic acid (PFNA)	3	2.85	4.46	0.0107	**
Perfluorooctanoic acid (PFOA)	3	2.59	0.53	0.6382	
Perfluorooctane sulfonic acid (PFOS)	3	2.63	3.60	0.0279	**
Perfluorooctane sulfonamide (PFOSA)	3	2.37	12.16	0.0001	***
2-(N-Ethyl-perfluorooctane sulfonamido) acetic acid (Et-PFOSA-AcOH)	3	1.86	1308.27	0.0000	***
2-(N-Methyl-perfluorooctane sulfonamido) acetic acid (Me-PFOSA-AcOH)	3	2.85	10.19	0.0001	***
Perfluoroundecanoic acid (PFUA)	3	1.59	2.09	0.1476	
Phthalate Metabolites					
Mono-benzyl phthalate (MBzP)	3	2.99	4.70	0.0067	***
Mono-isobutyl phthalate (MiBP)	3	2.28	6.97	0.0017	***
Mono-n-butyl phthalate (MnBP)	3	1.84	2.32	0.1156	
Mono-cyclohexyl phthalate (MCHP)	3	1.17	16.56	0.0001	***
Mono-ethyl phthalate (MEP)	3	2.73	1.30	0.2879	
Mono-2-ethylhexyl phthalate (MEHP)	3	2.44	3.55	0.0302	**
Mono-(2-ethyl-5-hydroxyhexyl) phthalate (MEHHP)	3	2.42	3.30	0.0388	**
Mono-(2-ethyl-5-oxohexyl) phthalate (MEOHP)	3	2.38	3.66	0.0280	**
Mono-(2-ethyl-5-carboxypentyl) phthalate (MECPP)	3	2.44	3.20	0.0425	**
Mono-isononyl phthalate (MiNP)	3	2.48	0.98	0.3996	
Mono-methyl phthalate (MMP)	3	2.73	0.38	0.7466	
Mono-(3-carboxypropyl) phthalate (MCPP)	3	2.49	1.87	0.1583	
Mono-n-octyl phthalate (MOP)	3	1.10	3347.47	0.0000	***
Urinary Heavy Metals					
Barium	3	2.67	1.78	0.1735	
Beryllium	3	1.21	10737.43	0.0000	***
Cadmium (urinary)	3	2.81	1.02	0.3915	
Cobalt	3	2.75	1.12	0.3511	
Cesium	3	2.62	2.13	0.1208	
Molybdenum	3	2.07	5.33	0.0088	***
Lead (urine)	3	2.82	4.50	0.0100	**
Platinum	3	1.70	2336.41	0.0000	***
Antimony	3	2.61	3.00	0.0497	**
Thallium	3	2.17	0.85	0.4460	
Tungsten	3	2.50	8.75	0.0004	***
Uranium	3	2.31	1.10	0.3515	
Mercury (urine)	3	2.57	0.27	0.8207	
Environmental Pesticides: Fungicides, Herbicides, Organochlorine and Metabolites					
O-Phenyl phenol (urinary)	3	2.78	5.24	0.0047	***
2,4-Dichlorophenol (urinary)	3	2.88	0.75	0.5264	

2,4,5-Trichlorophenol	3	2.98	0.38	0.7697
2,4,6-Trichlorophenol	3	1.87	1.39	0.2598
2,5-Dichlorophenol	3	2.94	1.55	0.2179
Phytoestrogens and Metabolites				
Urinary Daidzein	3	2.79	0.26	0.8367
Urinary Enterodiol	3	2.57	0.68	0.5502
Urinary Enterolactone	3	2.48	1.71	0.1902
Urinary Equol	3	2.79	0.84	0.4742
Urinary Genistein	3	2.57	1.81	0.1703
Urinary O-Desmethylangolensin	3	2.80	0.01	0.9986
Key: * P < 0.1; ** p < 0.05; *** p < 0.01				

Chemical Analyte Analyses: Contrasting Cycles to the 2003-2004 Cycle

Table 4 summarizes the analysis results of contrasting each cycle compared to the reference cycle (2003-2004) while taking into account the covariates. Half (50%) of the perflourinated compound analytes showed a cycle effect for every cycle tested when compared to the reference year. All of these were decreases in chemical exposure rates. While only 8% of the phthalate analytes analyzed showed a difference in exposure rates for all cycles when compared to 2003-2004 data, more than half (62%) showed a difference in exposures in 2009-2010 when compared to 2003-2004. Of these, all but one had declines in detections. Urinary heavy metal and PAH analytes showed some year to year changes but none were consistent in direction. Table 4 does not include current use pesticides, Beryllium, and Trimethylarsine oxide as these data were almost exclusively a placeholder value (LOD/sqrt(2)) as the detected value was below the LOD.

Table 4: Chemical Concentrations by Analyte ANOVA: Cycles Compared to Reference Cycle (2003-2004) in US Pregnant Women, Weighted and Adjusted for Covariates

Cycle	2003 vs Cycle B-Coefficient (90% CI)	Adjusted LSGM	Adjusted 90% CI
Perfluorinated Compounds, [serum (ng/mL)]			
Perfluorobutane sulfonic acid (PFBuS)			
2003-2004	--	0.30	(0.30 - 0.31)
2005-2006	-1.39 (-1.45 to -1.34)***	0.08	(0.07 - 0.08)
2007-2008	-1.45 (-1.49 to -1.41)***	0.07	(0.069 - 0.074)
2009-2010	-1.50 (-1.57 to -1.43)***	0.07	(0.06 - 0.07)
Perfluorodecanoic acid (PFDeA)			
2003-2004	--	0.19	(0.17 - 0.20)
2005-2006	0.30 (0.13 to 0.47)***	0.25	(0.22 - 0.30)
2007-2008	-0.02 (-0.17 to 0.13)	0.18	(0.16 - 0.21)
2009-2010	0.28 (-0.07 to 0.62)	0.25	(0.18 - 0.35)
Perfluorododecanoic acid (PFDoA)			
2003-2004	--	0.70	(0.68 - 0.70)
2005-2006	-1.59 (-1.62 to -1.56)***	0.14	(0.14 - 0.15)
2007-2008	-1.60 (-1.63 to -1.58)***	0.14	(0.137 - 0.144)
2009-2010	-2.21 (-2.35 to -2.07)***	0.08	(0.07 - 0.09)
Perfluoroheptanoic acid (PFHpA)			
2003-2004	--	0.22	(0.20 - 0.25)
2005-2006	0.36 (0.18 to 0.55)***	0.32	(0.28 - 0.36)
2007-2008	0.25 (0.10 to 0.40)***	0.28	(0.26 - 0.31)
2009-2010	-1.12 (-1.33 to -0.90)***	0.07	(0.06 - 0.08)
Perfluorohexane sulfonic acid (PFHxS)			
2003-2004	--	1.14	(0.84 - 1.54)
2005-2006	-0.44 (-0.89 to 0.01)	0.73	(0.52 - 1.03)
2007-2008	-0.20 (-0.72 to 0.31)	0.92	(0.58 - 1.48)
2009-2010	-0.13 (-0.66 to 0.40)	1.00	(0.68 - 1.46)
Perfluorononanoic acid (PFNA)			
2003-2004	--	0.64	(0.59 - 0.70)
2005-2006	0.05 (-0.12 to 0.23)	0.67	(0.58 - 0.77)
2007-2008	0.23 (-0.00 to 0.47)	0.81	(0.64 - 1.01)
2009-2010	0.54 (0.28 to 0.79)***	1.09	(0.88 - 1.36)
Perfluorooctanoic acid (PFOA)			
2003-2004	--	2.03	(1.75 - 2.39)
2005-2006	-0.07 (-0.26 to 0.13)	1.90	(1.63 - 2.23)
2007-2008	0.14 (-0.33 to 0.61)	2.36	(1.51 - 3.67)
2009-2010	0.16 (-0.24 to 0.56)	2.39	(1.72 - 3.35)
Perfluorooctane sulfonic acid (PFOS)			
2003-2004	--	11.02	(9.49 - 12.81)
2005-2006	-0.34 (-0.56 to -0.13)**	7.77	(6.75 - 9.03)
2007-2008	-0.61 (-1.00 to -0.22)**	5.99	(4.06 - 8.85)
2009-2010	-0.53 (-0.88 to -0.18)**	6.42	(4.81 - 8.67)
Perfluorooctane sulfonamide (PFOSA)			
2003-2004	--	0.11	(0.10 - 0.12)
2005-2006	-0.33 (-0.45 to -0.20)***	0.08	(0.07 - 0.09)
2007-2008	-0.43 (-0.56 to -0.29)***	0.07	(0.07 - 0.08)
2009-2010	-0.47 (-0.63 to -0.32)***	0.07	(0.06 - 0.08)

2-(N-Ethyl-perfluorooctane sulfonamido) acetic acid (Et-PFOSA-AcOH)			
2003-2004	--	0.30	(0.295 - 0.304)
2005-2006	-0.72 (-0.74 to -0.70)***	0.15	(0.142 - 0.148)
2007-2008	-0.76 (-0.78 to -0.73)***	0.14	(0.137 - 0.144)
2009-2010	-1.47 (-1.52 to -1.42)***	0.07	(0.066 - 0.071)
2-(N-Methyl-perfluorooctane sulfonamido) acetic acid (Me-PFOSA-AcOH)			
2003-2004	--	0.41	(0.38 - 0.46)
2005-2006	-0.14 (-0.35 to 0.07)	0.36	(0.31 - 0.42)
2007-2008	0.07 (-0.26 to 0.41)	0.44	(0.32 - 0.62)
2009-2010	-1.13 (-1.50 to -0.75)***	0.13	(0.10 - 0.19)
Perfluoroundecanoic acid (PFUA)			
2003-2004	--	0.19	(0.18 - 0.20)
2005-2006	-0.13 (-0.24 to -0.02)**	0.16	(0.15 - 0.18)
2007-2008	-0.27 (-0.36 to -0.17)***	0.14	(0.13 - 0.15)
2009-2010	0.02 (-0.29 to 0.33)	0.19	(0.14 - 0.26)
Phthalate Metabolites, [urine (ng/mL)]			
Mono-benzyl phthalate (MBzP)			
2003-2004	--	10.59	(8.25 - 13.74)
2005-2006	-0.48 (-0.84 to -0.12)**	6.55	(5.10 - 8.50)
2007-2008	-0.31 (-0.79 to 0.17)	7.77	(5.37 - 11.36)
2009-2010	-0.90 (-1.30 to -0.49)***	4.35	(3.22 - 5.87)
Mono-isobutyl phthalate (MiBP)			
2003-2004	--	3.49	(2.86 - 4.22)
2005-2006	0.02 (-0.36 to 0.39)	3.53	(2.59 - 4.81)
2007-2008	0.95 (0.58 to 1.32)***	8.94	(6.62 - 12.18)
2009-2010	0.50 (0.24 to 0.76)**	5.70	(4.85 - 6.75)
Mono-n-butyl phthalate (MnBP)			
2003-2004	--	19.69	(17.46 - 22.42)
2005-2006	-0.39 (-0.79 to -0.00)*	13.33	(9.39 - 18.92)
2007-2008	-0.21 (-0.51 to 0.08)	15.96	(12.43 - 20.29)
2009-2010	-0.42 (-0.64 to -0.21)***	12.94	(10.91 - 15.18)
Mono-cyclohexyl phthalate (MCHP)			
2003-2004	--	0.33	(0.29 - 0.37)
2005-2006	0.25 (0.11 to 0.40)***	0.42	(0.41 - 0.43)
2007-2008	0.28 (0.17 to 0.38)***	0.43	(0.41 - 0.44)
2009-2010	-0.16 (-0.31 to 0.00)	0.28	(0.26 - 0.29)
Mono-ethyl phthalate (MEP)			
2003-2004	--	134.29	(93.69 - 192.48)
2005-2006	-0.35 (-0.87 to 0.17)	94.63	(68.03 - 131.63)
2007-2008	-0.51 (-1.05 to 0.03)	80.64	(51.94 - 125.21)
2009-2010	-0.59 (-1.17 to 0.00)	74.44	(47.47 - 117.92)
Mono-2-ethylhexyl phthalate (MEHP)			
2003-2004	--	3.97	(2.86 - 5.47)
2005-2006	-0.07 (-0.59 to 0.44)	3.67	(2.34 - 5.81)
2007-2008	-0.21 (-0.80 to 0.39)	3.22	(1.92 - 5.42)
2009-2010	-1.06 (-1.56 to -0.56)***	1.38	(0.94 - 2.01)
Mono-(2-ethyl-5-hydroxyhexyl) phthalate (MEHHP)			
2003-2004	--	23.57	(17.46 - 31.82)
2005-2006	-0.31 (-0.83 to 0.22)	17.29	(11.02 - 27.39)
2007-2008	-0.13 (-0.77 to 0.51)	20.70	(11.59 - 36.60)

2009-2010	-1.06 (-1.50 to -0.61)***	8.17	(5.81 - 11.47)
Mono-(2-ethyl-5-oxohexyl) phthalate (MEOHP)			
2003-2004	--	19.11	(14.44 - 25.53)
2005-2006	-0.33 (-0.82 to 0.16)	13.87	(9.03 - 21.12)
2007-2008	-0.38 (-0.99 to 0.23)	13.07	(7.54 - 22.65)
2009-2010	-1.08 (-1.49 to -0.68)***	6.49	(4.76 - 8.85)
Mono-(2-ethyl-5-carboxypentyl) phthalate (MECPP)			
2003-2004	--	34.47	(26.58 - 44.70)
2005-2006	-0.16 (-0.59 to 0.27)	29.37	(20.29 - 42.52)
2007-2008	-0.17 (-0.76 to 0.42)	29.08	(16.61 - 50.91)
2009-2010	-0.91 (-1.30 to -0.51)***	13.87	(10.38 - 18.73)
Mono-isononyl phthalate (MiNP)			
2003-2004	--	1.07 ^	(0.99 - 1.16)
2005-2006	-0.02 (-0.18 to 0.14)	1.06 ^	(0.92 - 1.21)
2007-2008	-0.18 (-0.34 to -0.01)*	0.9 ^	(0.79 - 1.03)
2009-2010	-0.11 (-0.25 to 0.03)	0.96	(0.84 - 1.11)
Mono-methyl phthalate (MMP)			
2003-2004	--	1.49	(1.25 - 1.77)
2005-2006	-0.06 (-0.39 to 0.27)	1.40	(1.07 - 1.82)
2007-2008	-0.04 (-0.48 to 0.40)	1.42	(0.94 - 2.16)
2009-2010	-0.27 (-0.68 to 0.15)	1.14	(0.79 - 1.65)
Mono-(3-carboxypropyl) phthalate (MCPP)			
2003-2004	--	2.25	(1.80 - 2.77)
2005-2006	-0.46 (-0.88 to -0.05)*	1.40	(1.01 - 1.97)
2007-2008	-0.19 (-0.55 to 0.17)	1.86	(1.38 - 2.51)
2009-2010	-0.47 (-0.90 to -0.04)*	1.40	(0.96 - 2.05)
Mono-n-octyl phthalate (MOP)			
2003-2004	--	1.20	(1.19 - 1.22)
2005-2006	0.08 (0.07 to 0.10)***	1.31	(1.30 - 1.31)
2007-2008	0.09 (0.08 to 0.10)***	1.31	(1.31 - 1.32)
2009-2010	-0.71 (-0.74 to -0.69)***	0.59	(0.58 - 0.59)
Heavy Metals, [urine (ng/mL)]			
Barium			
2003-2004	--	2.20	(1.80 - 2.72)
2005-2006	-0.19 (-0.52 to 0.13)	1.82	(1.39 - 2.39)
2007-2008	0.05 (-0.33 to 0.43)	2.32	(1.75 - 3.06)
2009-2010	0.39 (-0.07 to 0.84)	3.25	(2.20 - 4.81)
Cadmium (urinary)			
2003-2004	--	0.19	(0.16 - 0.22)
2005-2006	-0.11 (-0.33 to 0.10)	0.17	(0.15 - 0.19)
2007-2008	-0.17 (-0.43 to 0.10)	0.16	(0.13 - 0.19)
2009-2010	-0.30 (-0.61 to 0.01)	0.14	(0.11 - 0.18)
Cobalt			
2003-2004	--	0.57	(0.46 - 0.69)
2005-2006	0.00 (-0.26 to 0.27)	0.57	(0.46 - 0.70)
2007-2008	-0.12 (-0.43 to 0.19)	0.50	(0.42 - 0.59)
2009-2010	0.28 (-0.11 to 0.68)	0.75	(0.55 - 1.02)
Cesium			
2003-2004	--	4.53	(4.10 - 5.00)
2005-2006	0.03 (-0.11 to 0.17)	4.66	(4.10 - 5.31)

2007-2008	0.30 (0.10 to 0.49)**	6.11	(5.21 - 7.17)
2009-2010	0.15 (-0.10 to 0.39)	5.26	(4.26 - 6.49)
Molybdenum			
2003-2004	--	46.99	(40.85 - 54.05)
2005-2006	0.06 (-0.11 to 0.23)	49.90	(44.26 - 55.70)
2007-2008	0.60 (0.29 to 0.90)***	85.63	(62.80 - 115.58)
2009-2010	-0.00 (-0.26 to 0.25)	46.99	(39.25 - 55.70)
Lead (urine)			
2003-2004	--	0.62	(0.55 - 0.70)
2005-2006	-0.32 (-0.47 to -0.16)***	0.45	(0.41 - 0.50)
2007-2008	-0.25 (-0.45 to -0.05)**	0.48	(0.41 - 0.56)
2009-2010	0.02 (-0.21 to 0.26)	0.63	(0.52 - 0.78)
Platinum			
2003-2004	--	0.050	(0.049 - 0.051)
2005-2006	-2.09 (-2.13 to -2.06)***	0.0062	(0.0060 - 0.0063)
2007-2008	-2.08 (-2.14 to -2.01)***	0.0063	(0.006 - 0.007)
2009-2010	-2.13 (-2.16 to -2.10)***	0.0060	(0.0059 - 0.0061)
Antimony			
2003-2004	--	0.08	(0.07 - 0.08)
2005-2006	-0.24 (-0.38 to -0.11)***	0.06	(0.05 - 0.07)
2007-2008	-0.13 (-0.34 to 0.09)	0.07	(0.06 - 0.08)
2009-2010	-0.26 (-0.43 to -0.10)**	0.06	(0.05 - 0.07)
Thallium			
2003-2004	--	0.16	(0.14 - 0.19)
2005-2006	-0.01 (-0.17 to 0.16)	0.16	(0.14 - 0.19)
2007-2008	0.15 (-0.14 to 0.44)	0.19	(0.15 - 0.24)
2009-2010	-0.14 (-0.42 to 0.14)	0.14	(0.11 - 0.18)
Tungsten			
2003-2004	--	0.06	(0.05 - 0.08)
2005-2006	0.50 (0.13 to 0.86)**	0.10	(0.08 - 0.12)
2007-2008	1.05 (0.70 to 1.40)***	0.17	(0.13 - 0.21)
2009-2010	0.71 (0.36 to 1.06)***	0.12	(0.10 - 0.15)
Uranium			
2003-2004	--	0.007	(0.006 - 0.008)
2005-2006	-0.25 (-0.57 to 0.06)	0.005	(0.004 - 0.008)
2007-2008	0.10 (-0.35 to 0.54)	0.008	(0.005 - 0.011)
2009-2010	0.19 (-0.24 to 0.63)	0.008	(0.006 - 0.012)
Mercury (urine)			
2003-2004	--	0.53	(0.33 - 0.84)
2005-2006	0.19 (-0.34 to 0.73)	0.64	(0.51 - 0.80)
2007-2008	0.06 (-0.60 to 0.71)	0.56	(0.38 - 0.81)
2009-2010	0.24 (-0.38 to 0.86)	0.67	(0.44 - 1.00)
Polycyclic Aromatic Hydrocarbons (PAHs), [urine (ng/L)]			
1-hydroxynaphthalene (1-Naphthol)			
2003-2004	--	1064.22	(862.64 - 1299.84)
2005-2006	0.50 (-0.19 to 1.19)	1737.15	(953.37 - 3165.29)
2007-2008	-0.23 (-0.78 to 0.32)	845.56	(533.79 - 1326.10)
2-hydroxynaphthalene (2-Naphthol)			
2003-2004	--	2489.91	(2038.56 - 3041.18)
2005-2006	0.17 (-0.15 to 0.48)	2921.93	(2275.60 - 3789.54)

2007-2008	-0.02 (-0.39 to 0.35)	2440.60	(1863.11 - 3197.10)
3-hydroxyfluorene			
2003-2004	--	43.82	(36.60 - 51.94)
2005-2006	-0.08 (-0.35 to 0.19)	40.45	(32.46 - 49.90)
2007-2008	-0.01 (-0.37 to 0.36)	43.38	(32.14 - 58.56)
2-hydroxyfluorene			
2003-2004	--	154.47	(132.95 - 179.47)
2005-2006	-0.02 (-0.25 to 0.22)	152.93	(126.47 - 183.09)
2007-2008	0.18 (-0.12 to 0.49)	186.79	(148.41 - 232.76)
3-hydroxyphenanthrene			
2003-2004	--	63.43	(54.60 - 73.70)
2005-2006	-0.30 (-0.56 to -0.04)*	46.99	(37.71 - 58.56)
2007-2008	-0.23 (-0.47 to -0.00)*	50.40	(42.95 - 58.56)
1-hydroxyphenanthrene			
2003-2004	--	131.63	(116.75 - 149.91)
2005-2006	-0.02 (-0.26 to 0.22)	129.02	(105.64 - 157.59)
2007-2008	-0.02 (-0.27 to 0.23)	129.02	(107.77 - 156.02)
2-hydroxyphenanthrene			
2003-2004	--	54.60	(48.42 - 61.56)
2005-2006	-0.07 (-0.28 to 0.15)	50.91	(42.52 - 60.95)
2007-2008	-0.01 (-0.24 to 0.22)	54.05	(46.06 - 63.43)
1-hydroxypyrene			
2003-2004	--	78.26	(63.43 - 97.51)
2005-2006	-0.04 (-0.36 to 0.28)	75.19	(59.74 - 94.63)
2007-2008	0.46 (0.07 to 0.85)*	123.97	(92.76 - 165.67)
9-hydroxyfluorene			
2003-2004	--	257.24	(214.86 - 311.06)
2005-2006	-0.16 (-0.41 to 0.10)	221.41	(184.93 - 265.07)
2007-2008	-0.11 (-0.39 to 0.16)	230.44	(196.37 - 270.43)

Key: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$
Information on Remaining Chemical Groups can be found in the Appendix.

Detects by Pregnant Woman: Analysis over Chemical Groups

The median number of chemical analytes detected within a given chemical group and the total number of analytes measured within each chemical group is displayed in Table 5. Both perflourinated compound and phthalate analytes showed an increase in the median number of chemicals detected over the four cycles. While the median number of detects went down in the environmental pesticide chemical group, urinary heavy metals and total and speciated arsenics chemical groups showed no consistent direction in the median number of detects over time. The majority of the chemical groups (blood heavy metals, PAHs, phytoestrogens, phenols, parabens,

cotinine, and urinary current use pesticides) had no change in median number of detects over the four cycles of interest.

Table 5: Median Number of Analytes per Group Detected in Pregnant Women by Cycle

Chemical Group (Total Number Measured)	2003-2004	2005-2006	2007-2008	2009-2010
Phthalates (13)	9	9	9	10
Urinary Heavy Metals (13)	9	11	11	10
Blood Heavy Metals (4)	3	3	3	3
Perflourinated Compounds (12)	4	5	5	6
PAHs (9)	9	9	9	n/a
Phytoestrogens (6)	6	6	6	6
Arsenics (8)	3	3	4	3
Phenols (3)	3	3	3	3
Environmental Pesticides (5)	3	2	2	2
Parabens (4)	n/a	3	3	3
Cotinine (1)	1	1	1	1
Current Use Pesticides (17)	1	1	1	n/a

Note: Total measured = 95 analytes

Figures 1-4 show the distribution of the number of chemical analytes detected in the pregnant women for a given chemical group. So that we may see how things have changed, these figures display the reference cycle (2003-2004) compared to the most recent cycle in the dataset (2009-2010). Table 6 lists the results of the Fisher Exact Test for each chemical group.

A large distributional shift in chemical detects for perflourinated compounds between 2003-2004 and 2009-2010 can be seen in Figure 1. The difference in the distribution of detects was significant at $p<0.01$ (see Table 6). While the median detects were 4, 5, 5, and 6 detects for the cycles starting in 2003-2004 and ending in 2009-2010 (see Table 5), there were clear differences in detects between the two cycles. Some pregnant women tested in 2003-2004 had not a single perflourinated compound analyte detected, while pregnant women tested in 2009-2010 had no less than 4 detected of the 12 total measured.

Urinary heavy metal detects are shown in Figure 2. While the median number of detects within this chemical class was 9, 11, 11, and 10 for 2003-2004, 2005-2006, 2007-2008, and 2009-2010 respectively (see Table 5), Figure 2 reveals that pregnant women in 2009-2010 had many more heavy metals detected in their urine compared to pregnant women measured in 2003-2004. The change in distribution of detects in this chemical group was significant at $p<0.05$ (Table 6). While no women in either cycle had all heavy metals measured detected in her urine, pregnant women in the 2009-2010 cycle had no less than 10 detected of the 13 tested.

The distribution of phthalate analytes detected in pregnant women in 2003-2004 and 2009-2010 is displayed in Figure 3. The change in distribution of the number detects between the two cycles is significant at $p<0.1$, as seen in Table 6. The median number of detects was 9 in 2003-2004, 2005-2006, and 2007-2008, but increased to 10 in 2009-2010 (see Table 5).

Figure 4 shows a similar shift in distribution of chemical detects but for the phytoestrogen chemical group. While pregnant women in 2003-2004 had between 3 and 6 of the six phytoestrogens detected, nearly all (93.6%) of the pregnant women had all six phytoestrogens

detected in the 2009-2010 cycle. Nonetheless, the distributional shift was not significant, as seen in Table 6.

Figures 1-4: Distribution of the Number of Analytes Detected in US Pregnant Women in 2003-2004 and 2009-2010.

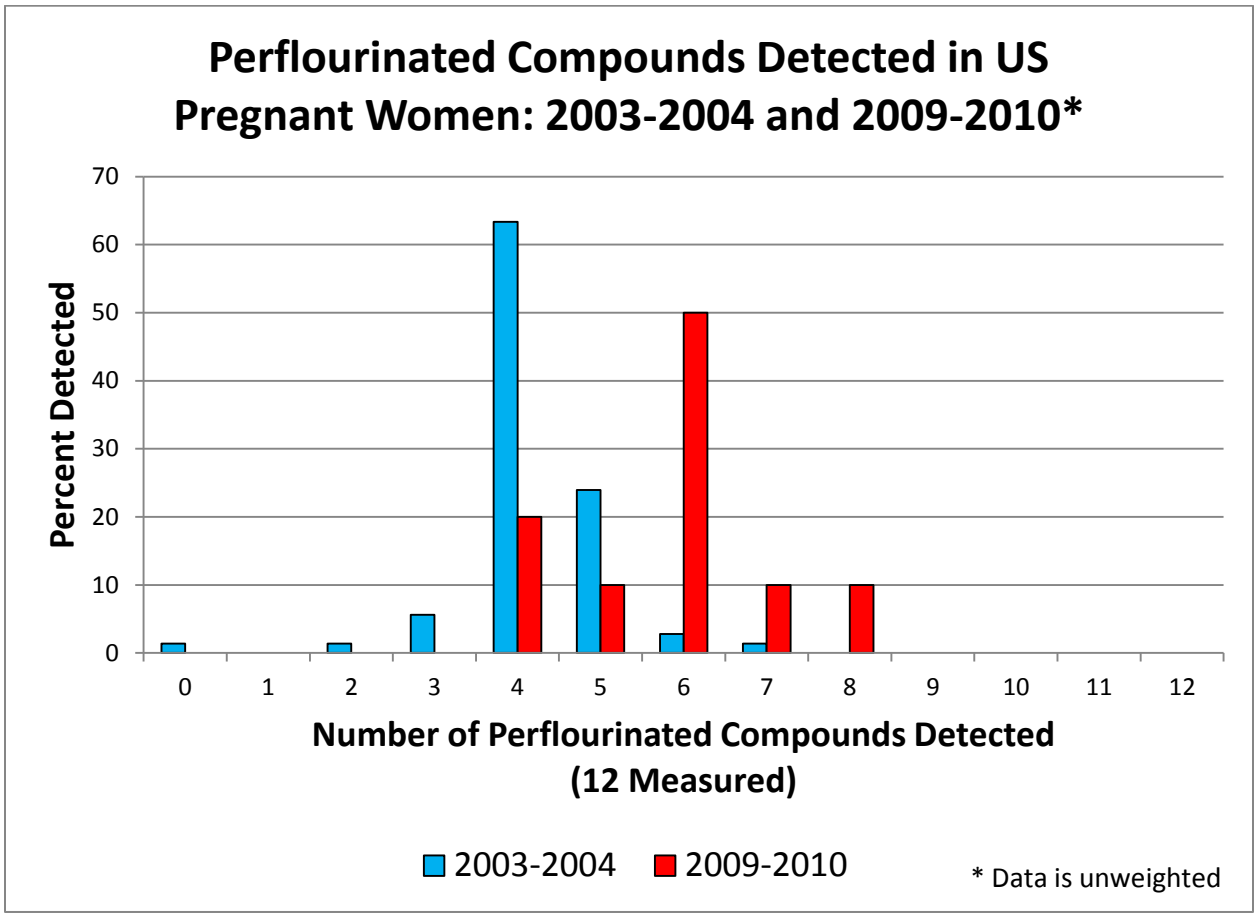

Figure 1: Perflourinated Compounds (2003-2004 vs. 2009-2010)

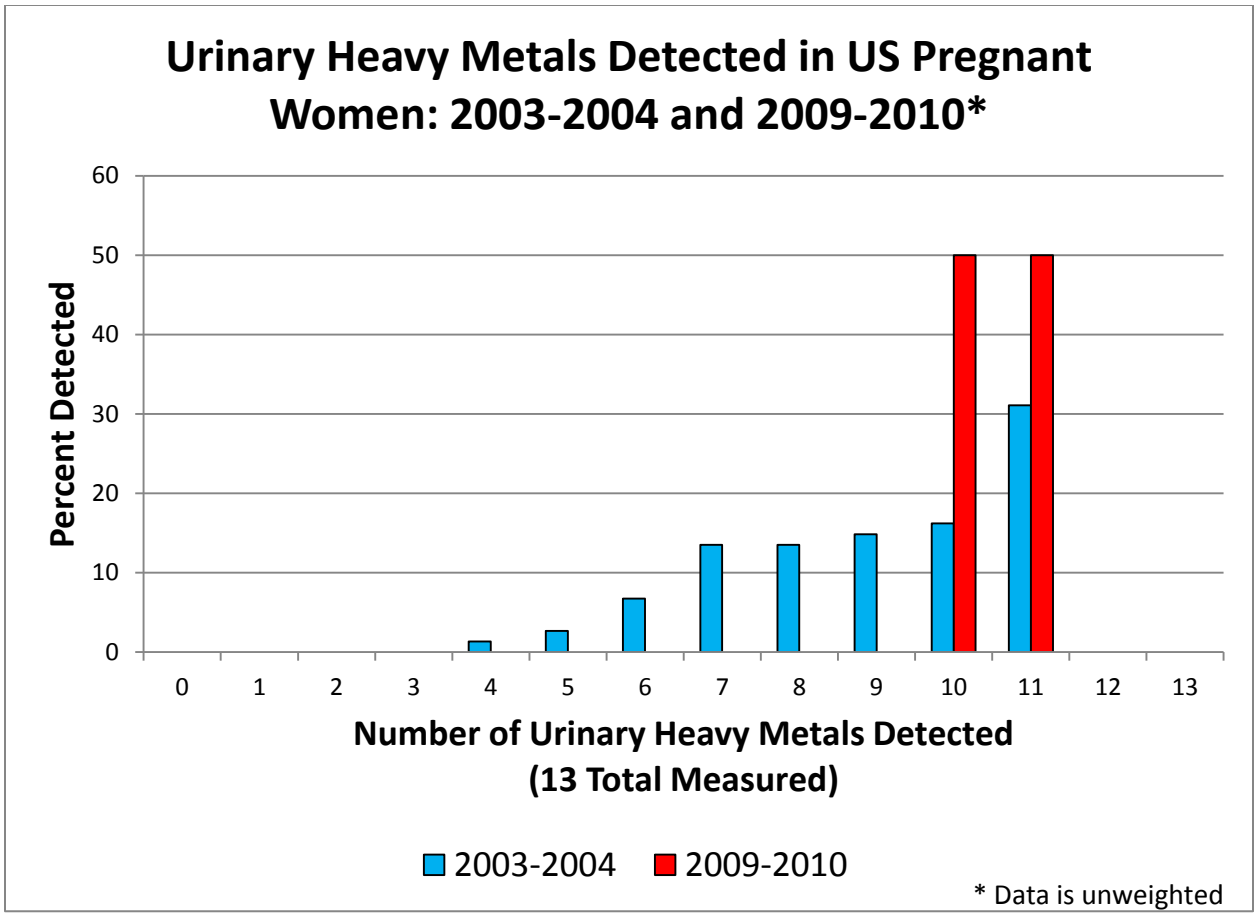

Figure 2: Urinary Heavy Metals (2003-2004 vs. 2009-2010)

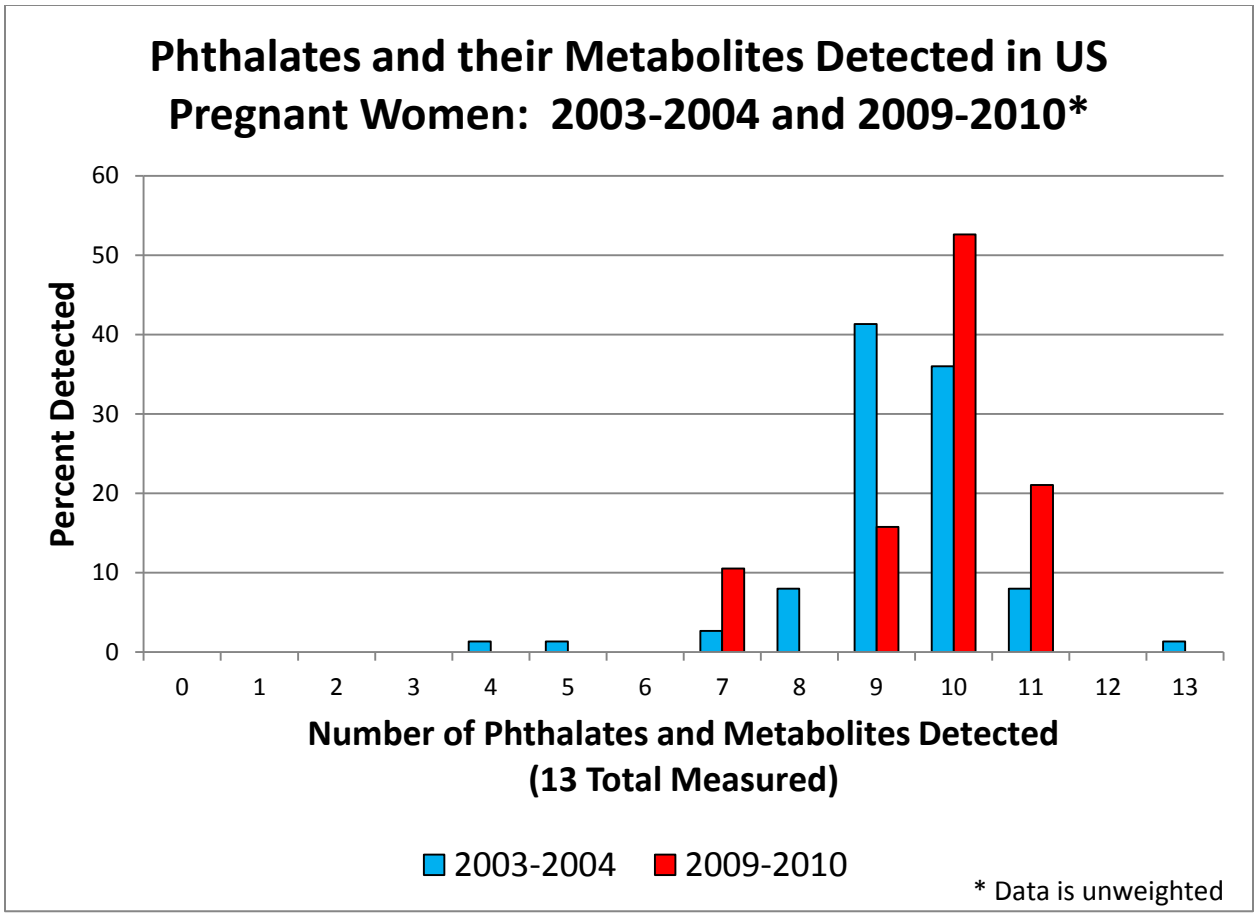

Figure 3: Phthalates and Metabolites (2003-2004 vs. 2009-2010)

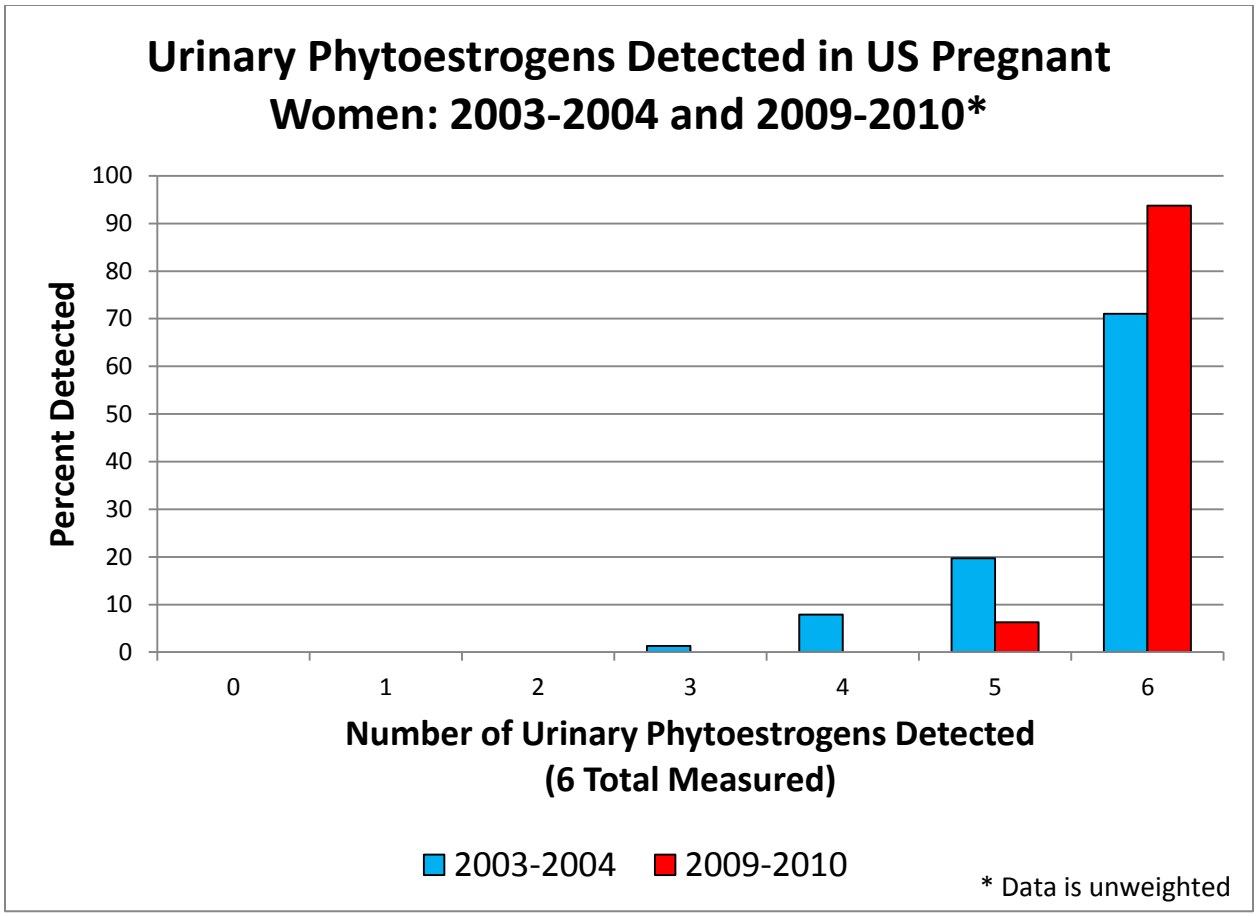

Figure 4: Urinary Phytoestrogens (2003-2004 vs. 2009-2010)

Table 6: Distribution of the Number of Detects by Group: 2003-2004 vs. 2009-2010

Chemical Group (Total # Measured)	Fisher's Exact Test	p-Value	Significance
Phthalates (13)	0.00007289	0.0948	*
Urinary Heavy Metals (13)	0.000004629	0.0238	**
Blood Heavy Metals (4)	0.0005928	0.1662	
Perflourinated Compounds (12)	4.351E-07	0.00009982	***
Phytoestrogens (6)	0.0288	0.3714	
Arsenics (8)	0.0021	0.2397	
Phenols (3)	0.0868	0.7177	
Environmental Pesticides (5)	0.00003206	0.0248	**

Key: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Note: PAHs, Current Use Pesticides, and Parabens were not analyzed as data was unavailable for one of the cycles. Cotinine was not analyzed as it is the only member of the chemical group measured for both cycles.

Detects by Pregnant Woman: Analysis over Subsamples

For subsamples A and B, the total number of analytes detected in a given pregnant woman for each of the four cycles is depicted in Figures 5-12 (for subsample C figures, see Appendix). Overall, the number of detects found within a given pregnant woman was not dominated by detects in any single chemical class, and this holds for all cycles. As chemical classes were not assigned to the same subsample group over each of the cycles, they cannot be compared directly.

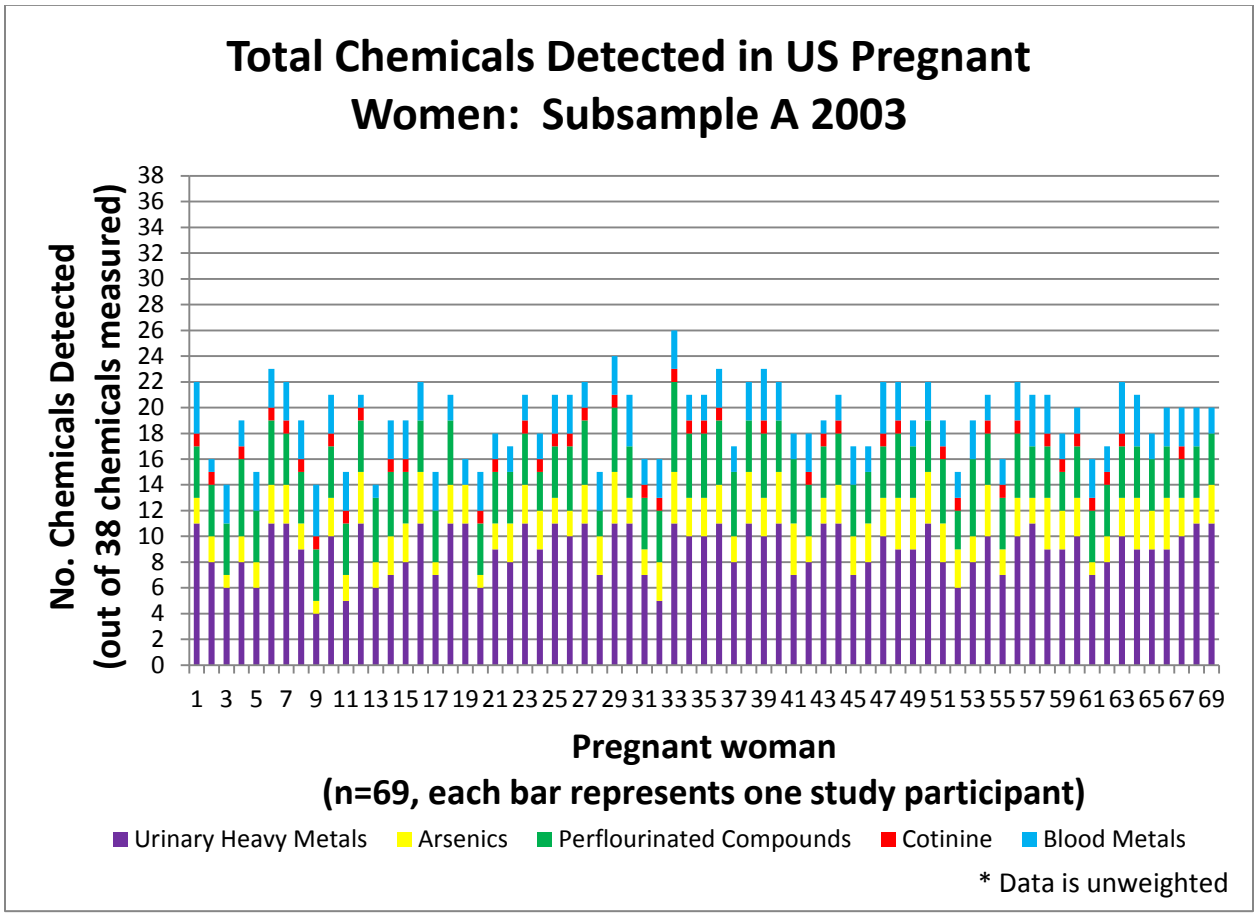

Figure 5: Total Chemicals Detected in US Pregnant Women: Subsample A 2003

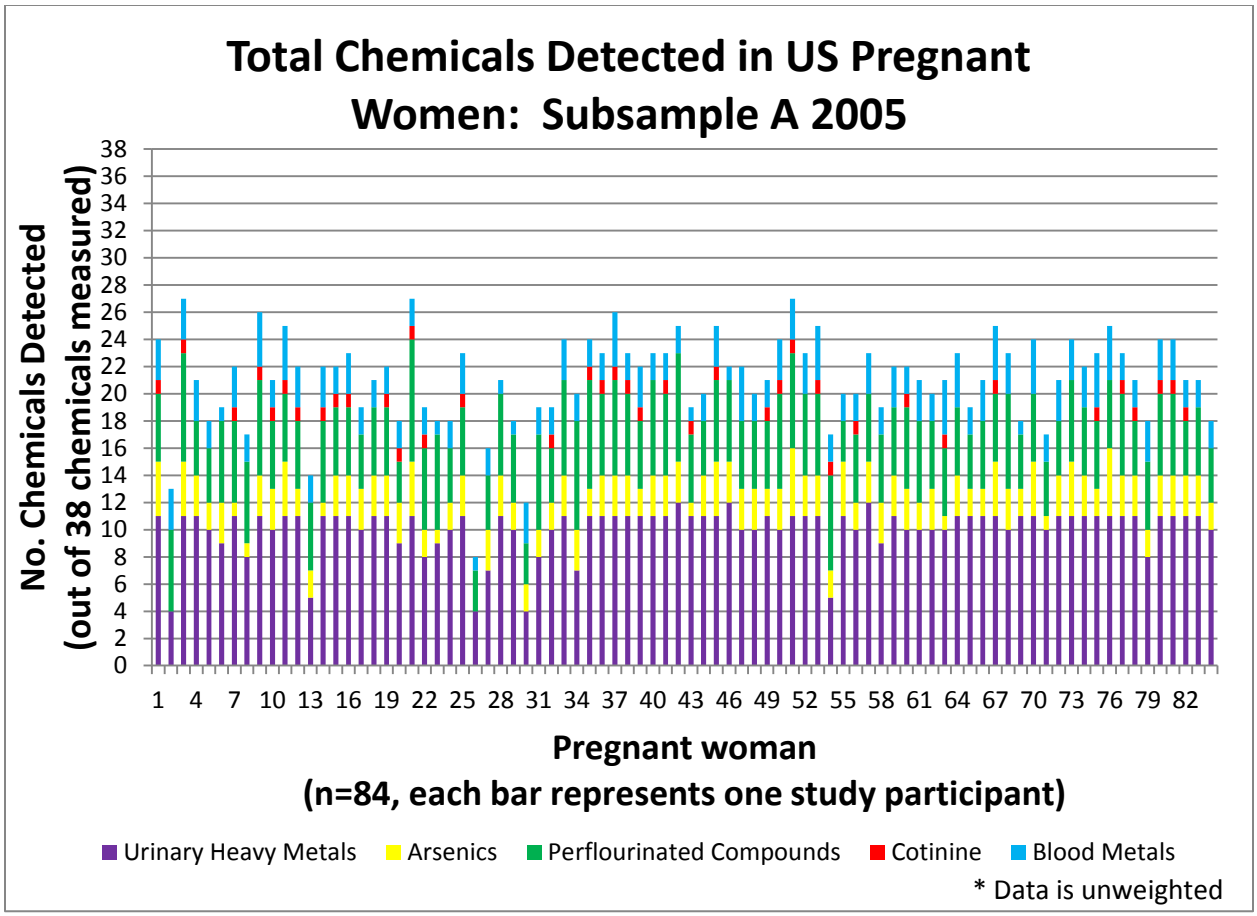

Figure 6: Total Chemicals Detected in US Pregnant Women: Subsample A 2005

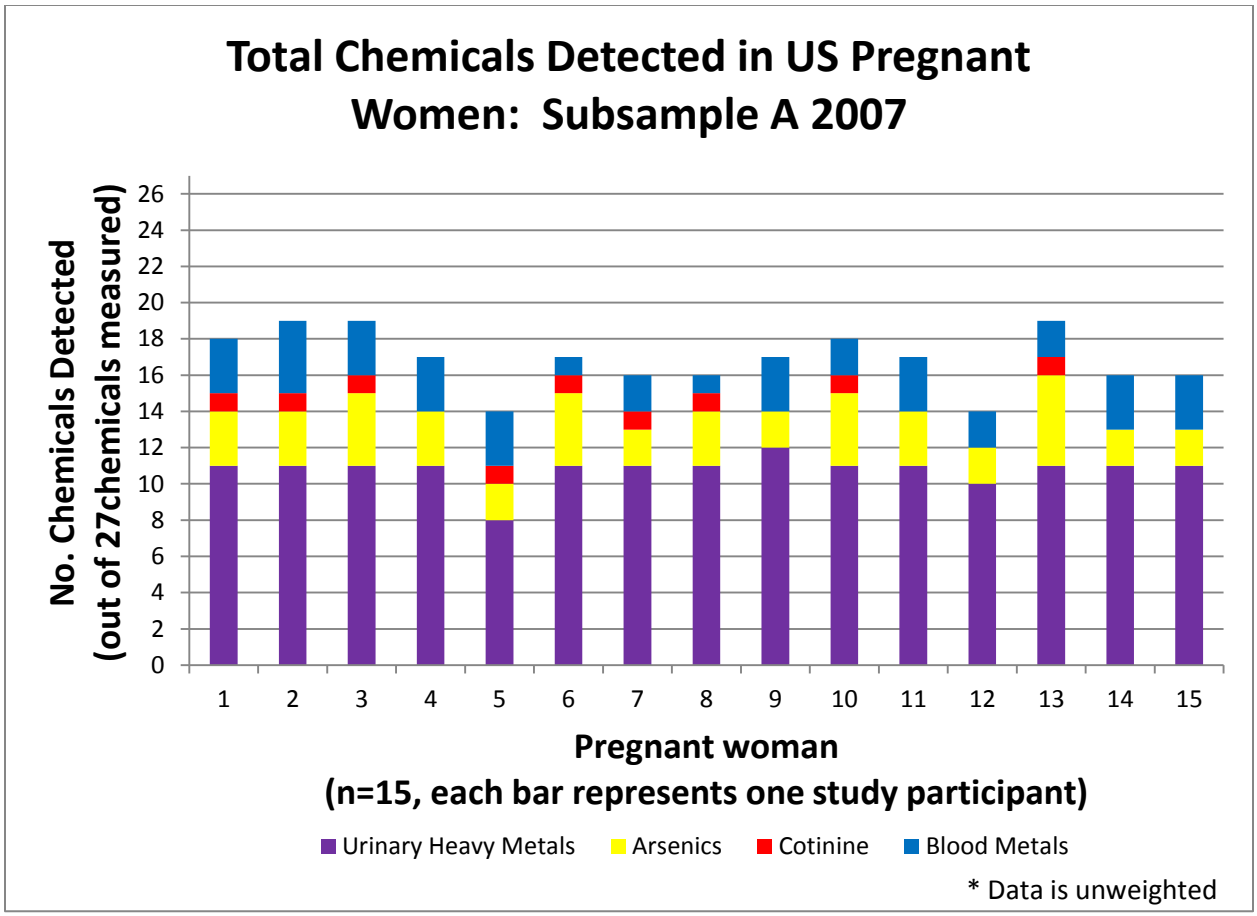

Figure 7: Total Chemicals Detected in US Pregnant Women: Subsample A 2007

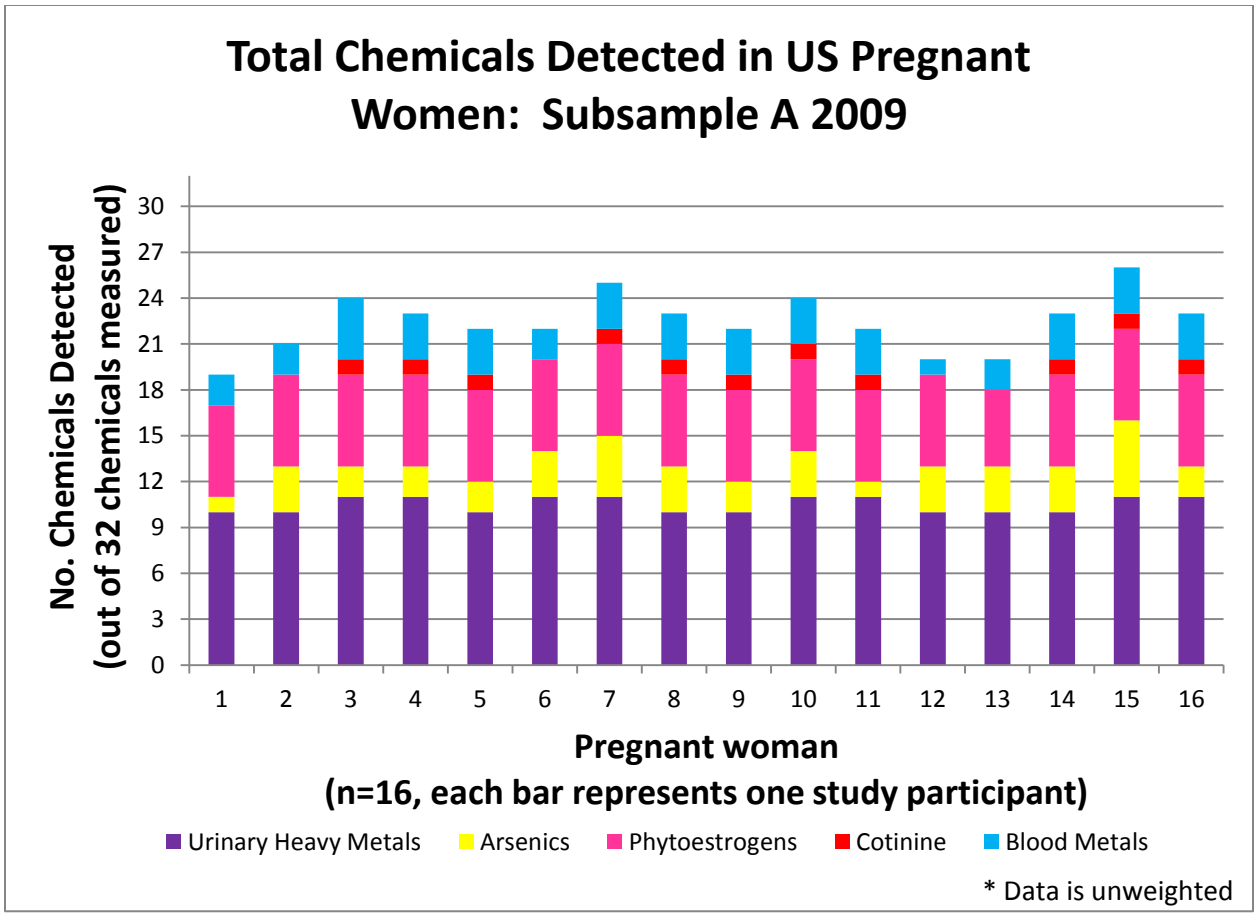

Figure 8: Total Chemicals Detected in US Pregnant Women: Subsample A 2009

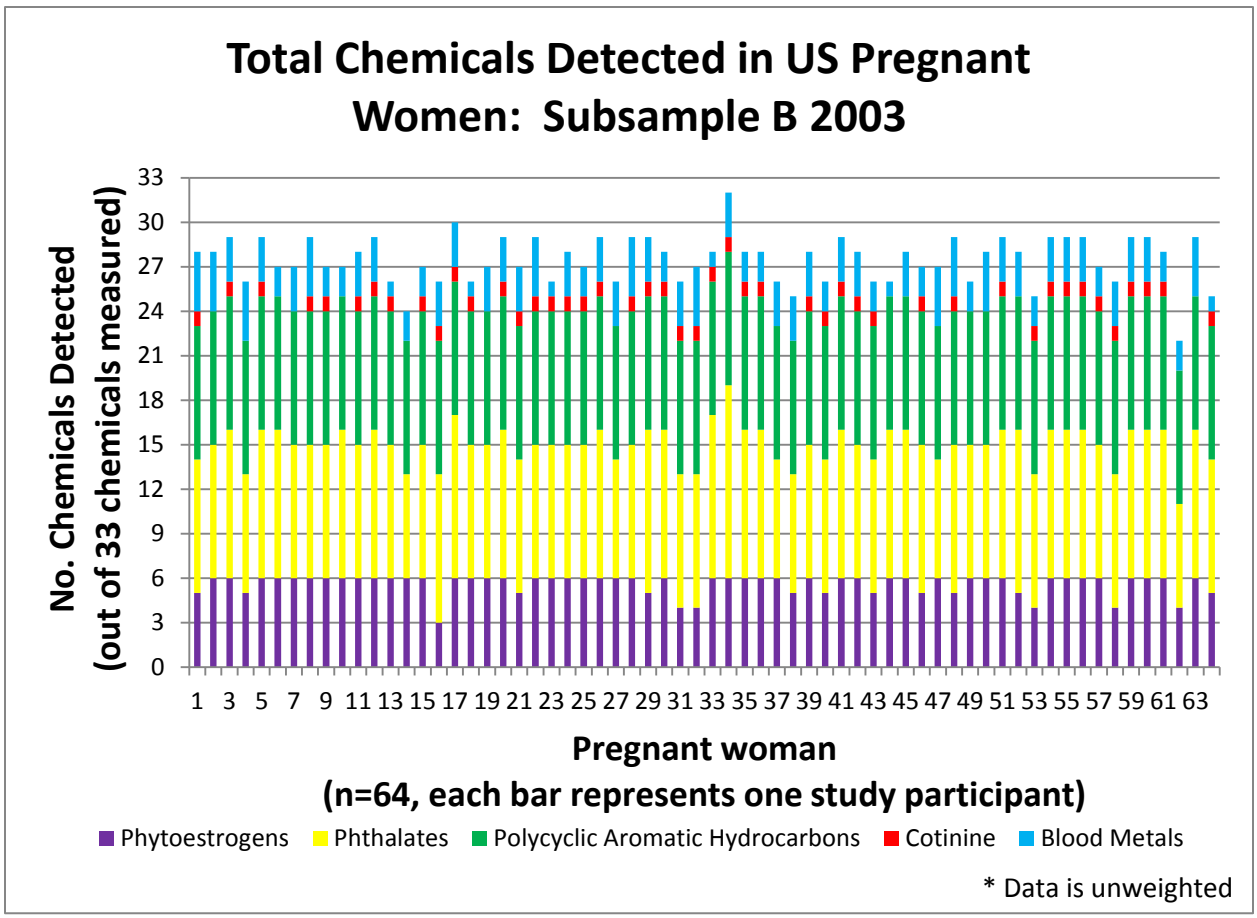

Figure 9: Total Chemicals Detected in US Pregnant Women: Subsample B 2003

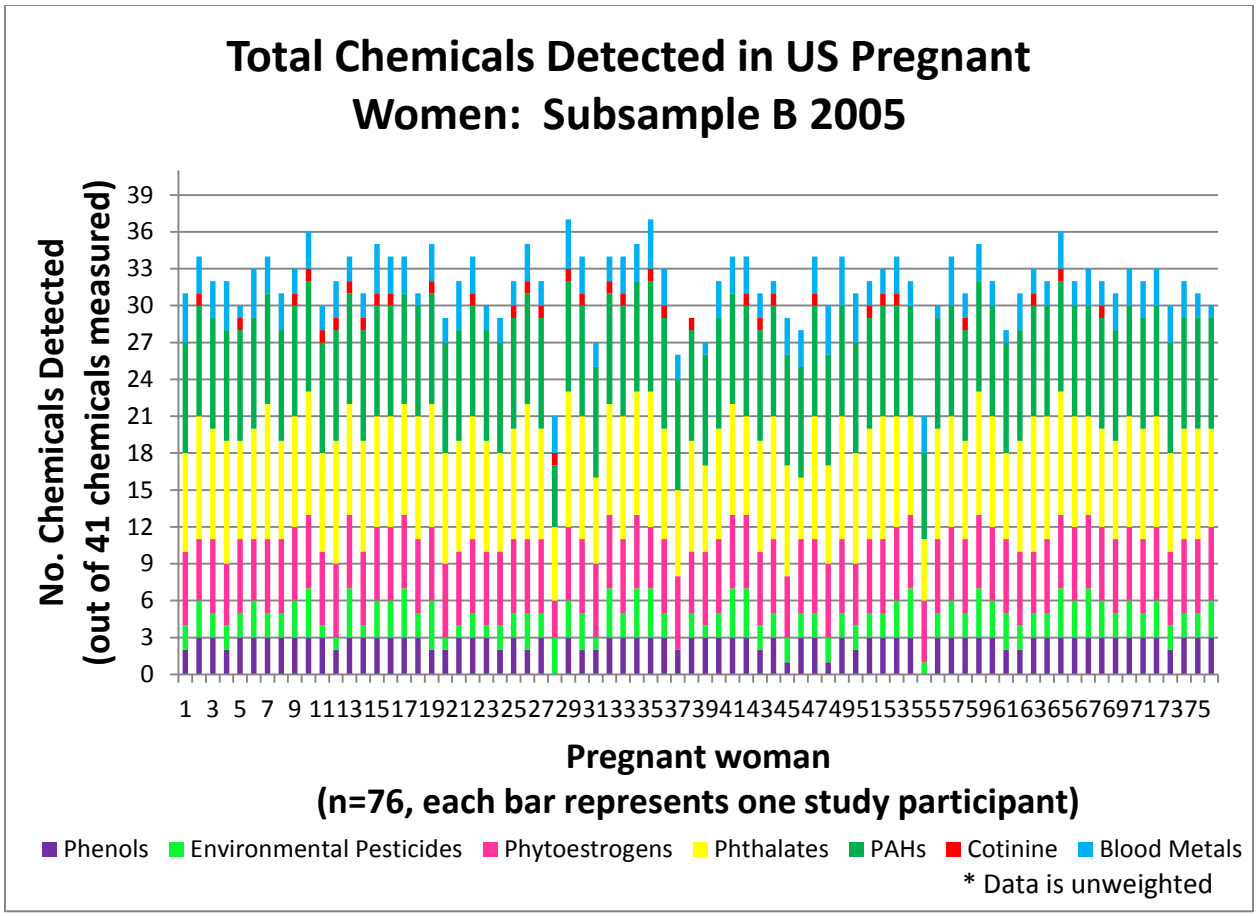

Figure 10: Total Chemicals Detected in US Pregnant Women: Subsample B 2005

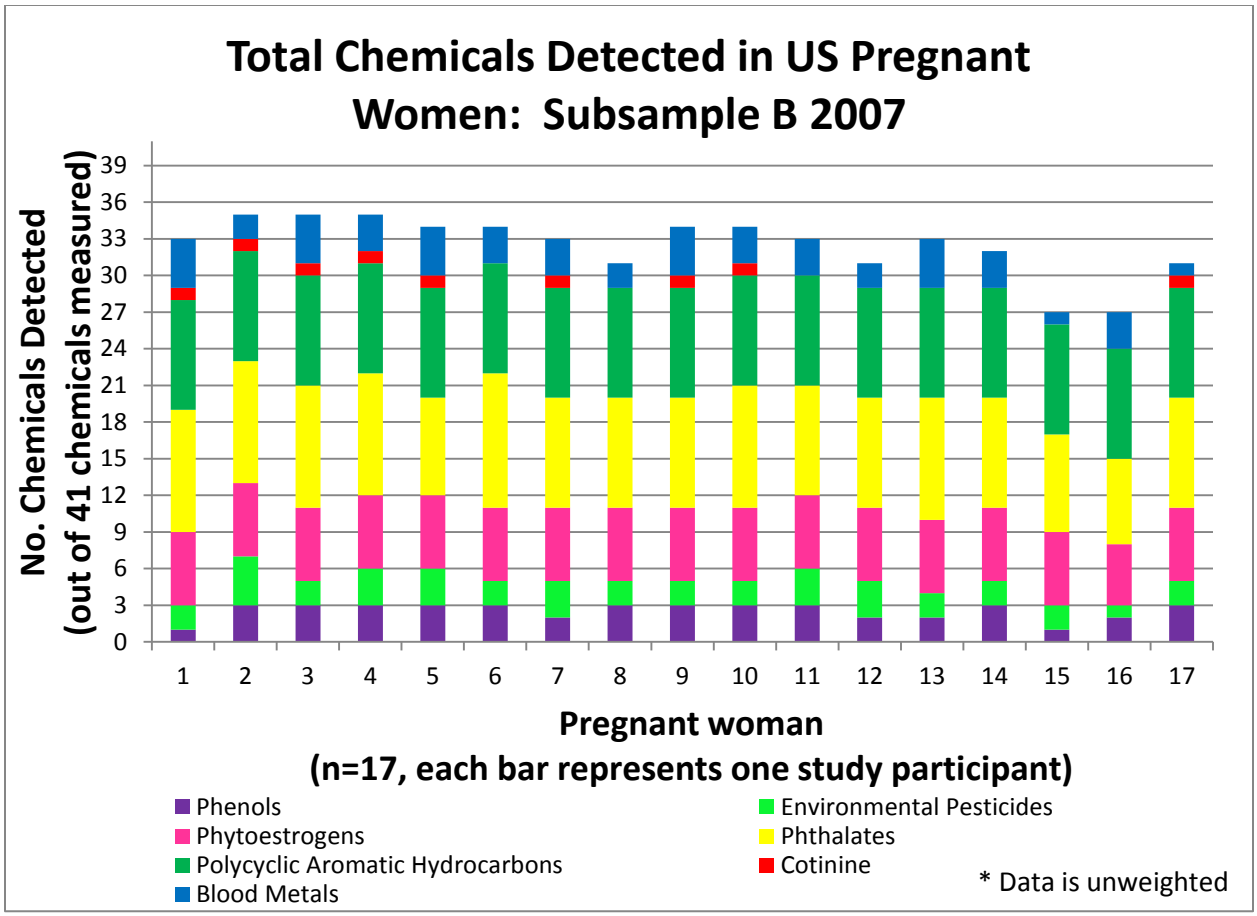

Figure 11: Total Chemicals Detected in US Pregnant Women: Subsample B 2007

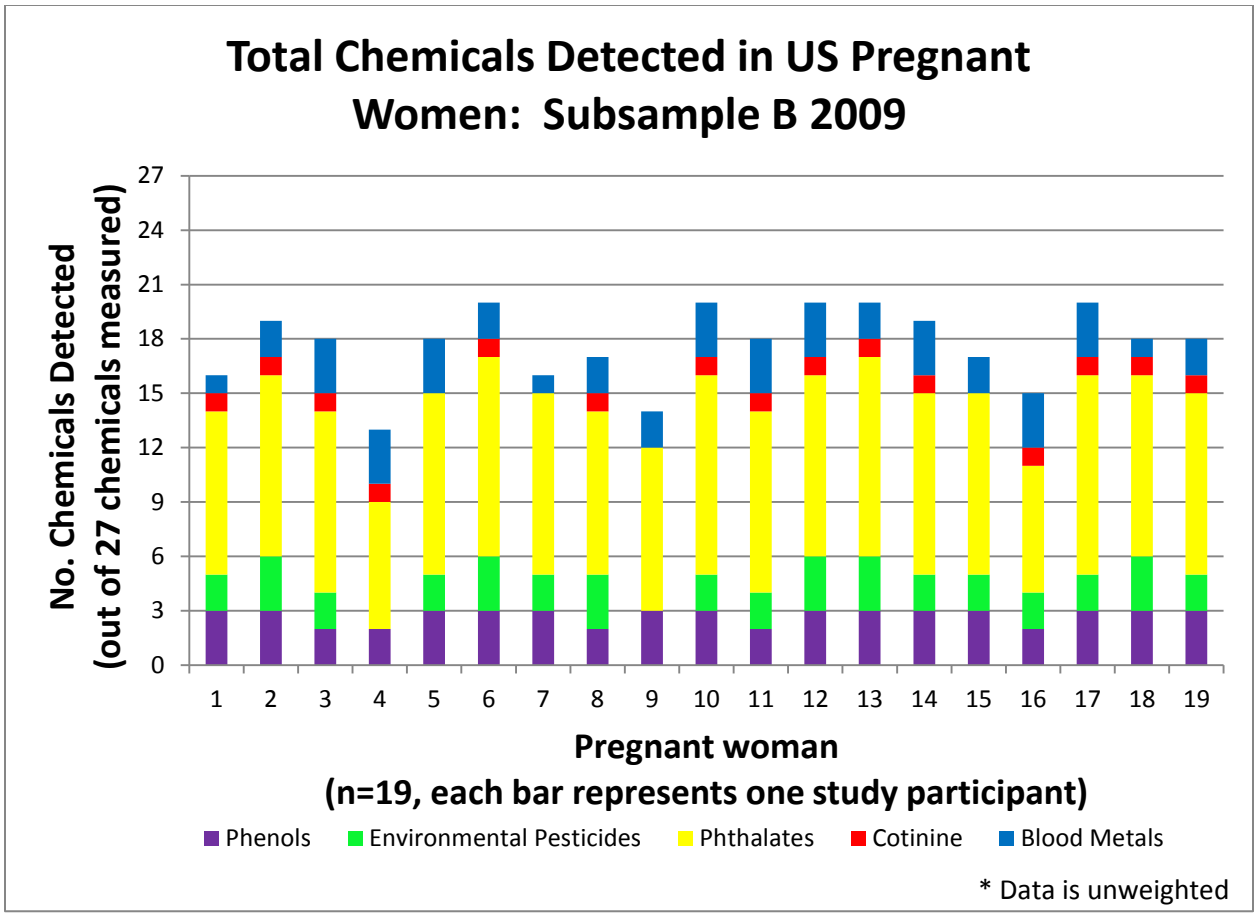

Figure 12: Total Chemicals Detected in US Pregnant Women: Subsample B 2009

In general, all of the pregnant women in our study had a large number of environmental chemical analytes detected in their bodies. Table 7 shows the average number of analytes detected by cycle and subsample. Over all four cycles, pregnant women assigned to subsample A had between 50% and 69% of all the chemicals for which they were tested detected in their body. Pregnant women in subsample B had between 69% and 82% of all the chemicals for which they were tested detected in their body. Subsample C showed much lower percent of detects, as subsample C includes the chemical group urinary current use pesticides. The data for these analytes were almost entirely less than the LOD except in the 2009-2010 cycle, for which data

was not yet available. Nonetheless, even when current use pesticides were included, the percent of analytes detected in pregnant women assigned to subsample C ranged between 14% and 27%.

Table 7: Average Number of Chemical Analytes Detected in a Pregnant Woman Sampled

	Subsample		
Cycle	A	B	C
2003-2004	19	27	8
2005-2006	21	32	3
2007-2008	17	32	7
2009-2010	22	18	9

Table 8: Total Number of Chemical Analytes Measured

	Subsample		
Cycle	A	B	C
2003-2004	38	33	30
2005-2006	38	41	22
2007-2008	26	41	34
2009-2010	32	26	17

Table 9: Percent, on Average, of Total Chemical Analytes Detected in Pregnant Women Sampled

	Subsample		
Cycle	A	B	C
2003-2004	50%	82%	27%
2005-2006	55%	78%	14%
2007-2008	65%	78%	21%
2009-2010	69%	69%	53%

Notes:
* n=3 for subsample C, 2007
* n=10 for subsample C, 2009
* No available data for 2009 subsample C urinary current use pesticides
* Data is unweighted

CONCLUSION

Our study's results of NHANES data from 2003-2004 through 2009-2010 confirms and extends Woodruff's findings of widespread exposures of multiple chemical analytes in US pregnant women.

While one-third of the chemicals had a cycle that differed in terms of exposure rates, closer evaluation of the specific cycles did not reveal a general, overwhelming increase in levels of chemical exposures over time. Taken on an individual chemical analyte basis, one might be tempted to conclude that the face of chemical exposures in US pregnant women is not changing over time. However, the distribution of the number of chemical exposures in individual pregnant women is shifting to a higher frequency over time.

That the sheer number of chemical analytes in a US pregnant woman's body is progressively rising underscores the growing need to avoid research which independently examines the rate of chemical exposure in the human body, fetus or pregnant mother. Rather, the results here suggest future research on chemical exposures should focus on concurrent exposure to multiple chemicals.

While this research did not make any causal link between chemical exposure and adverse outcome to the fetus, other research has found such relationship[32]. If we are to protect the most vulnerable member of our society, the unborn fetus, we need to better understand the cumulative effects of multiple chemical exposures to the pregnant mother. This particularly holds true when entire classes of chemicals have similar mechanisms of action to other classes or when chemicals have similar adverse health outcomes upon exposure[20].

Many chemicals studied in this analysis have similar mechanisms of action and/or similar adverse health outcomes upon exposure. For example, phthalates, parabens and pesticides all have anti-androgen properties. In our study, all 76 pregnant women in the 2005 subsample B group had both phthalate metabolites and pesticides detected in their bodies. In fact, these women had an average of 9 different phthalate metabolites detected in their body, with no woman having less than five. Even more, these women had an average of 2.4 environmental pesticides in their body, with all but one woman having at least one pesticide detected. In addition to the phthalates and the pesticides, these women had an average of 3 parabens in their body, with all but one woman having at least one paraben exposure. Thus, the 76 US pregnant women studied had, on average, more than 14 chemicals in their body simultaneously all of which are known to produce similar adverse outcomes (9 phthalate metabolites, 2.4 pesticides and 3 parabens).

This study was greatly limited by the data itself. Data is published on the NHANES website as it is available. However, release dates for different chemical groups within the same cycle are often not concurrent and may differ by months or even years. This is a problem when analyzing across multiple chemical groups. While some data for more recent cycles was available at the time of analysis, the sheer number of missing data for many chemical groups precluded us from analyzing more recent data cycles. In a similar way, the list of particular chemicals measured by NHANES changes over time with policy, laboratory advancements, and new chemical developments. Chemicals lacking data were dropped from analysis, introducing bias as both older and newer chemicals were excluded. Laboratory advancements and changes also impacted limits of detection from cycle to cycle. The inconsistent limits of detection could explain some

of the variation seen from cycle to cycle. Future research would benefit from more consistent limits and/or changes to the way in which these limits are applied to the exposure data.

Sampling methodology changes introduced by NHANES in 2007 resulted in a substantial decrease in the number of pregnant women surveyed for the 2007-2008 and 2009-2010 cycles. Furthermore, NHANES divides the total respondents into thirds for the environmental chemical testing. This subsampling methodology means that it is impossible to see all potential chemical exposures to a single pregnant woman. And, as the chemical classes are not consistently in one subsample or another, subsampling means that we are not able to directly compare one cycle's subsample with another.

This study was also limited in that it was designed to follow the framework of another study. Covariates were therefore preselected and were not re-evaluated for changes that may have come from the addition of more recent data. As many of the chemicals included in 2003-2004 were no longer being measured by 2009-2010, many chemicals were dropped from the analysis.

Future analyses would benefit from a consistent rollout of data for a given cycle by NHANES, as well as more consistency between cycles on which chemicals are measured. The NHANES subsampling methodology greatly limited the way we could analyze the data; therefore, it would be ideal if subsampling for environmental chemical data was discontinued. The cumbersome nature of the data structure and lack of complete data on chemical exposures for any single respondent truly detracts from the value of any resulting research. Subsampling may be required as the urinary specimen collected is a spot urine sample whereby there is a limited amount of volume to be analyzed. Changes to the collection process, such as requiring a 24 hour urine collection, would be very beneficial as it would ensure enough specimen per respondent so that

subsampling practices could be discontinued. Finally, advancements in statistical computer programs in the area of complex survey design data would also benefit future research.

Analysis of the NHANES data over four data cycles reveal that US pregnant women have experienced widespread and simultaneous chemical exposure from 2003 through 2010. This research suggests that chemical exposure data should be evaluated with an additional approach that looks at cumulative exposure to chemicals so that we may more readily understand the role of chemicals within the body and throughout the population. This study underscores the suggestions made in 2002 and 2003 by the Environmental Protection Agency (EPA) when developing The Framework for Cumulative Risk Assessment[33] and by the National Research Council in 2009 when discussing how best to advance risk assessment of exposure to multiple environmental chemicals[34]. A better understanding of the cumulative risk to the unborn fetus posed by environmental chemical exposure to the pregnant mother, and how that cumulative risk is changing over time, must be achieved.

Chapter 3: Discussion

Our study's results of NHANES data from 2003-2004 through 2009-2010 confirms and extends Woodruff's findings of widespread exposures of multiple chemical analytes in US pregnant women.

While one-third of the chemicals had a cycle that differed in terms of exposure rates, closer evaluation of the specific cycles did not reveal a general, overwhelming increase in levels of chemical exposures over time. Taken on an individual chemical analyte basis, one might be tempted to conclude that the face of chemical exposures in US pregnant women is not changing over time. However, the distribution of the number of chemical exposures in individual pregnant women is shifting to a higher frequency over time.

That the sheer number of chemical analytes in a US pregnant woman's body is progressively rising underscores the growing need to avoid research which independently examines the rate of chemical exposure in the human body, fetus or pregnant mother. Rather, the results here suggest future research on chemical exposures should focus on concurrent exposure to multiple chemicals.

While this research did not make any causal link between chemical exposure and adverse outcome to the fetus, other research has found such relationship[32]. If we are to protect the most vulnerable member of our society, the unborn fetus, we need to better understand the cumulative effects of multiple chemical exposures to the pregnant mother. This particularly holds true when entire classes of chemicals have similar mechanisms of action to other classes or when chemicals have similar adverse health outcomes upon exposure[20].

Many chemicals studied in this analysis have similar mechanisms of action and/or similar adverse health outcomes upon exposure. For example, phthalates, parabens and pesticides all have anti-androgen properties. In our study, all 76 pregnant women in the 2005 subsample B group had both phthalate metabolites and pesticides detected in their bodies. In fact, these women had an average of 9 different phthalate metabolites detected in their body, with no woman having less than five. Even more, these women had an average of 2.4 environmental pesticides in their body, with all but one woman having at least one pesticide detected. In addition to the phthalates and the pesticides, these women had an average of 3 parabens in their body, with all but one woman having at least one paraben exposure. Thus, the 76 US pregnant women studied had, on average, more than 14 chemicals in their body simultaneously all of which are known to produce similar adverse outcomes (9 phthalate metabolites, 2.4 pesticides and 3 parabens).

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Sampling methodology changes introduced by NHANES in 2007 resulted in a substantial decrease in the number of pregnant women surveyed for the 2007-2008 and 2009-2010 cycles. Furthermore, NHANES divides the total respondents into thirds for the environmental chemical testing. This subsampling methodology means that it is impossible to see all potential chemical exposures to a single pregnant woman. And, as the chemical classes are not consistently in one subsample or another, subsampling means that we are not able to directly compare one cycle's subsample with another.

This study was also limited in that it was designed to follow the framework of another study. Outliers were not removed based upon this methodology. Covariates were preselected and were not re-evaluated for changes that may have come from the addition of more recent data. As many of the chemicals included in 2003-2004 were no longer being measured by 2009-2010, many chemicals were dropped from the analysis.

Future analyses would benefit from a consistent rollout of data for a given cycle by NHANES, as well as more consistency between cycles on which chemicals are measured. The NHANES subsampling methodology greatly limited the way we could analyze the data; therefore, it would be ideal if subsampling for environmental chemical data was discontinued. The cumbersome nature of the data structure and lack of complete data on chemical exposures for any single respondent truly detracts from the value of any resulting research. Subsampling may be required as the urinary specimen collected is a spot urine sample whereby there is a limited amount of volume to be analyzed. Changes to the collection process, such as requiring a 24 hour urine collection, would be very beneficial as it would ensure enough specimen per respondent so that subsampling practices could be discontinued. Finally, advancements in statistical computer programs in the area of complex survey design data would also benefit future research.

Analysis of the NHANES data over four data cycles reveal that US pregnant women have experienced widespread and simultaneous chemical exposure from 2003 through 2010. This research suggests that chemical exposure data should be evaluated with an additional approach that looks at cumulative exposure to chemicals so that we may more readily understand the role of chemicals within the body and throughout the population. This study underscores the suggestions made in 2002 and 2003 by the Environmental Protection Agency (EPA) when developing The Framework for Cumulative Risk Assessment[33] and by the National Research Council in 2009 when discussing how best to advance risk assessment of exposure to multiple environmental chemicals[34]. This type of assessment looks directly at the combined fate and effects of multiple chemicals from multiple sources through multiple exposure pathways[35]. A better understanding of the cumulative risk to the unborn fetus posed by environmental chemical exposure to the pregnant mother, and how that cumulative risk is changing over time, must be achieved.

Chapter 4: Appendix

This Appendix is designed to contain supplemental tables and figures. Only select analytes of interest were discussed in text due to the large number of analytes included in these analyses. Those chemical groups and analytes not discussed directly are contained in this Appendix. The order of tables and figures follows the order found in text.

Table 10: Descriptive Statistics for Remaining Chemical Analytes by Cycle (Weighted)

Cycle	Sub-Sample	n	LOD	Percent > LOD	GM (GSE)	50th Percentile	95th Percentile	CV
Tobacco Smoke								
Cotinine								
2003-2004	All	249	0.015	57	___*	0.03	57.12	___*
2005-2006	All	348	0.02	54	___*	0.03	105.38	___*
2007-2008	All	50	0.015	62	0.06 (0.02)	0.04	4.25	0.30
2009-2010	All	64	0.015	60	___*	0.03	91.26	___*
NNAL (4-(methylnitrosoamino)-1-(3-pyridyl)-1-butanol)								
2003-2004	--							
2005-2006	--							
2007-2008	All	53	1	0	___*	< LOD	< LOD	___*
2009-2010	All	66	0.6	2	___*	< LOD	< LOD	___*
Environmental Phenols (urine, µg/L)								
Bisphenol A (2,2-bis [4-Hydroxyphenyl] propane)								
2003-2004	C	86	0.4	96	2.53 (0.63)	2.7	13.7	0.25
2005-2006	B	129	0.4	88	1.60 (0.19)	1.6	11.3	0.12
2007-2008	B	20	0.4	97	1.93 (0.18)	2.4	6.4	0.10
2009-2010	B	26	0.4	94	1.15 (0.19)	0.9	5.5	0.17
Triclosan (2,4,4'-Trichloro-2'-hydroxyphenyl ether)								
2003-2004	C	86	2.3	87	17.00 (8.74)	7.3	252.7	0.51
2005-2006	B	129	2.3	92	37.99 (8.13)	42.9	905.6	0.21
2007-2008	B	20	2.3	81	23.86 (5.87)	12.8	443.6	0.25
2009-2010	B	26	2.3	84	8.33 (2.03)	5.2	53.4	0.24
Benzophenone-3 (2-Hydroxy-4-methyoxybenzophenone)								
2003-2004	C	86	0.3	100	25.49 (6.51)	16.5	352.9	0.26
2005-2006	B	129	0.4	98	46.81 (10.42)	29.6	1929.0	0.22
2007-2008	B	20	0.4	97	16.59 (4.44)	6.7	332.0	0.27
2009-2010	B	26	0.4	100	45.30 (20.3)	33.8	2155.4	0.45
4-tert -Octylphenol (4-[1,1,3,3-Tetramethylbutyl] phenol)								
2003-2004	--							
2005-2006	B	129	0.2	4	___*	< LOD	< LOD	___*
2007-2008	B	20	0.2	3	___*	< LOD	< LOD	___*
2009-2010	B	26	0.2	14	___*	< LOD	0.3	___*
Environmental Pesticides: Fungicides, Herbicides, Organochlorines and Others								

O-Phenyl phenol								
2003-2004	C	89	0.1	39	___*	< LOD	0.5	___*
2005-2006	B	129	0.1	21	___*	< LOD	0.4	___*
2007-2008	B	20	0.1	14	___*	< LOD	0.3	___*
2009-2010	B	26	0.2	19	___*	< LOD	0.3	___*
2,4-Dichlorophenol								
2003-2004	C	89	0.17	90	1.58 (0.32)	1.7	33.0	0.20
2005-2006	B	129	0.2	91	0.74 (0.12)	0.6	5.6	0.17
2007-2008	B	20	0.2	97	0.79 (0.19)	0.4	24.9	0.24
2009-2010	B	26	0.2	62	0.42 (0.07)	0.3	2.9	0.17
2,5-Dichlorophenol								
2003-2004	C	89	0.12	99	28.12 (4.69)	20.0	1384.4	0.17
2005-2006	B	129	0.2	95	6.58 (2.72)	5.8	211.7	0.41
2007-2008	B	20	0.2	100	12.48 (3.64)	5.8	1173.8	0.29
2009-2010	B	26	0.2	98	2.78 (0.72)	1.9	72.5	0.26
2,4,5-Trichlorophenol								
2003-2004	C	89	0.1	32	___*	< LOD	0.3	___*
2005-2006	B	129	0.1	28	___*	< LOD	0.3	___*
2007-2008	B	20	0.1	19	___*	< LOD	0.2	___*
2009-2010	B	26	0.1	14	___*	< LOD	0.1	___*
2,4,6-Trichlorophenol								
2003-2004	C	89	0.5	21	___*	< LOD	1.4	___*
2005-2006	B	129	0.5	20	___*	< LOD	0.8	___*
2007-2008	B	20	0.5	16	___*	< LOD	0.6	___*
2009-2010	B	26	0.5	7	___*	< LOD	< LOD	___*
Urinary Current Use Pesticides: Sulfonlyurea Herbicides								
Bensulfuron-methyl								
2003-2004	C	84	0.05	0	___*	< LOD	< LOD	___*
2005-2006	C	129	0.05	0	___*	< LOD	< LOD	___*
2007-2008	C	9	0.05	0	___*	< LOD	< LOD	___*
2009-2010	--							
Chlorsulfuron								
2003-2004	C	80	0.06	0	___*	< LOD	< LOD	___*
2005-2006	C	115	0.06	0	___*	< LOD	< LOD	___*
2007-2008	C	10	0.06	0	___*	< LOD	< LOD	___*
2009-2010	--							
Ethametsulfuron-methyl								
2003-2004	C	87	0.1	0	___*	< LOD	< LOD	___*
2005-2006	C	129	0.1	0	___*	< LOD	< LOD	___*
2007-2008	C	8	0.1	0	___*	< LOD	< LOD	___*
2009-2010	--							
Foramsulfuron								
2003-2004	C	82	0.05	0	___*	< LOD	< LOD	___*
2005-2006	C	122	0.05	0	___*	< LOD	< LOD	___*
2007-2008	C	10	0.05	0	___*	< LOD	< LOD	___*
2009-2010	--							
Halosulfuron								
2003-2004	C	86	0.1	0	___*	< LOD	< LOD	___*
2005-2006	C	122	0.1	0	___*	< LOD	< LOD	___*
2007-2008	C	10	0.1	0	___*	< LOD	< LOD	___*

2009-2010	--							
Mesosulfuron-methyl								
2003-2004	C	89	0.06	0	___*	< LOD	< LOD	___*
2005-2006	C	129	0.06	0	___*	< LOD	< LOD	___*
2007-2008	C	9	0.06	0	___*	< LOD	< LOD	___*
2009-2010	--							
Metsulfuron-methyl								
2003-2004	C	88	0.05	0	___*	< LOD	< LOD	___*
2005-2006	C	129	0.05	0	___*	< LOD	< LOD	___*
2007-2008	C	8	0.05	0	___*	< LOD	< LOD	___*
2009-2010	--							
Nicosulfuron								
2003-2004	C	85	0.1	0	___*	< LOD	< LOD	___*
2005-2006	C	124	0.1	0	___*	< LOD	< LOD	___*
2007-2008	C	9	0.1	0	___*	< LOD	< LOD	___*
2009-2010	--							
Oxasulfuron								
2003-2004	C	87	0.06	0	___*	< LOD	< LOD	___*
2005-2006	C	129	0.06	0	___*	< LOD	< LOD	___*
2007-2008	C	10	0.06	0	___*	< LOD	< LOD	___*
2009-2010	--							
Primisulfuron-methyl								
2003-2004	C	84	0.07	0	___*	< LOD	< LOD	___*
2005-2006	C	118	0.07	0	___*	< LOD	< LOD	___*
2007-2008	C	10	0.07	0	___*	< LOD	< LOD	___*
2009-2010	--							
Prosulfuron								
2003-2004	C	86	0.05	0	___*	< LOD	< LOD	___*
2005-2006	C	121	0.05	0	___*	< LOD	< LOD	___*
2007-2008	C	10	0.05	0	___*	< LOD	< LOD	___*
2009-2010	--							
Rimsulfuron								
2003-2004	C	86	0.05	0	___*	< LOD	< LOD	___*
2005-2006	C	126	0.05	0	___*	< LOD	< LOD	___*
2007-2008	C	10	0.05	0	___*	< LOD	< LOD	___*
2009-2010	--							
Sulfometuron-methyl								
2003-2004	C	73	0.05	0	___*	< LOD	< LOD	___*
2005-2006	C	125	0.05	0	___*	< LOD	< LOD	___*
2007-2008	C	10	0.05	0	___*	< LOD	< LOD	___*
2009-2010	--							
Sulfosulfuron								
2003-2004	C	87	0.1	0	___*	< LOD	< LOD	___*
2005-2006	C	125	0.1	0	___*	< LOD	< LOD	___*
2007-2008	C	10	0.1	0	___*	< LOD	< LOD	___*
2009-2010	--							
Thifensulfuron-methyl								
2003-2004	C	85	0.08	0	___*	< LOD	< LOD	___*
2005-2006	C	129	0.08	0	___*	< LOD	< LOD	___*
2007-2008	C	8	0.08	0	___*	< LOD	< LOD	___*

2009-2010	--							
Triasulfuron								
2003-2004	C	83	0.07	0	___*	< LOD	< LOD	___*
2005-2006	C	124	0.07	0	___*	< LOD	< LOD	___*
2007-2008	C	8	0.07	0	___*	< LOD	< LOD	___*
2009-2010	--							
Triflusulfuron-methyl								
2003-2004	C	89	0.05	0	___*	< LOD	< LOD	___*
2005-2006	C	126	0.05	0	___*	< LOD	< LOD	___*
2007-2008	C	9	0.05	0	___*	< LOD	< LOD	___*
2009-2010	--							
Phytoestrogens and Metabolites								
Daidzein								
2003-2004	B	94	1.6	100	45.37 (10.30)	28.2	1171.4	0.23
2005-2006	B	130	0.4	100	46.55 (7.93)	43.0	1154.3	0.17
2007-2008	B	20	0.4	100	32.33 (5.04)	18.5	244.7	0.16
2009-2010	A	22	0.4	100	69.03 (14.36)	33.6	2665.9	0.21
Enterodiol								
2003-2004	B	94	1.5	99	58.65 (17.12)	62.7	390.5	0.29
2005-2006	B	130	0.04	100	42.12 (14.12)	51.9	459.4	0.33
2007-2008	B	20	0.04	100	40.52 (0.91)	32.0	313.7	0.02
2009-2010	A	22	0.04	100	94.82 (6.66)	70.3	1072.5	0.07
Enterolactone								
2003-2004	B	94	1.9	100	278.48 (67.65)	426.5	1559.3	0.25
2005-2006	B	130	0.1	100	283.29 (65.35)	393.8	2264.1	0.23
2007-2008	B	20	0.1	100	148.27 (47.49)	191.0	1691.6	0.32
2009-2010	A	22	0.1	100	260.87 (62.74)	273.1	1978.2	0.24
Equol								
2003-2004	B	94	3.3	81	8.30 (1.75)	9.8	43.8	0.21
2005-2006	B	130	0.06	100	7.70 (1.72)	8.1	38.9	0.22
2007-2008	B	20	0.06	100	3.32 (0.54)	2.6	40.8	0.16
2009-2010	A	22	0.06	100	8.75 (0.77)	7.2	46.6	0.09
Genistein								
2003-2004	B	94	0.8	100	23.00 (5.84)	16.8	493.6	0.25
2005-2006	B	130	1	100	21.04 (2.93)	17.1	498.0	0.14
2007-2008	B	20	0.2	100	13.91 (1.73)	12.3	51.1	0.12
2009-2010	A	22	0.2	100	46.25 (5.34)	32.6	1266.8	0.12
O-Desmethylangolensin								
2003-2004	B	94	0.4	87	3.41 (1.23)	2.7	103.8	0.36
2005-2006	B	130	0.2	96	2.78 (0.81)	2.3	80.9	0.29
2007-2008	B	20	0.2	87	2.15 (0.98)	0.7	57.0	0.46
2009-2010	A	22	0.2	86	4.67 (0.01)	5.5	128.1	0.002
Urinary Total Arsenic and Speciated Arsenics								
Arsenic, Total (urinary)								
2003-2004	A	84	0.74	97	9.91 (3.08)	8.06	88.89	0.31
2005-2006	A	98	0.74	94	7.03 (1.38)	9.46	40.21	0.20
2007-2008	A	27	0.74	100	11.76 (2.13)	10.98	40.54	0.18
2009-2010	A	22	0.74	100	10.00 (0.65)	8.46	62.27	0.06
Arsenous (III) Acid								
2003-2004	A	84	1.2	0	___*	< LOD	< LOD	___*

2005-2006	A	99	1.2	2	___*	< LOD	< LOD	___*
2007-2008	A	26	1.2	15	___*	< LOD	< LOD	___*
2009-2010	A	22	1.2	5	___*	< LOD	< LOD	___*
Arsenic (V) Acid								
2003-2004	A	84	1.0	3	___*	< LOD	< LOD	___*
2005-2006	A	99	1.0	3	___*	< LOD	< LOD	___*
2007-2008	A	26	1.0	0	___*	< LOD	< LOD	___*
2009-2010	A	22	1.0	0	___*	< LOD	< LOD	___*
Arsenobetaine								
2003-2004	A	84	0.4	65	1.66 (0.83)	0.66	52.76	0.50
2005-2006	A	99	0.4	59	___*	0.90	15.40	___*
2007-2008	A	26	0.4	80	2.77 (0.47)	3.62	19.88	0.17
2009-2010	A	22	0.4	67	1.88 (0.34)	0.82	39.88	0.18
Arsenocholine								
2003-2004	A	84	0.6	6	___*	< LOD	< LOD	___*
2005-2006	A	99	0.6	0	___*	< LOD	< LOD	___*
2007-2008	A	26	0.6	0	___*	< LOD	< LOD	___*
2009-2010	A	22	0.6	5	___*	< LOD	< LOD	___*
Dimethylarsinic Acid								
2003-2004	A	84	1.7	93	4.73 (0.99)	3.98	22.27	0.21
2005-2006	A	99	1.7	87	4.06 (0.53)	4.78	12.81	0.13
2007-2008	A	26	1.7	87	4.67 (0.98)	4.44	16.75	0.21
2009-2010	A	22	1.7	77	3.32 (0.16)	2.72	10.72	0.05
Monomethylarsonic Acid								
2003-2004	A	84	0.9	36	___*	< LOD	2.65	___*
2005-2006	A	99	0.9	22	___*	< LOD	1.91	___*
2007-2008	A	26	0.9	38	___*	< LOD	1.60	___*
2009-2010	A	22	0.9	18	___*	< LOD	1.02	___*
Trimethylarsine oxide								
2003-2004	A	84	1.0	0	___*	< LOD	< LOD	___*
2005-2006	A	99	1.0	0	___*	< LOD	< LOD	___*
2007-2008	A	26	1.0	0	___*	< LOD	< LOD	___*
2009-2010	A	22	1.0	0	___*	< LOD	< LOD	___*
Blood Lead, Cadmium, and Mercury (Total & Inorganic)								
Cadmium (blood)								
2003-2004	All	253	0.14	66	0.22 (0.01)	0.17	0.79	0.07
2005-2006	All	348	0.2	100	0.25 (0.01)	0.22	0.96	0.05
2007-2008	All	50	0.2	100	0.25 (0.03)	0.22	0.67	0.10
2009-2010	All	65	0.2	100	0.27 (0.02)	0.23	1.04	0.07
Lead (blood)								
2003-2004	All	253	0.28	94	0.68 (0.04)	0.57	1.77	0.06
2005-2006	All	348	0.25	96	0.62 (0.03)	0.60	1.55	0.05
2007-2008	All	50	0.25	100	0.62 (0.05)	0.61	1.20	0.08
2009-2010	All	65	0.25	97	0.64 (0.04)	0.64	1.25	0.06
Mercury, Inorganic								
2003-2004	All	253	0.42	22	___*	< LOD	0.69	___*
2005-2006	All	347	0.4	25	___*	< LOD	0.94	___*
2007-2008	All	50	0.35	25	___*	< LOD	0.48	___*
2009-2010	All	64	0.35	9	___*	< LOD	0.44	___*
Mercury, Total								

	2003-2004	All	253	0.2	87	0.67 (0.07)	0.64	3.12	0.10
	2005-2006	All	348	0.33	78	0.69 (0.05)	0.77	2.41	0.07
	2007-2008	All	50	0.33	81	0.74 (0.08)	0.79	3.49	0.11
	2009-2010	All	65	0.33	82	0.75 (0.07)	0.72	2.81	0.09
Environmental Phenols: Parabens									
	Butyl paraben								
	2003-2004	--							
	2005-2006	B	129	0.2	68	0.98 (0.30)	1.16	26.68	0.30
	2007-2008	B	20	0.2	89	1.56 (0.22)	0.29	67.28	0.14
	2009-2010	B	26	0.2	59	___*	0.38	11.40	___*
	Ethyl paraben								
	2003-2004	--							
	2005-2006	B	129	1	39	___*	< LOD	133.10	___*
	2007-2008	B	20	1	73	7.63 (1.42)	4.08	151.52	0.19
	2009-2010	B	26	1	54	___*	1.33	31.85	___*
	Methyl paraben								
	2003-2004	--							
	2005-2006	B	129	1	100	98.95 (18.21)	75.99	1042.3	0.18
	2007-2008	B	20	1	100	286.93 (48.62)	414.65	1433.0	0.17
	2009-2010	B	26	1	100	64.37 (15.95)	61.56	917.1	0.25
	n -Propyl paraben								
	2003-2004	--							
	2005-2006	B	129	0.2	94	16.83 (5.90)	17.52	361.6	0.35
	2007-2008	B	20	0.2	100	41.69 (6.21)	33.32	254.2	0.15
	2009-2010	B	26	0.2	93	14.73 (4.58)	14.06	288.6	0.31
Perchlorate and Other Anions									
	Perchlorate								
	2003-2004	C	89	0.05	100	4.39 (0.88)	4.40	30.5	0.20
	2005-2006	All	352	0.05	100	3.22 (0.29)	3.21	11.0	0.09
	2007-2008	All	56	0.05	100	3.30 (0.49)	2.65	12.8	0.15
	2009-2010	--							
	Nitrate								
	2003-2004	No data							
	2005-2006	All	352	0.7	100	37080 (3577.04)	41437.48	108684.4	0.10
	2007-2008	All	56	0.7	99	42002 (4466.84)	51642.60	102898.3	0.11
	2009-2010	--							
	Thiocynanate								
	2003-2004	--							
	2005-2006	All	352	0.02	100	873.04 (102.71)	914.52	5614.5	0.12
	2007-2008	All	56	0.02	96	836.93 (147.20)	915.08	4073.9	0.18
	2009-2010	--							

KEY:		
	___*	GM, GSE, CV could not be calculated as detection rate is <60%
	--	Data was unavailable from NHANES
	< LOD	Percentile is less than the limit of detection

Table 11: ANOVA Results for Remaining Analytes, Weighted and Adjusted for Covariates

Chemical	DF	Satterthwaite Adjusted DF	Satterthwaite Adjusted F	p-Value	Sig
Tobacco Smoke					
Serum Cotinine	3	2.45	0.85	0.4545	
Environmental Phenols (urine, µg/L)					
Bisphenol A	3	2.45	1.21	0.3156	
Triclosan	3	2.42	2.90	0.0576	*
Benzophenone-3	3	2.58	2.46	0.0856	*
4-tert -Octylphenol	+				
Urinary Current Use Pesticides: Sulfonlyurea Herbicides					
Bensulfuron-methyl	+				
Chlorsulfuron	+				
Ethametsulfuron-methyl	+				
Foramsulfuron	+				
Halosulfuron	+				
Mesosulfuron-methyl	+				
Metsulfuron-methyl	+				
Nicosulfuron	+				
Oxasulfuron	+				
Primisulfuron-methyl	+				
Prosulfuron	+				
Rimsulfuron	+				
Sulfometuron-methyl	+				
Sulfosulfuron	+				
Thifensulfuron-methyl	+				
Triasulfuron	+				
Triflusulfuron-methyl	+				
Urinary Total Arsenic and Speciated Arsenics					
Arsenic, Total (urine)	3	2.48	1.30	0.2873	
Arsenous (III) Acid	3	2.21	4.96	0.0105	**
Arsenic (V) Acid	3	2.27	1.64	0.2051	
Arsenobetaine	3	2.58	1.35	0.2726	
Arsenocholine	3	1.18	3.29	0.0719	*
Dimethylarsinic Acid	3	2.14	0.62	0.5549	
Monomethylarsonic Acid	3	1.73	0.43	0.6231	
Trimethylarsine oxide	+				
Blood Lead, Cadmium, and Mercury (Total & Inorganic)					
Cadmium (blood)	3	2.56	1.69	0.1862	
Lead (blood)	3	2.89	1.86	0.1487	
Mercury, Inorganic	3	2.43	4.24	0.0141	**
Mercury, Total	3	2.63	0.31	0.7884	
Perchlorate and Other Anions					
Perchlorate	2	1.78	0.42	0.6338	
Nitrate	--				
Thiocynanate	--				
Urinary Polycyclic Aromatic Hydrocarbons (PAHs)					
1-hydroxynaphthalene (ng/L) (1-Naphthol)	2	1.58	2.00	0.1597	

2-hydroxynaphthalene (ng/L) (2-Naphthol)	2	1.94	0.67	0.5125	
3-hydroxyfluorene (ng/L)	2	1.99	0.15	0.8565	
2-hydroxyfluorene (ng/L)	2	1.97	0.78	0.4651	
3-hydroxyphenanthrene (ng/L)	2	1.67	2.64	0.0948	*
1-hydroxyphenanthrene (ng/L)	2	1.83	0.02	0.9787	
2-hydroxyphenanthrene (ng/L)	2	1.88	0.21	0.7988	
1-hydroxypyrene (ng/L)	2	1.98	2.69	0.0833	*
9-hydroxyfluorene (ng/L)	2	1.88	0.67	0.5094	
4-hydroxyphenanthrene (ng/L)	--				

Key: * P < 0.1; ** p < 0.05; *** p < 0.01
+: Not enough data for analysis.
--: Data unavailable for analysis.

Table 12: Chemical Concentrations by Analyte ANOVA: Cycles Compared to Reference Cycle (2003-2004) in US Pregnant Women, Weighted and Adjusted for Covariates (Remaining Analytes)

Cycle	2003 vs Cycle B-Coefficient (90% CI)	Adjusted LSGM	Adjusted 90% CI
Tobacco Smoke			
Cotinine, [serum (ng/mL)]			
2003-2004	--	0.06	(0.05 - 0.08)
2005-2006	0.31 (0.00 to 0.62)*	0.08	(0.07 - 0.10)
2007-2008	0.65 (-0.06 to 1.36)	0.12	(0.06 - 0.22)
2009-2010	0.31 (-0.38 to 1.01)	0.08	(0.04 - 0.15)
Environmental Phenols, [urine (ng/mL)]			
Bisphenol A (2,2-bis [4-Hydroxyphenyl] propane)			
2003-2004	--	1.86	(1.49 - 2.29)
2005-2006	-0.11 (-0.38 to 0.16)	1.65	(1.36 - 2.01)
2007-2008	0.00 (-0.36 to 0.37)	1.86	(1.42 - 2.44)
2009-2010	-0.38 (-0.77 to 0.02)	1.27	(0.90 - 1.79)
Triclosan (2,4,4'-Trichloro-2'-hydroxyphenyl ether)			
2003-2004	--	17.12	(10.28 - 28.50)
2005-2006	0.82 (0.17 to 1.48) **	38.86	(26.05 - 57.97)
2007-2008	-0.05 (-1.09 to 1.00)	16.28	(6.11 - 43.82)
2009-2010	-0.38 (-1.11 to 0.36)	11.70	(6.82 - 20.09)
Benzophenone-3 (2-Hydroxy-4-methyoxybenzophenone)			
2003-2004	--	50.91	(29.96 - 85.63)
2005-2006	-0.06 (-0.83 to 0.70)	47.47	(29.37 - 77.48)
2007-2008	-1.46 (-2.39 to -0.54) **	11.70	(5.99 - 23.10)
2009-2010	-0.56 (-1.48 to 0.36)	29.08	(12.06 - 69.41)
Environmental Pesticides: Fungicides, Herbicides, Organochlorines, and Other [urine (µg/L)]			
O-Phenyl phenol			
2003-2004	--	0.13	(0.10 - 0.16)
2005-2006	-0.31 (-0.60 to -0.01)*	0.09 ^	(0.08 - 0.11)
2007-2008	-0.29 (-0.64 to 0.07)	0.1 ^	(0.73 - 0.13)
2009-2010	0.28 (0.02 to 0.53)*	0.17 ^	(0.15 - 0.19)
2,4-Dichlorophenol			
2003-2004	--	1.17	(0.77 - 1.80)
2005-2006	-0.45 (-1.02 to 0.13)	0.76	(0.53 - 1.06)
2007-2008	-0.37 (-1.19 to 0.46)	0.81	(0.41 - 1.60)
2009-2010	-0.57 (-1.24 to 0.09)	0.66	(0.43 - 1.03)
2,4,5-Trichlorophenol			
2003-2004	--	0.09	(0.08 - 0.10)
2005-2006	0.05 (-0.11 to 0.22)	0.09	(0.09 - 0.11)
2007-2008	-0.05 (-0.26 to 0.16)	0.09	(0.07 - 0.10)
2009-2010	-0.02 (-0.20 to 0.17)	0.09	(0.08 - 0.10)
2,4,6-Trichlorophenol			
2003-2004	--	0.42	(0.38 - 0.48)
2005-2006	-0.01 (-0.19 to 0.18)	0.42	(0.38 - 0.46)
2007-2008	-0.14 (-0.28 to -0.01)*	0.36	(0.34 - 0.39)
2009-2010	-0.11 (-0.28 to 0.06)	0.38	(0.35 - 0.41)
2,5-Dichlorophenol			
2003-2004	--	17.29	(10.59 - 28.50)
2005-2006	-0.83 (-1.71 to 0.05)	7.54	(4.01 - 14.15)

2007-2008	-0.47 (-1.68 to 0.74)**	10.91	(4.06 - 29.08)
2009-2010	-1.32 (-2.37 to -0.28)	4.62	(2.03 - 10.49)
Phytoestrogens and Metabolites, [urine (ng/mL)]			
Daidzein			
2003-2004	--	40.85	(26.84 - 62.18)
2005-2006	0.22 (-0.40 to 0.84)	50.91	(34.12 - 76.71)
2007-2008	-0.07 (-0.77 to 0.63)	38.09	(23.57 - 60.95)
2009-2010	0.19 (-0.57 to 0.95)	49.40	(25.53 - 95.58)
Enterodiol			
2003-2004	--	55.15	(32.46 - 94.63)
2005-2006	-0.17 (-0.96 to 0.63)	46.99	(25.28 - 86.49)
2007-2008	-0.65 (-1.47 to 0.17)	28.79	(17.12 - 48.91)
2009-2010	0.23 (-0.81 to 1.26)	69.41	(30.57 - 159.17)
Enterolactone			
2003-2004	--	259.82	(184.93 - 368.71)
2005-2006	0.20 (-0.28 to 0.67)	317.35	(221.41 - 454.87)
2007-2008	-0.63 (-1.54 to 0.29)	139.77	(60.95 - 317.35)
2009-2010	0.39 (-0.19 to 0.98)	387.61	(235.10 - 632.70)
Equol			
2003-2004	--	7.10	(5.47 - 9.21)
2005-2006	0.01 (-0.51 to 0.52)	7.17	(4.76 - 10.70)
2007-2008	-0.51 (-1.06 to 0.04)	4.26	(2.75 - 6.62)
2009-2010	-0.00 (-0.58 to 0.57)	7.03	(4.35 - 11.47)
Genistein			
2003-2004	--	21.76	(13.33 - 35.87)
2005-2006	0.06 (-0.51 to 0.63)	23.10	(18.36 - 29.37)
2007-2008	-0.57 (-1.23 to 0.08)	12.30	(8.25 - 18.36)
2009-2010	0.39 (-0.37 to 1.16)	32.14	(18.92 - 55.15)
O-Desmethylangolensin			
2003-2004	--	2.89	(1.55 - 5.37)
2005-2006	0.05 (-0.94 to 1.05)	3.03	(1.52 - 6.05)
2007-2008	0.09 (-0.96 to 1.15)	3.16	(1.42 - 7.03)
2009-2010	0.08 (-0.98 to 1.13)	3.13	(1.36 - 7.10)
Total Arsenic and Speciated Arsenics, [urine (µg/L)]			
Arsenic, Total (urine)			
2003-2004	--	8.17	(5.93 - 11.25)
2005-2006	0.07 (-0.27 to 0.42)	8.76	(7.24 - 10.70)
2007-2008	0.45 (-0.10 to 1.00)	12.81	(8.85 - 18.36)
2009-2010	0.39 (-0.17 to 0.95)	12.06	(8.41 - 17.29)
Arsenous (III) Acid			
2003-2004	--	0.79	(0.77 - 0.80)
2005-2006	0.10 (0.06 to 0.14)***	0.87	(0.85 - 0.89)
2007-2008	0.14 (0.06 to 0.22)***	0.90	(0.84 - 0.97)
2009-2010	0.17 (0.07 to 0.26)***	0.92	(0.85 - 1.01)
Arsenic (V) Acid			
2003-2004	--	0.70	(0.70 - 0.71)
2005-2006	0.02 (-0.00 to 0.03)	0.72	(0.71 - 0.73)
2007-2008	0.01 (-0.00 to 0.03)	0.71	(0.70 - 0.72)
2009-2010	0.02 (0.01 to 0.04)**	0.72	(0.70 - 0.73)
Arsenobetaine			

2003-2004	--	1.14	(0.63 - 2.08)
2005-2006	0.27 (-0.41 to 0.95)	1.49	(1.04 - 2.14)
2007-2008	0.93 (0.02 to 1.84)*	2.89	(1.70 - 4.90)
2009-2010	0.43 (-0.49 to 1.34)	1.73	(0.97 - 3.13)
Arsenocholine			
2003-2004	--	0.39	(0.37 - 0.40)
2005-2006	0.12 (0.04 to 0.20)**	0.44	(0.42 - 0.46)
2007-2008	0.08 (0.02 to 0.13)**	0.42	(0.40 - 0.44)
2009-2010	0.26 (0.04 to 0.49)*	0.50	(0.41 - 0.61)
Dimethylarsinic Acid			
2003-2004	--	4.14	(3.35 - 5.10)
2005-2006	0.13 (-0.11 to 0.36)	4.71	(4.22 - 5.26)
2007-2008	0.29 (-0.21 to 0.79)	5.53	(3.67 - 8.33)
2009-2010	0.02 (-0.35 to 0.39)	4.22	(3.29 - 5.47)
Monomethylarsonic Acid			
2003-2004	--	0.83	(0.72 - 0.96)
2005-2006	-0.04 (-0.19 to 0.12)	0.80	(0.73 - 0.88)
2007-2008	-0.13 (-0.49 to 0.22)	0.73	(0.55 - 0.96)
2009-2010	-0.14 (-0.32 to 0.05)	0.73	(0.66 - 0.80)
Blood Lead, Cadmium, and Mercury, [serum (µg/L)]			
Cadmium			
2003-2004	--	0.22	(0.19 - 0.25)
2005-2006	0.17 (0.03 to 0.30)**	0.26	(0.24 - 0.27)
2007-2008	0.12 (-0.09 to 0.33)	0.24	(0.21 - 0.29)
2009-2010	0.06 (-0.11 to 0.23)	0.23	(0.21 - 0.25)
Lead (blood)			
2003-2004	--	0.70	(0.63 - 0.77)
2005-2006	-0.12 (-0.24 to 0.00)	0.62	(0.57 - 0.67)
2007-2008	-0.19 (-0.34 to -0.04)**	0.58	(0.52 - 0.63)
2009-2010	-0.15 (-0.31 to -0.00)*	0.60	(0.54 - 0.67)
Inorganic Mercury			
2003-2004	--	0.36	(0.34 - 0.38)
2005-2006	-0.08 (-0.20 to 0.03)	0.33	(0.30 - 0.37)
2007-2008	-0.14 (-0.25 to -0.03)**	0.31	(0.29 - 0.34)
2009-2010	-0.28 (-0.39 to -0.17)***	0.27	(0.25 - 0.30)
Total Mercury			
2003-2004	--	0.73	(0.61 - 0.87)
2005-2006	0.01 (-0.22 to 0.24)	0.73	(0.64 - 0.84)
2007-2008	-0.12 (-0.38 to 0.14)	0.64	(0.53 - 0.78)
2009-2010	0.01 (-0.22 to 0.23)	0.73	(0.64 - 0.83)
Perchlorate, [urine (ng/mL)]			
Perchlorate			
2003-2004	--	3.46	(3.00 - 4.01)
2005-2006	-0.07 (-0.24 to 0.10)	3.22	(2.92 - 3.56)
2007-2008	0.03 (-0.22 to 0.28)	3.56	(2.86 - 4.48)

Key: * p < 0.1; ** p < 0.05; *** p < 0.01

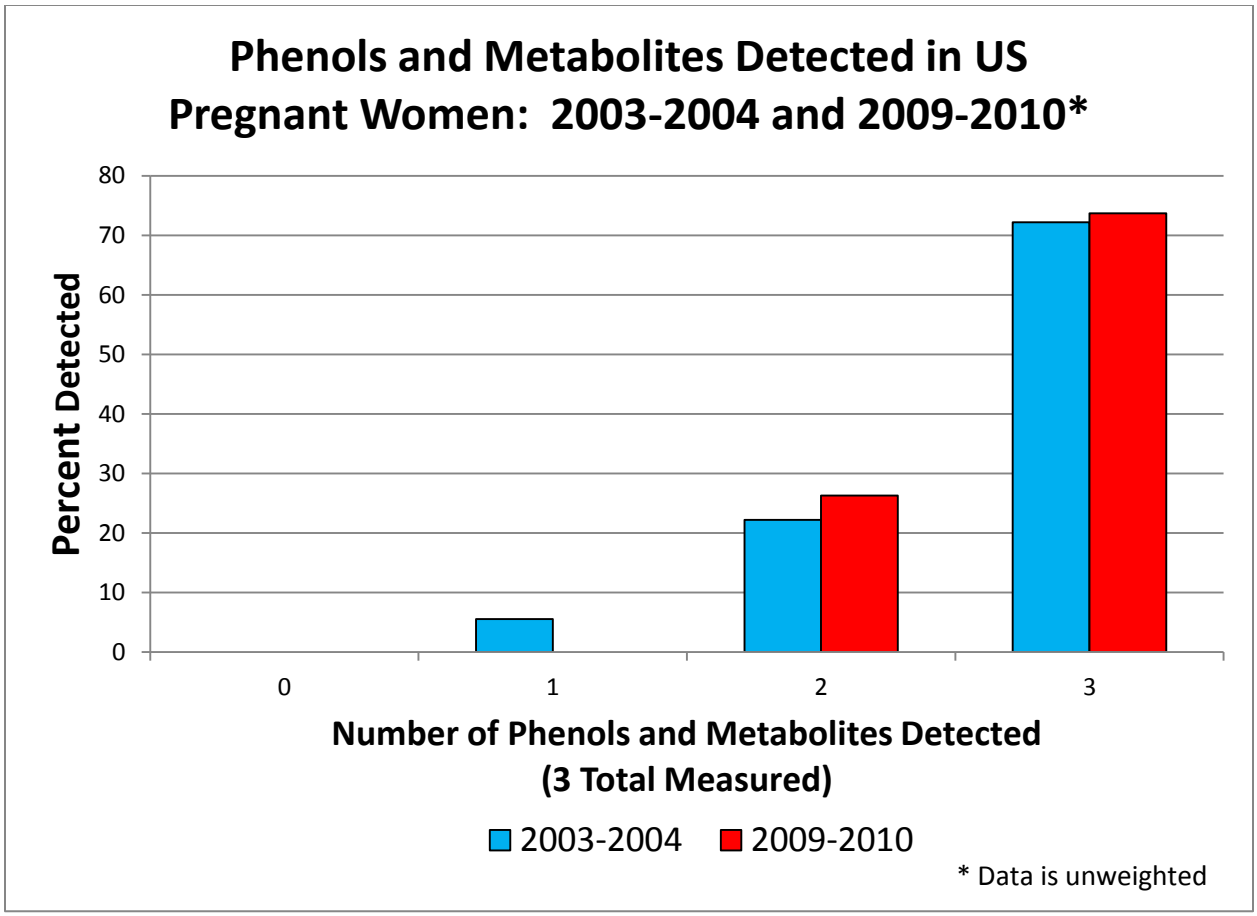

Figure 13: Phenols and Metabolites (2003-2004 vs. 2009-2010)

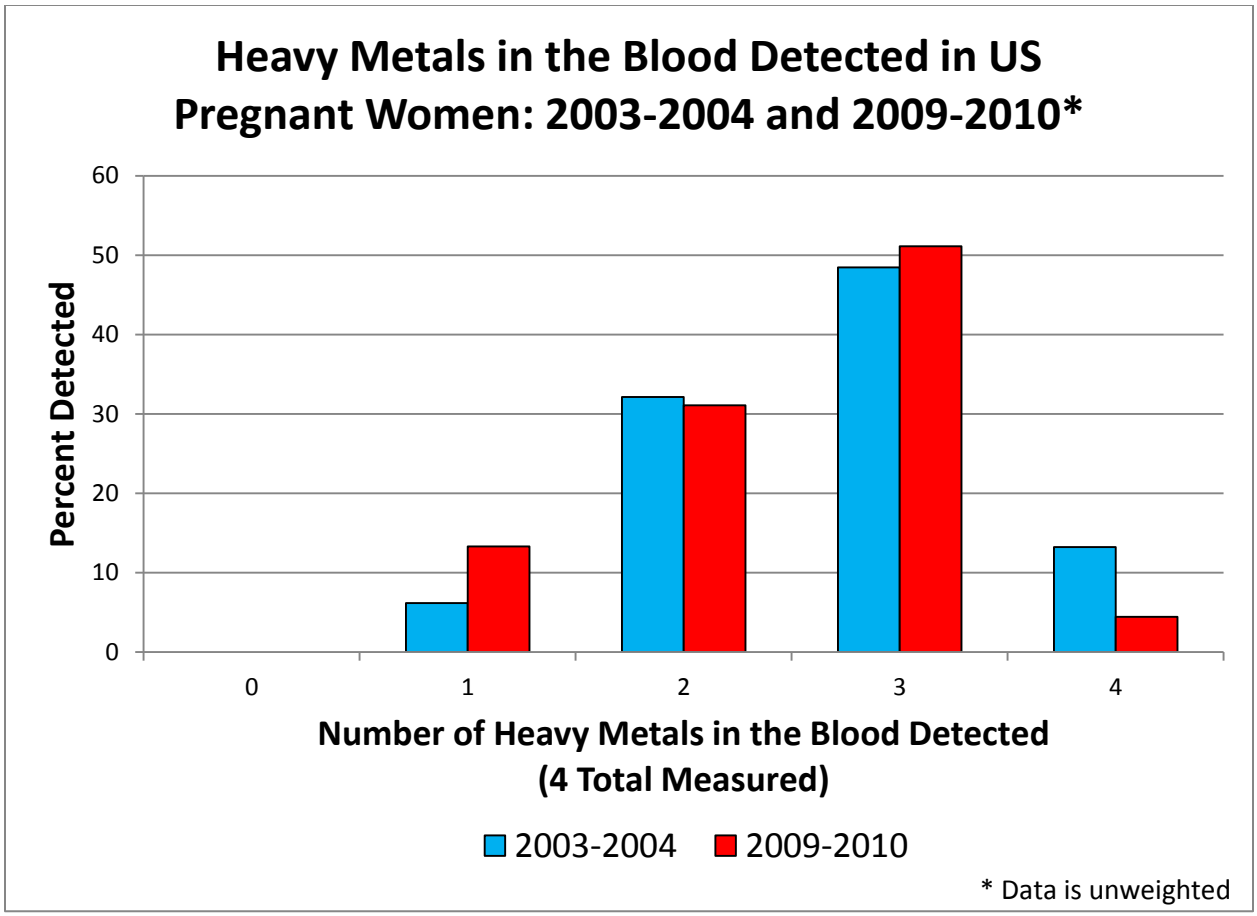

Figure 14: Heavy Metals in the Blood (2003-2004 vs. 2009-2010)

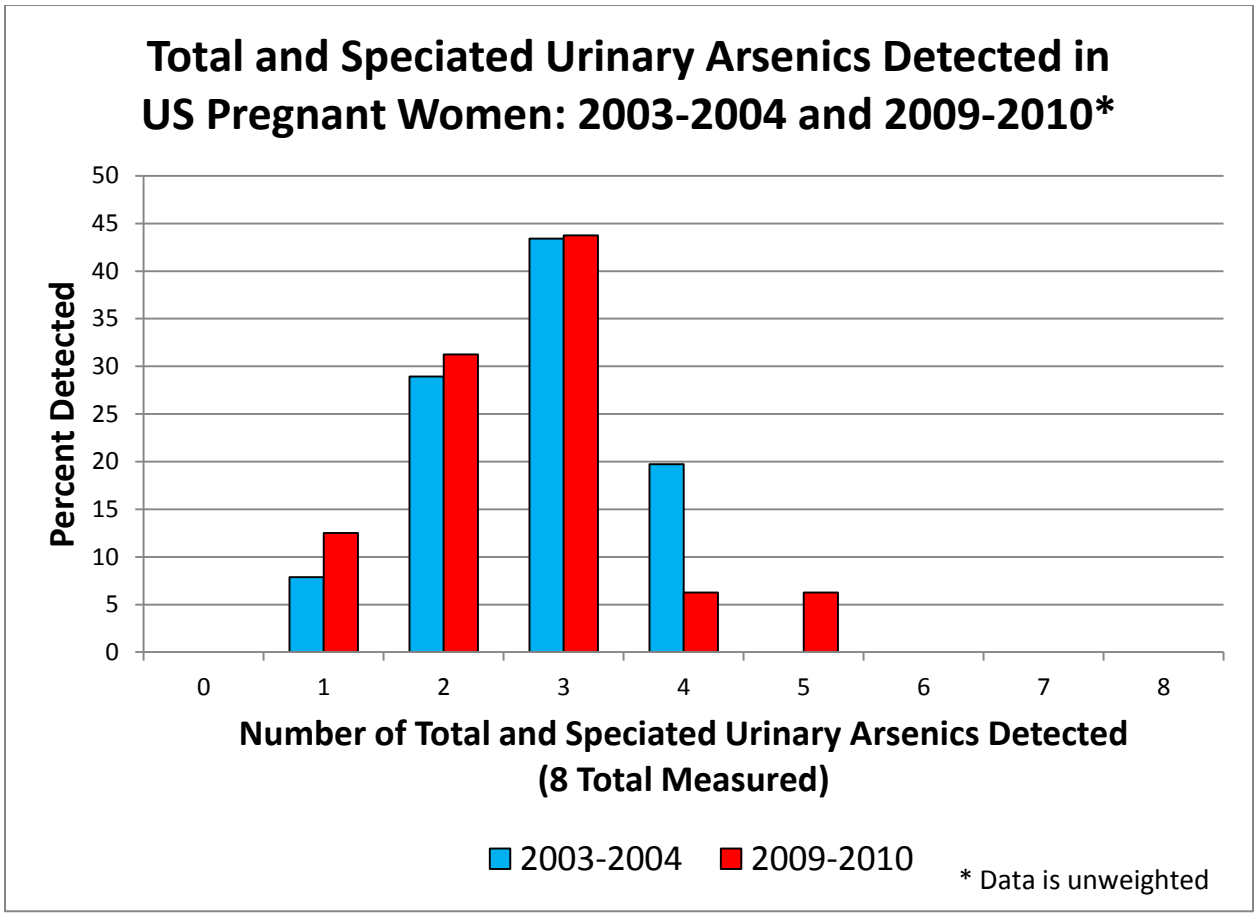

Figure 15: Total and Speciated Urinary Arsenics (2003-2004 vs. 2009-2010)

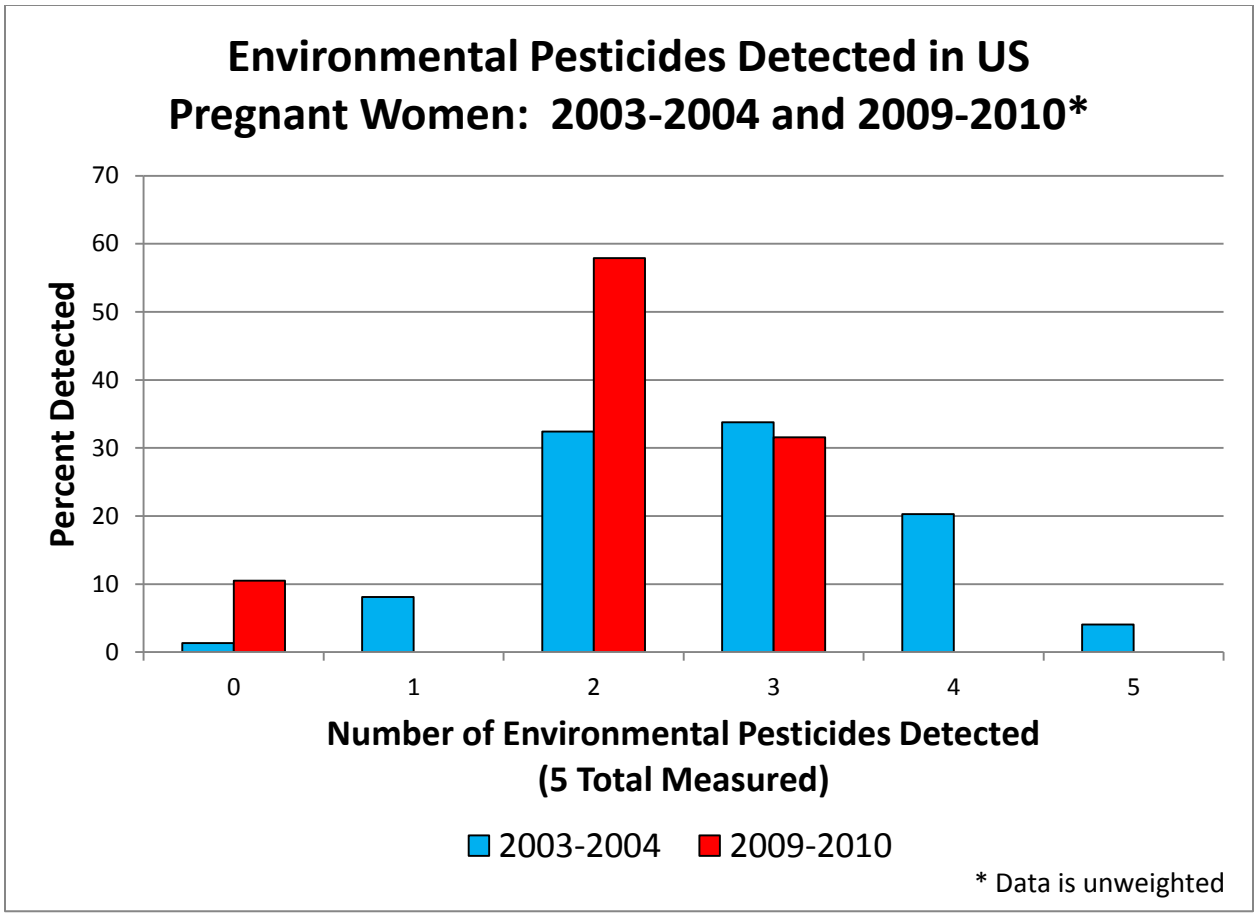

Figure 16: Environmental Pesticides (2003-2004 vs. 2009-2010)

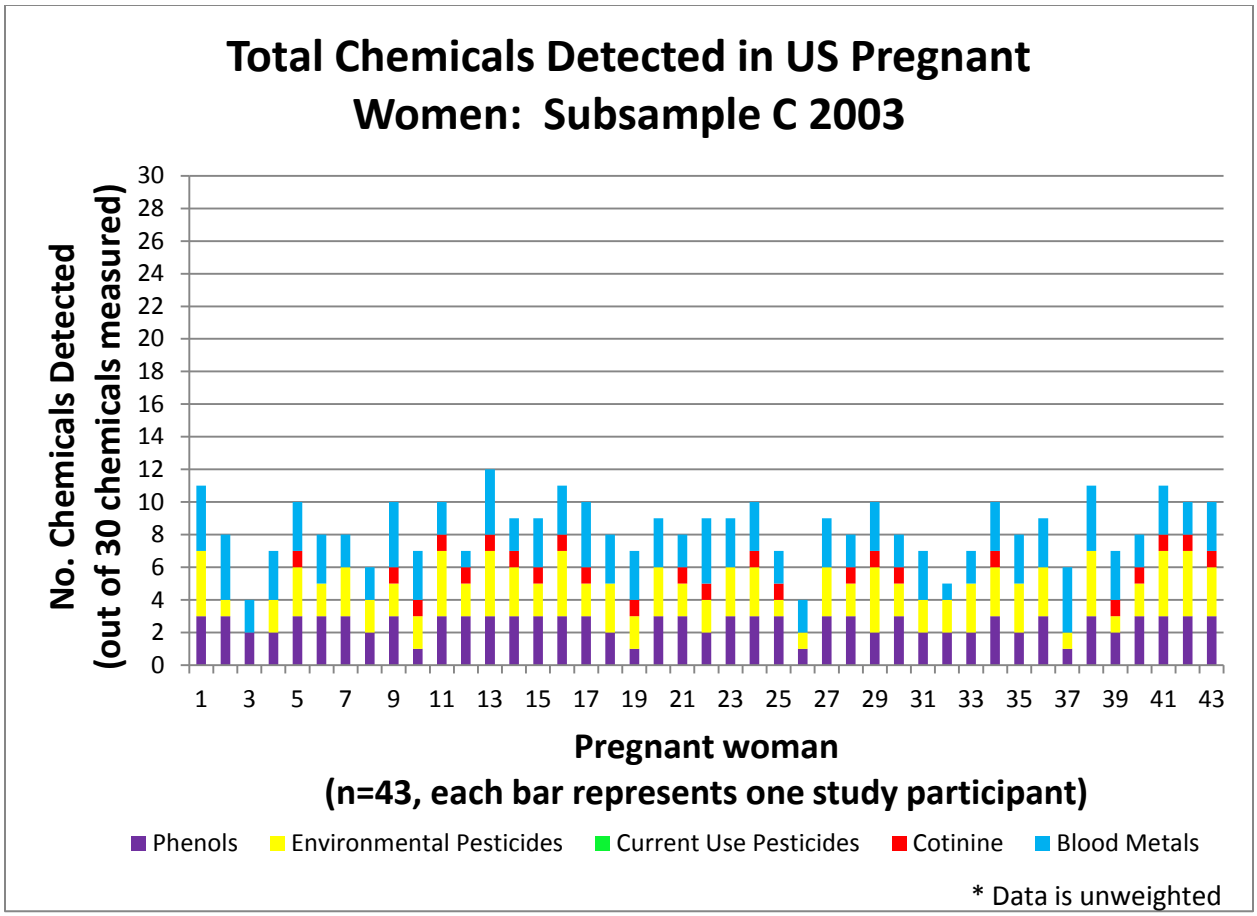

Figure 17: Total Chemicals Detected in US Pregnant Women: Subsample C 2003

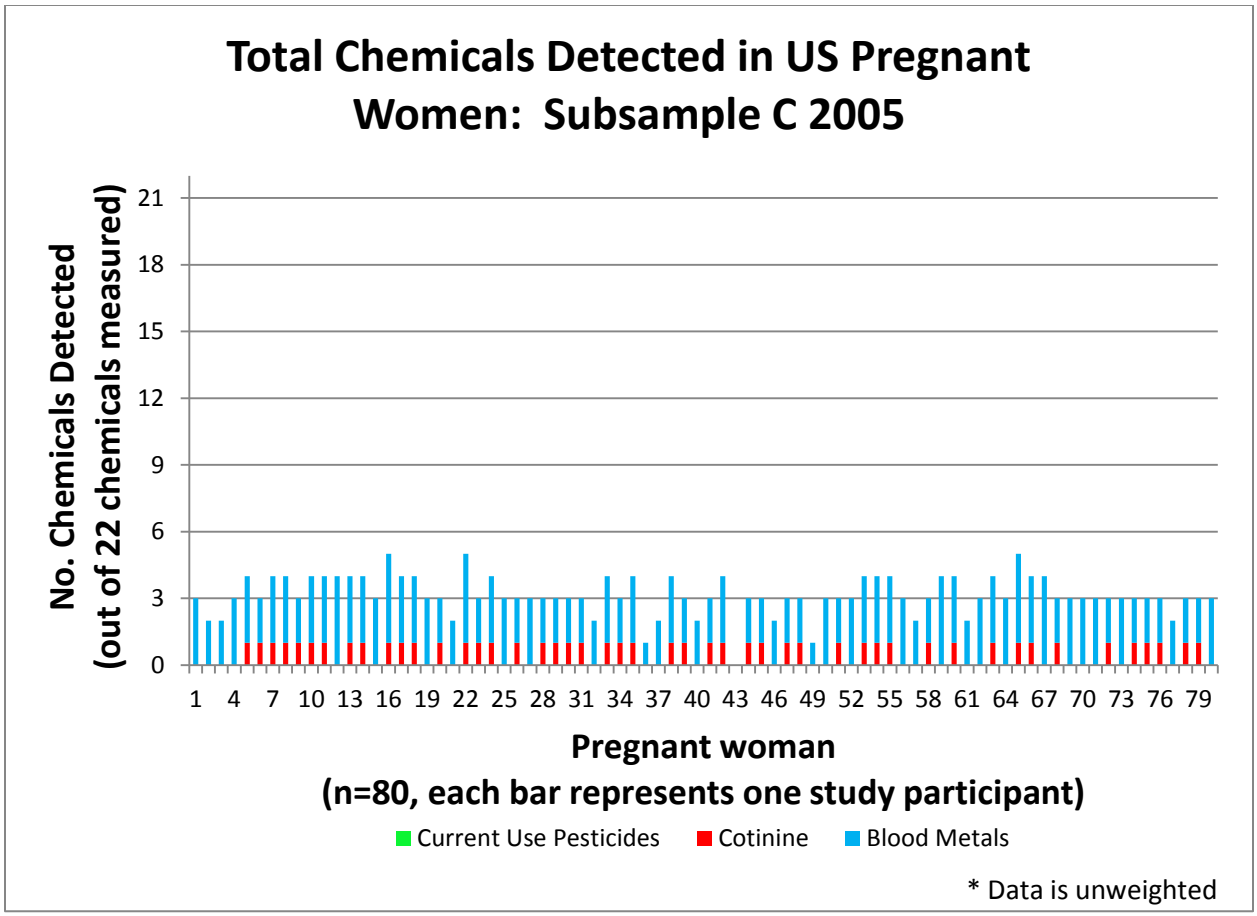

Figure 18: Total Chemicals Detected in US Pregnant Women: Subsample C 2005

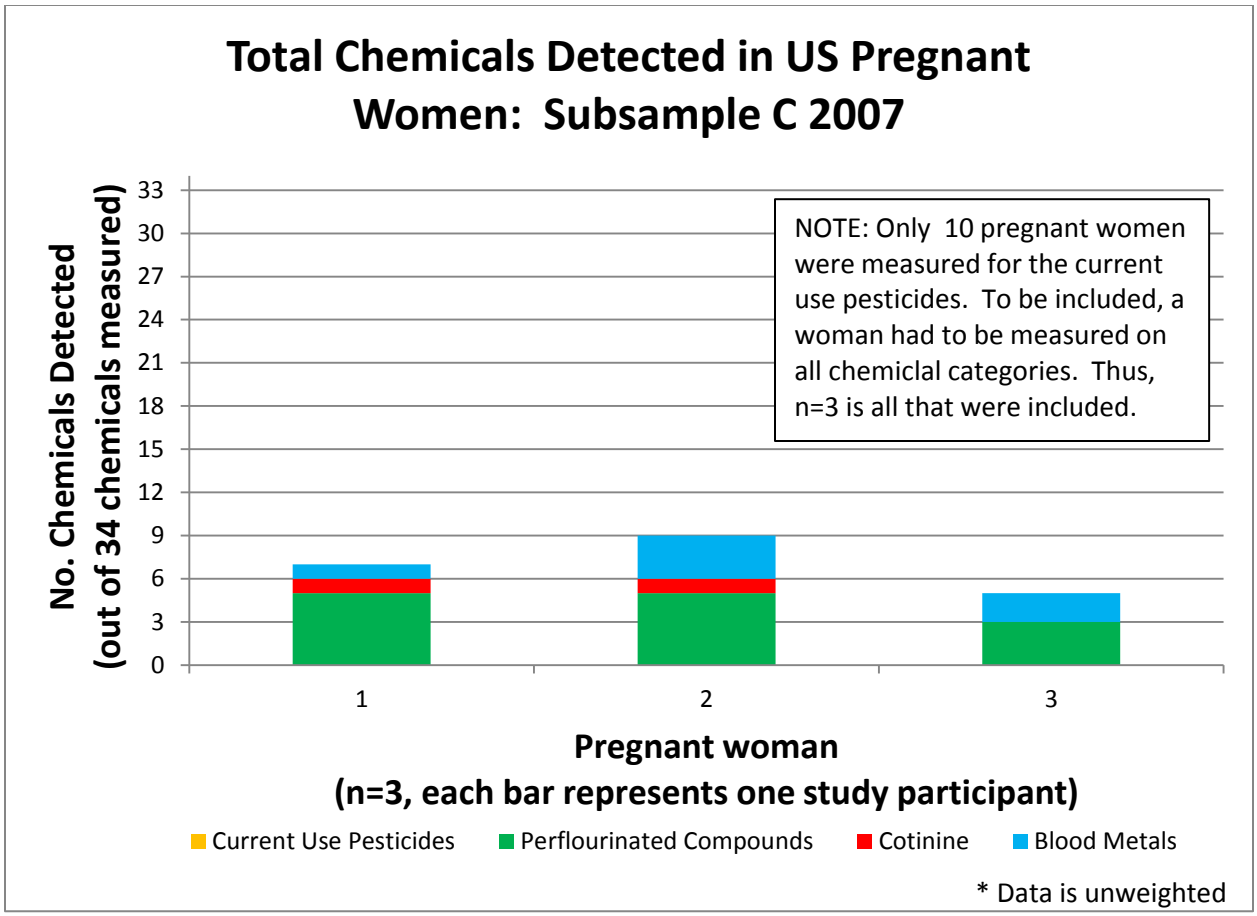

Figure 19: Total Chemicals Detected in US Pregnant Women: Subsample C 2007

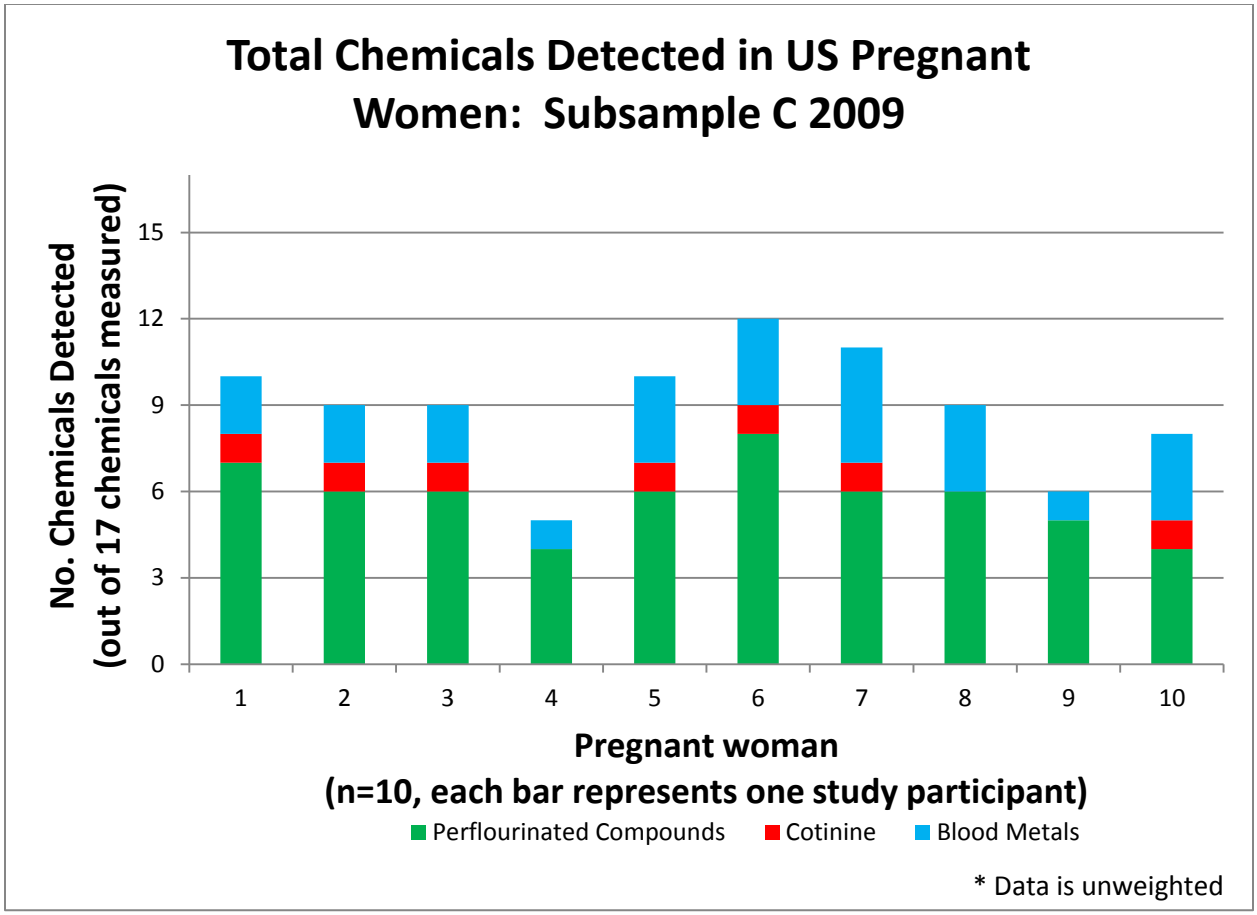

Figure 20: Total Chemicals Detected in US Pregnant Women: Subsample C 2009

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SAS Code

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                                MS Thesis
                                June 2014

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      Multiple Chemical Exposures to Pregnant Women in the US -
            An NHANES Study of Data from 2003 through 2010

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data source.lab07_10;  set lab07_10.PERNT_E; run;
data source.lab07_11;  set lab07_11.PHTHTE_E; run;
data source.lab07_12;  set lab07_12.PHYTO_E; run;
data source.lab07_13;  set lab07_13.PbCd_E; run;
data source.lab07_14;  set lab07_14.THgIHg_E; run;
data source.lab07_15;  set lab07_15.PAH_E; run;
data source.lab07_18;  set lab07_18.ALB_CR_E; run;
data source.lab07_19;  set lab07_19.FASTQX_E; run;
data source.lab07_20;  set lab07_20.BIOPRO_E; run;
data source.lab07_21;  set lab07_21.BMX_E; run;

/***************
  2009 CYCLE
***************/
LIBNAME demo_09 xport 'C:\Users\mathteri\Documents\Thesis Files\Data\Source
Files\DEMO_F.xpt';
LIBNAME trim_09 xport 'C:\Users\mathteri\Documents\Thesis Files\Data\Source
Files\RHQ_F.xpt';
LIBNAME preg_09 xport 'C:\Users\mathteri\Documents\Thesis Files\Data\Source
Files\UCPREG_F.xpt';
LIBNAME smoke_09 xport 'C:\Users\mathteri\Documents\Thesis Files\Data\Source
Files\smq_f.xpt';
LIBNAME lab09_1   xport 'C:\Users\mathteri\Documents\Thesis Files\Data\Source
Files\COTNAL_F.xpt';
LIBNAME lab09_2   xport 'C:\Users\mathteri\Documents\Thesis Files\Data\Source
Files\PP_F.xpt';
LIBNAME lab09_3   xport 'C:\Users\mathteri\Documents\Thesis Files\Data\Source
Files\EPH_F.xpt';
LIBNAME lab09_4     xport 'C:\Users\mathteri\Documents\Thesis
Files\Data\Source Files\UHM_F.xpt';
LIBNAME lab09_6   xport 'C:\Users\mathteri\Documents\Thesis Files\Data\Source
Files\PFC_F.xpt';
LIBNAME lab09_7     xport 'C:\Users\mathteri\Documents\Thesis
Files\Data\Source Files\UAS_F.xpt';
LIBNAME lab09_9   xport 'C:\Users\mathteri\Documents\Thesis Files\Data\Source
Files\UHG_F.xpt';
LIBNAME lab09_11  xport 'C:\Users\mathteri\Documents\Thesis Files\Data\Source
Files\PHTHTE_F.xpt';
LIBNAME lab09_12  xport 'C:\Users\mathteri\Documents\Thesis Files\Data\Source
Files\PHYTO_F.xpt';
LIBNAME lab09_13  xport 'C:\Users\mathteri\Documents\Thesis Files\Data\Source
Files\PbCd_F.xpt';
LIBNAME lab09_14  xport 'C:\Users\mathteri\Documents\Thesis Files\Data\Source
Files\THgIHg_F.xpt';
LIBNAME lab09_18  xport 'C:\Users\mathteri\Documents\Thesis Files\Data\Source
Files\ALB_CR_F.xpt';
LIBNAME lab09_19  xport 'C:\Users\mathteri\Documents\Thesis Files\Data\Source
Files\FASTQX_F.xpt';
```

```
LIBNAME lab09_20  xport 'C:\Users\mathteri\Documents\Thesis Files\Data\Source
Files\BIOPRO_F.xpt';
LIBNAME lab09_21  xport 'C:\Users\mathteri\Documents\Thesis Files\Data\Source
Files\BMX_F.xpt';

            data source.demo_09; set demo_09.demo_F; run;
            data source.trim_09; set trim_09.rhq_F; run;
            data source.preg_09; set preg_09.UCPREG_F; run;
            data source.smoke_09; set smoke_09.smq_f; run;
            data source.lab09_1;  set lab09_1.COTNAL_F; run;
            data source.lab09_2;  set lab09_2.PP_F; run;
            data source.lab09_3;  set lab09_3.EPH_F; run;
            data source.lab09_4;  set lab09_4.UHM_F; run;
            data source.lab09_6;  set lab09_6.PFC_F; run;
            data source.lab09_7;  set lab09_7.UAS_F; run;
            data source.lab09_9;  set lab09_9.UHG_F; run;
            data source.lab09_11;  set lab09_11.PHTHTE_F; run;
            data source.lab09_12;  set lab09_12.PHYTO_F; run;
            data source.lab09_13;  set lab09_13.PbCd_F; run;
            data source.lab09_14;  set lab09_14.THgIHg_F; run;
            data source.lab09_18;  set lab09_18.ALB_CR_F; run;
            data source.lab09_19;  set lab09_19.FASTQX_F; run;
            data source.lab09_20;  set lab09_20.BIOPRO_F; run;
            data source.lab09_21;  set lab09_21.BMX_F; run;

/*NOTE: 2009 Urinary Phytoestrogens was released Jan 2013,
            with a wrong field - SHOULD BE SUBSAMPLE A (shows B - so I delete
the
                  wt column altogether here)*/
            data source.lab09_12;
                  set source.lab09_12 (drop = WTSB2YR);
            run;

/*************************************************************
                              SECTION TWO
Purpose:  Combine datafiles into four files, by cycle.
               Truncate data to primary group of interest:
                 US pregnant women of child-bearing age
                 (females, 15-44 yrs).
*************************************************************/

/***************
  2003 CYCLE
***************/
            /*********************************
                  Sort all 2003 by seqn
            *********************************/
                  proc sort data = source.demo_03;  by seqn;  run;
                  proc sort data = source.trim_03;  by seqn;      run;
                  proc sort data = source.preg_03;  by seqn;      run;
                  proc sort data = source.smoke_03;  by seqn;     run;
                  proc sort data = source.smec_03;  by seqn;      run;
                  proc sort data = source.lab03_1;   by seqn; run;
                  proc sort data = source.lab03_2;   by seqn; run;
                  proc sort data = source.lab03_3;   by seqn; run;
                  proc sort data = source.lab03_4;   by seqn; run;
                  proc sort data = source.lab03_5;   by seqn; run;
```

```
                proc sort data = source.lab03_6;   by seqn; run;
                proc sort data = source.lab03_7;   by seqn; run;
                proc sort data = source.lab03_8;   by seqn; run;
                proc sort data = source.lab03_9;   by seqn; run;
                proc sort data = source.lab03_10;   by seqn; run;
                proc sort data = source.lab03_11;   by seqn; run;
                proc sort data = source.lab03_12;   by seqn; run;
                proc sort data = source.lab03_13;   by seqn; run;
                proc sort data = source.lab03_15;   by seqn; run;
                proc sort data = source.lab03_18;   by seqn; run;
                proc sort data = source.lab03_19;   by seqn; run;
                proc sort data = source.lab03_20;   by seqn; run;
                proc sort data = source.lab03_21;   by seqn; run;

            /**********************************
             1) Truncate Demo File
                        Keep only Females (RIAGENDR = 2)
                        Child-bearing ages (15 <= RIDAGEYR <=44)
            **********************************/
                        Data source.base_03;
                              set source.demo_03;
                              IF RIAGENDR = 2 and (RIDAGEYR >=15 and RIDAGEYR
<= 44);
                        run;
            /*****************************
            2) Use Preg Lab File to Further
                  Limit Data to Pregnant Women
                  URXPREG =1 (positive)
            *****************************/
                        DATA source.basica_03;
                              merge source.base_03 (IN=A)
                                      source.preg_03 (IN=B)  ;
                              BY SEQN;
                              If A and B and (URXPREG = 1);  /*Capture preg
women only*/
                        RUN;
            /*****************************
            3) Append Smoking Files
                  Smoke and Smoke_MEC
                  Adult and Youth, respectively
                  Define Smoking Status
            *****************************/
                        Data source.basicb_03;
                              merge source.basica_03 (in=A)
                                      source.smoke_03 (keep = SEQN SMQ020
SMD030 SMQ040) ;
                              by Seqn;
                              If A;
                        run;
                        Data source.basicc_03;
                              merge source.basicb_03 (in=A)
                                      source.smec_03 (keep = seqn SMAQUEX
SMQ620 SMD630 SMQ640 SMQ650);
                              by Seqn;
                              If A;
                        run;
```

```
            /*****************************
            4) Append Reproductive Health File
                  For Trimester and Parity Data
                  Rename variable!
                        RHD170 to RHQ171 => 2003 has a different field name
for Parity
            *****************************/
                        DATA source.basicd_03(rename=(RHD170=RHQ171));
                              MERGE source.basicc_03 (IN=A)
                                    source.trim_03 (keep=RHD152 RHD170
RHQ160 RHD143 RHQ131 SEQN) ;
                              BY SEQN;
                              IF A;
                        RUN;
            /*********************************
            6)    Append Lab files to Base Data =>Temp file
            *********************************/
                  data tempa;
                        MERGE  source.basicd_03 (IN=A)
                                 source.lab03_1 ;
                        BY SEQN;
                        IF A;
                  run;
                  proc sort data=tempa; by seqn; run;
                  data tempb;
                        MERGE  tempa (IN=A)
                                 source.lab03_2 ;
                        BY SEQN;
                        IF A;
                  run;
                  proc sort data=tempb; by seqn; run;
                  data tempc;
                        MERGE  tempb (IN=A)
                                 source.lab03_3 ;
                        BY SEQN;
                        IF A;
                  run;
                  proc sort data=tempc; by seqn; run;
                  data tempd;
                        MERGE  tempc (IN=A)
                                 source.lab03_4 ;
                        BY SEQN;
                        IF A;
                  run;
                  proc sort data=tempd; by seqn; run;
                  data tempe;
                        MERGE  tempd (IN=A)
                                 source.lab03_5 ;
                        BY SEQN;
                        IF A;
                  run;
                  proc sort data=tempe; by seqn; run;
                  data tempf;
                        MERGE  tempe (IN=A)
                                 source.lab03_6 ;
                        BY SEQN;
                        IF A;
```

```
run;
proc sort data=tempf; by seqn; run;
data tempg;
      MERGE  tempf (IN=A)
               source.lab03_7 ;
      BY SEQN;
      IF A;
run;
proc sort data=tempg; by seqn; run;
data temph;
      MERGE  tempg (IN=A)
               source.lab03_8 ;
      BY SEQN;
      IF A;
run;
proc sort data=temph; by seqn; run;
data tempi;
      MERGE  temph (IN=A)
               source.lab03_9 ;
      BY SEQN;
      IF A;
run;
proc sort data=tempi; by seqn; run;
data tempj;
      MERGE  tempi (IN=A)
               source.lab03_10 ;
      BY SEQN;
      IF A;
run;
proc sort data=tempj; by seqn; run;
data tempk;
      MERGE  tempj (IN=A)
               source.lab03_11 ;
      BY SEQN;
      IF A;
run;
proc sort data=tempk; by seqn; run;
data templ;
      MERGE  tempk (IN=A)
               source.lab03_12 ;
      BY SEQN;
      IF A;
run;
proc sort data=templ; by seqn; run;
data tempm;
      MERGE  templ (IN=A)
               source.lab03_13 ;
      BY SEQN;
      IF A;
run;
data tempn;
      MERGE  tempm (IN=A)
               source.lab03_15 ;
      BY SEQN;
      IF A;
run;
data tempo;
```

```
                        MERGE  tempn (IN=A)
                                 source.lab03_18 ;
                        BY SEQN;
                        IF A;
                  run;
                  data tempp;
                        MERGE  tempo (IN=A)
                                 source.lab03_19 (keep = SEQN PHAFSTHR
PHAFSTMN);
                        BY SEQN;
                        IF A;
                  run;
                  data tempq;
                        MERGE  tempp (IN=A)
                                 source.lab03_20 (keep = SEQN LBXSAL
LBDSALSI);
                        BY SEQN;
                        IF A;
                  run;
                  /*****************************
                  7) Creating the final 2003 table
                  *****************************/
                  data source.all_03;
                        MERGE  tempq (IN=A)
                                 source.lab03_21 (keep = SEQN BMXBMI);
                        BY SEQN;
                        IF A;
                  run;
                  proc sort data=source.all_03; by seqn; run;

                  /*****************************
                  8)    Drop temp tables
                  *****************************/
                        proc sql;
                              drop table tempa, tempb, tempc, tempd, tempe,
tempf, tempg, temph, tempi,
                                                tempj, tempk, templ, tempm,
tempn, tempo, tempp, tempq;
                        quit;

/***************
  2005 CYCLE
***************/
            /*********************************
                        Sort all 2005 data files
            *********************************/
                  proc sort data = source.demo_05;  by seqn;  run;
                  proc sort data = source.trim_05;  by seqn;      run;
                  proc sort data = source.preg_05;  by seqn;      run;
                  proc sort data = source.smoke_05;  by seqn;     run;
                  proc sort data = source.lab05_1;   by seqn; run;
                  proc sort data = source.lab05_2;   by seqn; run;
                  proc sort data = source.lab05_3;   by seqn; run;
                  proc sort data = source.lab05_4;   by seqn; run;
                  proc sort data = source.lab05_6;   by seqn; run;
                  proc sort data = source.lab05_7;   by seqn; run;
                  proc sort data = source.lab05_8;   by seqn; run;
```

```
      proc sort data = source.lab05_9;   by seqn; run;
      proc sort data = source.lab05_10;   by seqn; run;
      proc sort data = source.lab05_11;   by seqn; run;
      proc sort data = source.lab05_12;   by seqn; run;
      proc sort data = source.lab05_13;   by seqn; run;
      proc sort data = source.lab05_14;   by seqn; run;
      proc sort data = source.lab05_15;   by seqn; run;
      proc sort data = source.lab05_18;   by seqn; run;
      proc sort data = source.lab05_19;   by seqn; run;
      proc sort data = source.lab05_20;   by seqn; run;
      proc sort data = source.lab05_21;   by seqn; run;

/**********************************
            Truncate Demo File
      Keep only Pregnant Females
            of Child-Bearing Ages
                  (15-44yrs)
**********************************/
            proc sort data = source.base_05;  by seqn;  run;
            proc sort data = source.trim_05;  by seqn;      run;
            proc sort data = source.preg_05;  by seqn;      run;
            Data source.base_05;
                  set source.demo_05;
                  IF RIAGENDR = 2 and (RIDAGEYR >=15 and RIDAGEYR
< 44);
            run;
/*****************************
      2) Use Preg Lab File to Further
            Limit Data to Pregnant Women
            URXPREG =1 (positive)
*****************************/
            DATA source.basica_05;
                  merge source.base_05  (IN=A)
                        source.preg_05  (IN=B) ;
                  BY SEQN;
                  If A and B and (URXPREG = 1);
            RUN;
/*****************************
      3) Append Smoking File
            Define Smoking Status
*****************************/
            Data source.basicb_05;
                  merge       source.basica_05 (in=a)
                              source.smoke_05 ;
                  By seqn;
                  if a;
            run;
/*****************************
4) Append Reproductive Health File
            For Trimester and Parity Data
            Pregnant Females = 367
                  Pregnant Females w/o Reproductive Health files
= 23
*****************************/
            DATA source.basicc_05;
                  MERGE source.basicb_05 (IN=A)
```

```
                                    source.trim_05 (keep=RHD152 RHQ160
RHQ171 RHQ131 SEQN) ;
                              BY SEQN;
                              IF A;
                        RUN;

                        /*Checking how many subj had missing reproductive
files */
                        proc sql;
                              select count(seqn) from source.basicc_05 where
RHD152 = . and RHQ171 = .;
                        quit;

            /**********************************
            5)    Append 2005 Lab files to Base Data =>Temp file
            **********************************/
                  data tempa;
                        MERGE  source.basicc_05 (IN=A)
                                 source.lab05_1 ;
                        BY SEQN;
                        IF A;
                  run;
                  proc sort data=tempa; by seqn; run;
                  data tempb;
                        MERGE  tempa (IN=A)
                                 source.lab05_2 ;
                        BY SEQN;
                        IF A;
                  run;
                  proc sort data=tempb; by seqn; run;
                  data tempc;
                        MERGE  tempb (IN=A)
                                 source.lab05_3 ;
                        BY SEQN;
                        IF A;
                  run;
                  proc sort data=tempc; by seqn; run;
                  data tempd;
                        MERGE  tempc (IN=A)
                                 source.lab05_4 ;
                        BY SEQN;
                        IF A;
                  run;
                  proc sort data=tempd; by seqn; run;
      /*Skip lab05_5 as this file was not needed; see nhanes chem1 sas code
file*/
                  data tempe;
                        MERGE  tempd (IN=A)
                                 source.lab05_6 ;
                        BY SEQN;
                        IF A;
                  run;
                  proc sort data=tempe; by seqn; run;
                  data tempf;
                        MERGE  tempe (IN=A)
                                 source.lab05_7 ;
                        BY SEQN;
```

```
      IF A;
run;
proc sort data=tempf; by seqn; run;
data tempg;
      MERGE  tempf (IN=A)
               source.lab05_8 ;
      BY SEQN;
      IF A;
run;
proc sort data=tempg; by seqn; run;
data temph;
      MERGE  tempg (IN=A)
               source.lab05_9 ;
      BY SEQN;
      IF A;
run;
proc sort data=temph; by seqn; run;
data tempi;
      MERGE  temph (IN=A)
               source.lab05_10;
      BY SEQN;
      IF A;
run;
proc sort data=tempi; by seqn; run;
data tempj;
      MERGE  tempi (IN=A)
               source.lab05_11 ;
      BY SEQN;
      IF A;
run;
proc sort data=tempj; by seqn; run;
data tempk;
      MERGE  tempj (IN=A)
               source.lab05_12;
      BY SEQN;
      IF A;
run;
proc sort data=tempk; by seqn; run;
data templ;
      MERGE  tempk (IN=A)
               source.lab05_13;
      BY SEQN;
      IF A;
run;
proc sort data=templ; by seqn; run;
data tempm;
      MERGE  templ (IN=A)
               source.lab05_14 ;
      BY SEQN;
      IF A;
run;
data tempn;
      MERGE  tempm (IN=A)
               source.lab05_15 ;
      BY SEQN;
      IF A;
run;
```

```
                  data tempo;
                        MERGE  tempn (IN=A)
                                 source.lab05_18 ;
                        BY SEQN;
                        IF A;
                  run;
                  data tempp;
                        MERGE  tempo (IN=A)
                                 source.lab05_19 (keep = SEQN PHAFSTHR
PHAFSTMN);
                        BY SEQN;
                        IF A;
                  run;
                  data tempq;
                        MERGE  tempp (IN=A)
                                 source.lab05_20 (keep = SEQN LBXSAL
LBDSALSI);
                        BY SEQN;
                        IF A;
                  run;
                  /*****************************
                  Creating the final 2005 table
                  *****************************/
                  data source.all_05;
                        MERGE  tempq (IN=A)
                                 source.lab05_21 (keep = SEQN BMXBMI);
                        BY SEQN;
                        IF A;
                  run;
                  proc sort data=source.all_05; by seqn; run;
                  /*****************************
                        Drop temp tables
                  *****************************/
                        proc sql;
                              drop table tempa, tempb, tempc, tempd, tempe,
tempf, tempg, temph, tempi,
                                                      tempj, tempk, templ, tempm,
tempn, tempo, tempp, tempq ;
                        quit;

/***************
  2007 CYCLE
***************/
            /*********************************
                  Sort all 2007 data files
            *********************************/
                  proc sort data = source.demo_07;  by seqn;  run;
                  proc sort data = source.trim_07;  by seqn;      run;
                  proc sort data = source.preg_07;  by seqn;      run;
                  proc sort data = source.smoke_07;  by seqn;     run;
                  proc sort data = source.lab07_1;   by seqn; run;
                  proc sort data = source.lab07_2;   by seqn; run;
                  proc sort data = source.lab07_3;   by seqn; run;
                  proc sort data = source.lab07_4;   by seqn; run;
                  proc sort data = source.lab07_6;   by seqn; run;
                  proc sort data = source.lab07_7;   by seqn; run;
                  proc sort data = source.lab07_8;   by seqn; run;
```

```
proc sort data = source.lab07_9;   by seqn; run;
proc sort data = source.lab07_10;   by seqn; run;
proc sort data = source.lab07_11;   by seqn; run;
proc sort data = source.lab07_12;   by seqn; run;
proc sort data = source.lab07_13;   by seqn; run;
proc sort data = source.lab07_14;   by seqn; run;
proc sort data = source.lab07_15;   by seqn; run;
proc sort data = source.lab07_18;   by seqn; run;
proc sort data = source.lab07_19;   by seqn; run;
proc sort data = source.lab07_20;   by seqn; run;
proc sort data = source.lab07_21;   by seqn; run;

/**********************************
            Truncate Demo File
      Keep only Pregnant Females
      of Child-Bearing Age (15-44)
**********************************/
            proc sort data = source.base_07;  by seqn;  run;
            proc sort data = source.trim_07;  by seqn;      run;
            proc sort data = source.preg_07;  by seqn;      run;
            Data source.base_07;
                  set source.demo_07;
                  IF RIAGENDR = 2 and (RIDAGEYR >=15 and RIDAGEYR
<= 44);
            run;
/*****************************
      2) Use Preg Lab File to Further
            Limit Data to Pregnant Women
            URXPREG =1 (positive)
*****************************/
            DATA source.basica_07;
                  merge source.base_07  (IN=A)
                        source.preg_07  (IN=B) ;
                  BY SEQN;
                  If A and B and (URXPREG = 1);
            RUN;
/*****************************
      3) Append Smoking File
            Define Smoking Status
*****************************/
            Data source.basicb_07;
                  merge       source.basica_07 (in=a)
                              source.smoke_07 ;
                  By seqn;
                  if a;
            run;
/*****************************
      4) Append Reproductive Health File
            For Trimester and Parity Data
*****************************/
            DATA source.basicc_07;
                  MERGE source.basicb_07 (IN=A)
                        source.trim_07 (keep=RHD152 RHQ160
RHQ171 RHQ131 SEQN) ;
                  BY SEQN;
                  IF A;
            RUN;
```

```
/**********************************
5)    Append 2007 Lab files to Base Data =>Temp file
**********************************/
      data tempa;
            MERGE  source.basicc_07 (IN=A)
                     source.lab07_1 ;
            BY SEQN;
            IF A;
      run;
      proc sort data=tempa; by seqn; run;
      data tempb;
            MERGE  tempa (IN=A)
                     source.lab07_2 ;
            BY SEQN;
            IF A;
      run;
      proc sort data=tempb; by seqn; run;
      data tempc;
            MERGE  tempb (IN=A)
                     source.lab07_3 ;
            BY SEQN;
            IF A;
      run;
      proc sort data=tempc; by seqn; run;
      data tempd;
            MERGE  tempc (IN=A)
                     source.lab07_4 ;
            BY SEQN;
            IF A;
      run;
      proc sort data=tempd; by seqn; run;
/*Skip lab07_5 as this file was not needed; see nhanes chem1 sas code
file*/
      data tempe;
            MERGE  tempd (IN=A)
                     source.lab07_6 ;
            BY SEQN;
            IF A;
      run;
      proc sort data=tempe; by seqn; run;
      data tempf;
            MERGE  tempe (IN=A)
                     source.lab07_7 ;
            BY SEQN;
            IF A;
      run;
      proc sort data=tempf; by seqn; run;
      data tempg;
            MERGE  tempf (IN=A)
                     source.lab07_8 ;
            BY SEQN;
            IF A;
      run;
      proc sort data=tempg; by seqn; run;
      data temph;
            MERGE  tempg (IN=A)
                     source.lab07_9 ;
```

```
      BY SEQN;
      IF A;
run;
proc sort data=temph; by seqn; run;
data tempi;
      MERGE  temph (IN=A)
               source.lab07_10;
      BY SEQN;
      IF A;
run;
proc sort data=tempi; by seqn; run;
data tempj;
      MERGE  tempi (IN=A)
               source.lab07_11 ;
      BY SEQN;
      IF A;
run;
proc sort data=tempj; by seqn; run;
data tempk;
      MERGE  tempj (IN=A)
               source.lab07_12;
      BY SEQN;
      IF A;
run;
proc sort data=tempk; by seqn; run;
data templ;
      MERGE  tempk (IN=A)
               source.lab07_13;
      BY SEQN;
      IF A;
run;
proc sort data=templ; by seqn; run;
data tempm;
      MERGE  templ (IN=A)
               source.lab07_14 ;
      BY SEQN;
      IF A;
run;
data tempn;
      MERGE  tempm (IN=A)
               source.lab07_15 ;
      BY SEQN;
      IF A;
run;
data tempo;
      MERGE  tempn (IN=A)
               source.lab07_18 ;
      BY SEQN;
      IF A;
run;
data tempp;
      MERGE  tempo (IN=A)
               source.lab07_19 (keep = SEQN PHAFSTHR
PHAFSTMN);
      BY SEQN;
      IF A;
run;
```

```
                  data tempq;
                        MERGE  tempp (IN=A)
                                 source.lab07_20 (keep = SEQN LBXSAL
LBDSALSI);
                        BY SEQN;
                        IF A;
                  run;
                  /*****************************
                  Creating the final 2007 table
                  *****************************/
                  data source.all_07;
                        MERGE  tempq (IN=A)
                                 source.lab07_21 (keep = SEQN BMXBMI);
                        BY SEQN;
                        IF A;
                  run;
                  proc sort data=source.all_07; by seqn; run;
                  /*****************************
                        Drop temp tables
                  *****************************/
                        proc sql;
                              drop table tempa, tempb, tempc, tempd, tempe,
tempf, tempg, temph, tempi,
                                                      tempj, tempk, templ, tempm,
tempn, tempo, tempp, tempq ;
                        quit;

/***************
  2009 CYCLE
***************/
            /*********************************
                        Sort all 2009 data files
            *********************************/
                  proc sort data = source.demo_09;  by seqn;  run;
                  proc sort data = source.trim_09;  by seqn;      run;
                  proc sort data = source.preg_09;  by seqn;      run;
                  proc sort data = source.smoke_09;  by seqn;     run;
                  proc sort data = source.lab09_1;   by seqn; run;
                  proc sort data = source.lab09_2;   by seqn; run;
                  proc sort data = source.lab09_3;   by seqn; run;
                  proc sort data = source.lab09_4;   by seqn; run;
                  proc sort data = source.lab09_6;   by seqn; run;
                  proc sort data = source.lab09_7;   by seqn; run;
                  proc sort data = source.lab09_9;   by seqn; run;
                  proc sort data = source.lab09_11;   by seqn; run;
                  proc sort data = source.lab09_13;   by seqn; run;
                  proc sort data = source.lab09_14;   by seqn; run;
                  proc sort data = source.lab09_18;   by seqn; run;
                  proc sort data = source.lab09_19;   by seqn; run;
                  proc sort data = source.lab09_20;   by seqn; run;
                  proc sort data = source.lab09_21;   by seqn; run;

            /*********************************
                        Truncate Demo File
                  Keep only Pregnant Females
                  of Child-Bearing Age (15-44)
            *********************************/
```

```
                        proc sort data = source.base_09;  by seqn;  run;
                        proc sort data = source.trim_09;  by seqn;       run;
                        proc sort data = source.preg_09;  by seqn;       run;
                        Data source.base_09;
                              set source.demo_09;
                              IF RIAGENDR = 2 and (RIDAGEYR >=15 and RIDAGEYR
<= 44);
                        run;
                  /*****************************
                        2) Use Preg Lab File to Further
                              Limit Data to Pregnant Women
                              URXPREG =1 (positive)
                  *****************************/
                        DATA source.basica_09;
                              merge source.base_09  (IN=A)
                                    source.preg_09  (IN=B) ;
                              BY SEQN;
                              If A and B and (URXPREG = 1);
                        RUN;
                  /*****************************
                        3) Append Smoking File
                              Define Smoking Status
                  *****************************/
                        Data source.basicb_09;
                              merge       source.basica_09 (in=a)
                                          source.smoke_09 ;
                              By seqn;
                              if a;
                        run;
                  /*****************************
                  4) Append Reproductive Health File
                              For Trimester and Parity Data
                  *****************************/
                        DATA source.basicc_09;
                              MERGE source.basicb_09 (IN=A)
                                    source.trim_09 (keep=RHD152 RHQ160
RHQ171 RHQ131 SEQN) ;
                              BY SEQN;
                              IF A;
                        RUN;
                  /*********************************
                  5)    Append 2009 Lab files to
                              Base Data =>Temp file
                  *********************************/
                        data tempa;
                              MERGE  source.basicc_09 (IN=A)
                                     source.lab09_1 ;
                              BY SEQN;
                              IF A;
                        run;
                        proc sort data=tempa; by seqn; run;
                        data tempb;
                              MERGE  tempa (IN=A)
                                     source.lab09_2 ;
                              BY SEQN;
                              IF A;
                        run;
```

```
proc sort data=tempb; by seqn; run;
data tempc;
      MERGE  tempb (IN=A)
               source.lab09_3 ;
      BY SEQN;
      IF A;
run;
proc sort data=tempc; by seqn; run;
data tempd;
      MERGE  tempc (IN=A)
               source.lab09_4 ;
      BY SEQN;
      IF A;
run;
proc sort data=tempd; by seqn; run;
/*Skip lab09_5 as this file does not exist; see nhanes chem1 sas code
file*/
data tempe;
      MERGE  tempd (IN=A)
               source.lab09_6 ;
      BY SEQN;
      IF A;
run;
proc sort data=tempe; by seqn; run;
data tempf;
      MERGE  tempe (IN=A)
               source.lab09_7 ;
      BY SEQN;
      IF A;
run;
proc sort data=tempf; by seqn; run;
/*Skip lab09_8 as this file does not exist; see nhanes chem1 sas code
file*/
data tempg;
      MERGE  tempf (IN=A)
               source.lab09_9 ;
      BY SEQN;
      IF A;
run;
proc sort data=tempg; by seqn; run;
/*Skip lab09_10 as does not yet exist; see nhanes chem1 sas code file*/
data temph;
      MERGE  tempg (IN=A)
               source.lab09_11;
      BY SEQN;
      IF A;
run;
proc sort data=temph; by seqn; run;
data tempi;
      MERGE  temph (IN=A)
               source.lab09_12;
      BY SEQN;
      IF A;
run;
proc sort data=tempi; by seqn; run;
data tempj;
      MERGE  tempi (IN=A)
```

```
                              source.lab09_13 ;
                  BY SEQN;
                  IF A;
            run;
            proc sort data=tempj; by seqn; run;
            data tempk;
                  MERGE  tempj (IN=A)
                              source.lab09_14 ;
                  BY SEQN;
                  IF A;
            run;
            proc sort data =tempk; by seqn; run;
            data templ;
                  MERGE  tempk (IN=A)
                              source.lab09_18;
                  BY SEQN;
                  IF A;
            run;
            proc sort data=templ; by seqn; run;
            data tempm;
                  MERGE  templ (IN=A)
                              source.lab09_19 (keep = SEQN PHAFSTHR
PHAFSTMN);
                  BY SEQN;
                  IF A;
            run;
            proc sort data=tempm; by seqn; run;
            data tempn;
                  MERGE  tempm (IN=A)
                              source.lab09_20 (keep = SEQN LBXSAL
LBDSALSI);
                  BY SEQN;
                  IF A;
            run;
            proc sort data=tempn; by seqn; run;
            /*****************************
            Creating the final 2009 table
            *****************************/
            data source.all_09;
                  MERGE  tempn (IN=A)
                              source.lab09_21 (keep = SEQN BMXBMI);
                  BY SEQN;
                  IF A;
            run;
            proc sort data=source.all_09; by seqn; run;
            /*****************************
                  Drop temp tables
            *****************************/
                  proc sql;
                        drop table tempa, tempb, tempc, tempd, tempe,
tempf, tempg, temph, tempi,
                                                tempj, tempk, templ, tempm,
tempn ;
                  quit;

/*************************************************************
                        SECTION THREE
```

```
Purpose: Id & update changes to field names over cycles.
             Create the Master File:  Source.All.
             Code for Demographics.
             Code for Covariates.
************************************************************/

      /***********************************
      1) Renaming Variables for Consistency
      Across Data Cycles
      2003 only as no other renaming needed

      URDTRS-URXTRS Urinary Triclosan (rename=(URDTRS=URXTRS))
      ************************************/
            Data source.all_03;
                  rename URDTRS=URXTRS;
                  set source.all_03 ;
            run;

      /*****************************
      2) Create Master File
                  Includes all files
                  over all cycles
      *****************************/
            data source.all;
                  set source.all_03
                        source.all_05
                        source.all_07
                        source.all_09;
            run;

      /*****************************
      3)  Create Demographics Vars
                  to Match Woodruff

      Note: My original defns were used for Demo Table.
      This code modifies that a little so the vars
      can be used in the model via Sudaan.
      *****************************/
      data source.all;
            set source.all;
      /*Age gp*/
            if (RIDAGEYR GE 15 and RIDAGEYR LE 17) then age_gp = "15-17";
            if (RIDAGEYR GE 18 and RIDAGEYR LE 24) then age_gp = "18-24";
            if (RIDAGEYR GE 25 and RIDAGEYR LE 29) then age_gp = "25-29";
            if (RIDAGEYR GE 30 and RIDAGEYR LE 34) then age_gp = "30-34";
            if (RIDAGEYR GE 35 and RIDAGEYR LE 44) then age_gp = "35-44";
            if (RIDAGEYR < 15 or RIDAGEYR > 45) then age_gp = "";
      /*Race:  Race and eth*/
            if RIDRETH1 = 1 then do;
                                    race = "Mexican American";
                                    eth = 1;
                              end;
            if RIDRETH1 = 2 then do;
                                    race = "Other Hispanic";
                                    eth = 4;
                              end;
            if RIDRETH1 = 3 then do;
```

```
                                    race = "Non-Hispanic White";
                                    eth = 2;
                              end;
            if RIDRETH1 = 4 then do;
                                    race = "Non-Hispanic Black";
                                    eth = 3;
                              end;
            if RIDRETH1 = 5 then do;
                                    race = "Other Race";
                                    eth = 4;
                              end;

      /*ETH:  Race for model: 4 levels*/
/*
            if RIDRETH1 = 1 then eth = 1;*/
/*
            if RIDRETH1 = 3 then eth = 2;*/
/*
            if RIDRETH1 = 4 then eth = 3;*/
/*
            if RIDRETH1 in (2,5) then eth= 4;*/
      /*Education: (EDU and grad)
            2003 Education Rules Differ for those LE 19 yrs of age*/
            IF SDDSRVYR = 3 and RIDAGEYR LE 19 then do;
                        IF DMDEDUC3 LE 12 or DMDEDUC3=55 or DMDEDUC3=66 then
do;
                                    EDU="< HS Grad";
                                    grad = 1;
                              end;
                        IF DMDEDUC3=13 or DMDEDUC3=14 then do;
                                    EDU="= HS Grad";
                                    grad = 1;
                              end;
                        IF DMDEDUC3=15 then do;
                                    EDU="> HS Grad";
                                    grad = 2;
                              end;
            end;
            IF (SDDSRVYR = 3 and RIDAGEYR > 19) or SDDSRVYR >3  then do;
                        IF DMDEDUC2=1 or DMDEDUC2=2 then do;
                                    EDU ="< HS Grad";
                                    grad = 1;
                              end;
                        IF DMDEDUC2=3 then do;
                                    EDU = "= HS Grad";
                                    grad = 1;
                              end;
                        IF DMDEDUC2=4 or DMDEDUC2=5 then do;
                                    EDU ="> HS Grad";
                                    grad = 2;
                              end;
            end;
                                                /*GRAD: Education for use in
model*/
/*                                                              IF EDU in
("< HS Grad", "= HS Grad") then grad = 1;*/
```

```
/*                                                                  IF EDU = ">
HS Grad" then grad = 2;*/
/*                                                                  IF EDU = ''
then grad = .;*/
      /*Marital Status:  Marry_stat and Marry*/
            IF DMDMARTL in (2,3,4) then do;
                        marry_stat = 'Divorced, Separated, or Widowed';
                        marry = 1;
                  end;
            IF DMDMARTL in (1, 6) then do;
                        marry_stat = 'Married or Living with Partner';
                        marry = 2;
                  end;
            IF DMDMARTL = 5 then do;
                        marry_stat = 'Never Married';
                        marry = 3;
                  end;
            IF DMDMARTL = 77 then do;
                        marry_stat = "Refused / Don't Know";
                        marry = .;
                  end;
                                                /*MARRY:  Marital Status for
model*/
/*                                                                  IF DMDMARTL
in (2,3,4) then marry = 1;*/
/*                                                                  IF DMDMARTL
in (1, 6) then marry = 2;*/
/*                                                                  IF DMDMARTL
= 5 then marry = 3;*/
/*                                                                  IF DMDMARTL
in (77, .) then marry = .; */
            IF RHQ131 = 2 then do;
                        parity = "Nulliparous";
                        kids = 1;
                  end;
            ELSE IF RHQ131 = 1 then do;
                  IF (RHQ160 = 1 and RHQ171 = .) or RHQ171 = 0 then do;
                        parity = "Nulliparous";
                        kids = 1;
                  end;
                  IF RHQ171 = 0 then do;
                        parity = "Nulliparous";
                        kids = 1;
                  end;
                  IF (RHQ160 = 1 and RHQ171 = 1) then do;
                        parity = 'One';
                        kids = 2;
                  end;
                  If RHQ160 >1 then do;
                              IF RHQ171 = 1 then do;
                                    parity = 'One';
                                    kids = 2;
                              end;
                              IF (RHQ171 > 1 and RHQ171 ^in (77,99) ) then
do;
                                    parity = 'TwoPlus';
                                    kids = 2;
```

```
                              end;
                              IF RHQ171 in (77,99) then do;
                                    parity = "DK/Ref";
                                    kids = .;
                              end;
                        end;
            end;
                                                      /*KIDS: Parity - For Model*/
/*                                                                  IF parity =
"Nulliparous" then kids = 1;*/
/*                                                                  IF parity
in ('One', 'TwoPlus') then kids = 2;*/
/*                                                                  IF parity
in ("", "DK/Ref") then kids = .;*/

      /*Trimester - Month of Pregnancy*/
            IF (RHD152 GE 0 and RHD152 LE 3) then trim = '1';
            IF (RHD152 GE 4 and RHD152 LE 6) then trim = '2';
            IF (RHD152 GE 7 and RHD152 LE 98) then trim = '3';
            IF (RHD152 = . or RHD152 = 99) then trim = '';
      /*Duration of Fasting, in Hrs, for Model*/
            IF PHAFSTHR >=0 then do;
                  IF PHAFSTHR < 4 then fast = 1;
                  IF PHAFSTHR = 4 and (PHAFSTMN >= 0 and PHAFSTMN <= 30) then
fast = 1;
                  IF PHAFSTHR = 4 and (PHAFSTMN > 30) then fast = 2;
            end;
            IF PHAFSTHR >4  then do;
                  IF PHAFSTHR < 8 then fast = 2;
                  IF PHAFSTHR = 8 and (PHAFSTMN >= 0 and PHAFSTMN <= 30) then
fast = 2;
                  IF PHAFSTHR = 8 and (PHAFSTMN > 30) then fast = 3;
            end;
            IF PHAFSTHR >8  then do;
                  IF PHAFSTHR < 24 then fast = 3;
                  IF PHAFSTHR = 24 and (PHAFSTMN >= 0 and PHAFSTMN <= 30)
then fast = 3;
                  IF PHAFSTHR = 24 and (PHAFSTMN > 30) then fast = .;
            end;
            IF PHAFSTHR > 24 then fast = .;
            IF PHAFSTHR = . and PHAFSTMN = . then fast = .;
                  /* Minutes-only subjects are shown as Hrs = 0, Mins = 30
                        NOT Hrs = ., Mins = 30*/
/*Pregnant*/
      IF URXPREG = 1 then preg = 0; /*0=yes*/
      IF URXPREG = 2 then preg = 1; /*1=no*/
      IF URXPREG in (0,3,4,.) then preg = . ;
/*Cycle -- Be sure direction corresponds w/desired ref level*/
      If SDDSRVYR = 3 then cycle=2003;
      If SDDSRVYR = 4 then cycle=2005;
      If SDDSRVYR = 5 then cycle=2007;
      If SDDSRVYR = 6 then cycle=2009;
run;

            /*****************************
             Smoking Status
```

```
                  First section is for 2003, while 2nd section is for
remaining years.
                  Note: Combined data should use MEC weights for analysis.
            ****************************/
            data source.all;
                  set source.all;
                  IF SDDSRVYR = 3 then do;
                        if (smaquex = 2 and SMQ020=1 and SMD030 ^= 0 and
(SMQ040 = 1 or SMQ040 = 2) ) then do;
                                          smoke_status = "Current";
                                          smoker = 3;
                                    end;
                        IF (smaquex = 2 and SMQ020=2)
                                          OR
                           (smaquex = 2 and SMQ020=1 and SMD030=0) then do;
                                          smoke_status = "Never";
                                          smoker = 1;
                                    end;
                        if (smaquex = 2 and SMQ020=1 and SMD030 ^= 0 and
SMQ040 = 3) then do;
                                          smoke_status = "Former";
                                          smoker = 2;
                                    end;
                        if (smaquex = 1 and SMQ620=2) then do;
                                          smoke_status = "Never";
                                          smoker = 1;
                                    end;
                        if (smaquex = 1 and SMQ620=1 and SMQ640 in (77, 99,
.)) then do;
                                          smoke_status = "";
                                          smoker = .;
                                    end;
                        if (smaquex = 1 and SMQ620=1 and SMQ640=0) then do;
                                          smoke_status = "Former";
                                          smoker = 2;
                                    end;
                        if (smaquex = 1 and SMQ620=1 and (SMQ640>0 and SMQ640
<= 31) ) then do;
                                          smoke_status = "Current";
                                          smoker = 3;
                                    end;
                  end;
                  IF SDDSRVYR ^= 3 then do;
                        IF SMQ020=2 OR (SMQ020 = 1 and SMD030 = 0) then do;
                              smoke_status = "Never";
                              smoker = 1;
                        end;
                        IF SMQ020 = 1 AND (SMD030 > 0 and SMD030 < 777) AND SMQ040
in (1,2) then do;
                              smoke_status = "Current";
                              smoker = 3;
                        end;
                        IF SMQ020 = 1 AND (SMD030 > 0 and SMD030 < 777) AND SMQ040
= 3 then do;
                              smoke_status = "Former";
                              smoker = 2;
                        end;
```

```
            end;
            run;

/*****************************************
            Define Formats for Covariates
*****************************************/
            proc format;
                  value cycle  2003 = '2003/2004'
                               2005 = '2005/2006'
                               2007 = '2007/2008'
                               2009 = '2009/2010';
                  value preg   0 = 'Yes'
                               1 = 'No';
                  /*value age_gp 1 = "15-17"
                               2 = "18-24"
                               3 = "25-29"
                               4 = "30-34";*/
                  value eth    1 = "Mexican American"
                               2 = "Non-Hispanic White"
                               3 = "Non-Hispanic Black"
                               4 = "Other";
                  value grad   1 = "<= HS Grad"
                               2 = "> HS Grad";
                  value marry  1 = 'Divorced, Separated, or Widowed'
                               2 = 'Married or Living with Partner'
                               3 = 'Never Married';
                  value kids   1 = "Nulliparous"
                               2 = "One or More";
                  value fast   1 = '0-4.5 hrs'
                               2 = '4.5-8.5 hrs'
                               3 = '8.5-24 hrs';
                  value smoker       1 = 'Never'
                                     2 = 'Former'
                                     3 = 'Current';
                  run;

/*****************************
4)  Demographic Table
            Weighted Analyses
                  (as Woodruff did)
*****************************/
                  /*****************
                  Demos w/Interview Wgts
                  *****************/
                  PROC SURVEYFREQ data = check;
                        BY cycle ;
                        CLUSTER SDMVPSU ;
                        STRATA SDMVSTRA;
                        TABLES  marry_stat; /* age_gp race edu marry_stat
trim*/
                        WEIGHT WTINT2YR ; /*Interview wgts*/
                  run;
                  /*****************
                  Demos w/MEC Wgts
                  *****************/
                  PROC SURVEYFREQ data = source.all;
                        BY cycle ;
```

```
                        CLUSTER SDMVPSU ;
                        STRATA SDMVSTRA;
                        TABLES smoke_status ;  /*trim parity smoke_status*/
                        WEIGHT WTMEC2YR ; /*Smoking status, trim, parity,
fasting, albumin, creatinine uses MEC weights*/
                  run;
      /*******************
            5) Mean Age +/- SE
                  Matches Woodruff
      *******************/
                  PROC SURVEYMEANS data = check;
                        BY cycle;
                        CLUSTER SDMVPSU ;
                        STRATA SDMVSTRA;
                        VAR RIDAGEYR ; /*to get mean age*/
                        WEIGHT WTINT2YR ;
                  RUN;
      /*********************************
            6) Mean Biochemcial measurements:
                  BOTH OF THESE ARE MEASURED IN MEC SO USE 2YR MEC WEIGHTS:
WTMEC2YR
                  a) Serum albumin (g/dL)
                  b) Urinary creatinine (mg/dL)
      *********************************/
                  /*****************************
                        a) Serum Albumin
                  *****************************/
                  PROC SURVEYMEANS data = check;
                        BY cycle;
                        CLUSTER SDMVPSU ;
                        STRATA SDMVSTRA;
                        VAR LBXSAL; /*BLOOD Albumin*/
                        WEIGHT WTMEC2YR;  /*MEC Weight*/
                  RUN;
                  /*****************************
                        b) Urinary Creatinine
                              Use MEC wgts
                  *****************************/
                  PROC SURVEYMEANS data = check;
                        BY cycle;
                        CLUSTER SDMVPSU ;
                        STRATA SDMVSTRA;
                        VAR URXUCR; /*urinary creatinine mg/dL */
                        WEIGHT  WTMEC2YR;  /*MEC Weight*/
                  RUN;
      /*********************************
            7) Fasting - Mean Duration:  Reported in HOURS
      *********************************/
                  PROC SURVEYMEANS data = check;
                        BY cycle;
                        CLUSTER SDMVPSU ;
                        STRATA SDMVSTRA;
                        VAR PHAFSTHR;
                        WEIGHT WTMEC2YR;   /*MEC Weight*/
                  RUN;

/*************************************************************
```

```
                              SECTION FOUR
Purpose: Obtain GM, GSE, CV, 50th & 95th Pctl
             Weights data & incorporates the survey structure.
*Note:  This section is designed to be used as a
              plug-n-run...fill in where input is requested.
            When using vars asked of all respondents, use MEC weighting.
              Else, use the corresponding Subsample Weight.
************************************************************/
            title;
            data temp;
                  set source.all;
                  where SDDSRVYR = 3 and WTSB2YR >0;
      /*Input Here*/
                  logofvarname = log(URXP10);
            /*Input Here*/
            run;
            proc surveymeans data=temp mean stdERR percentile=(50 95);
               weight WTSB2YR;
            /*Input Here*/
               strata sdmvstra;
               cluster sdmvpsu;
               var logofvarname;
               ods output statistics = estimates;
            run;
            data estimates;
               set estimates;
               Mean = exp(Mean);
               StdErr  = sqrt((Mean**2)*(StdErr**2));
                        CV = StdErr/Mean;
                        Fifty = exp(Pctl_50);
                        Ninefive= exp(Pctl_95);
               VarName = "URXP10";
            /*Input Here*/
               label Mean='Geometric Mean'
                     StdErr='Standard Error'
                         CV = 'CV'
                         Fifty='50th Pctl'
                         Ninefive='95th Pctl';
            run;
            proc print data=estimates label noobs;
                  var varname Mean StdErr CV Fifty Ninefive;
            run;

/************************************************************
                              SECTION FOUR
Purpose: Obtain proportion greater than the limit of detection.
Note:  Section is designed to be run w/different variables.
            Input where requested, ensuring you're using the
            correct section (designed by subsample pattern:
            AABB means subsample A in cycles 2003, 2005 and
            subsample B in cycles 2007, 2009.
************************************************************/

/*****************************
A)  Comment Code Variables
            Weight via Surveyfreq
            to get % > LOD (look at % of "0" group)
```

```
*****************************/
/*Subsample Pattern:  AACC*/
            PROC SURVEYFREQ data = source.all;
                  where SDDSRVYR in (3,4);
                  BY SDDSRVYR ;
                  CLUSTER sdmvpsu ;
                  STRATA sdmvstra ;
                  TABLES LBDPFUAL;              /*Input Here*/
                  WEIGHT  WTSA2YR;
            run;
            PROC SURVEYFREQ data = source.all;
                  where SDDSRVYR in (5,6);
                  BY SDDSRVYR ;
                  CLUSTER sdmvpsu ;
                  STRATA sdmvstra ;
                  TABLES LBDPFUAL;        /*Input Here*/
                  WEIGHT  WTSC2YR;
            run;
/*Subsample Pattern:  AAAA*/
            PROC SURVEYFREQ data = source.all;
                  BY SDDSRVYR ;
                  CLUSTER sdmvpsu ;
                  STRATA sdmvstra ;
                  TABLES URDUTMLC;              /*Input Here*/
                  WEIGHT  WTSA2YR;
            run;
/*Subsample Pattern:  BBBB*/
            PROC SURVEYFREQ data = source.all;
                  BY SDDSRVYR ;
                  CLUSTER sdmvpsu ;
                  STRATA sdmvstra ;
                  TABLES URDP19LC;              /*Input Here*/
                  WEIGHT  WTSB2YR;
            run;
/*Subsample Pattern:  CBBB*/
            PROC SURVEYFREQ data = source.all;
                  where SDDSRVYR =3 ;     /*Input Here*/
                  CLUSTER sdmvpsu ;
                  STRATA sdmvstra ;
                  TABLES   URDOPPLC;      /*Input Here*/
                  WEIGHT  WTSC2YR;
            run;
            PROC SURVEYFREQ data = source.all;
                  where SDDSRVYR in (4,5,6);
                  BY SDDSRVYR ;
                  CLUSTER sdmvpsu ;
                  STRATA sdmvstra ;
                  TABLES URDOPPLC;        /*Input Here*/
                  WEIGHT  WTSB2YR;
            run;
/*Subsample Pattern:  CCC,MISSING*/
            PROC SURVEYFREQ data = source.all;
                  where SDDSRVYR in (3,4,5) ; /*Input Here*/
                  BY SDDSRVYR ;
                  CLUSTER sdmvpsu ;
                  STRATA sdmvstra ;
                  TABLES URDTRNLC;                    /*Input Here*/
```

```
                  WEIGHT  WTSC2YR;
            run;
/*Subsample Pattern:  BBB,MISSING*/
            PROC SURVEYFREQ data = source.all;
                  where SDDSRVYR in (3,4,5) ; /*Input Here*/
                  BY SDDSRVYR ;
                  CLUSTER sdmvpsu ;
                  STRATA sdmvstra ;
                  TABLES   URDDMALC;            /*Input Here*/
                  WEIGHT  WTSB2YR;
            run;
/*Subsample Pattern:  MISSING,BBB */
            PROC SURVEYFREQ data = source.all;
                  where SDDSRVYR in (4,5,6) ; /*Input Here*/
                  BY SDDSRVYR ;
                  CLUSTER sdmvpsu ;
                  STRATA sdmvstra ;
                  TABLES   URDPPBLC;            /*Input Here*/
                  WEIGHT  WTSB2YR;
            run;
/*Subsample Pattern:  C, All, All, Missing
      Urinary Percholate
      Note: 2003 didn't have a comment code variable.*/
            data tempy;
                  set source.all;
                  where SDDSRVYR =3 and WTSC2YR > 0 and URXUP8 ^= .;
                  if URXUP8    > 0.05 then CHECK =1;
                  if URXUP8   <= 0.05 then CHECK =2;
            run;
            PROC SURVEYFREQ data = tempy;
                  BY SDDSRVYR ;
                  CLUSTER sdmvpsu ;
                  STRATA sdmvstra ;
                  TABLES CHECK ;
                  WEIGHT  WTSC2YR;
            run;
            PROC SURVEYFREQ data = source.all;
                  where SDDSRVYR in (4,5) ;
                  BY SDDSRVYR ;
                  CLUSTER sdmvpsu ;
                  STRATA sdmvstra ;
                  TABLES URDUP8LC;
                  WEIGHT  WTMEC2YR;
            run;
/*Subsample Pattern:  ALL, w/only 2 data points
            Nitrate, Thiocynate*/
            PROC SURVEYFREQ data = source.all;
                  where SDDSRVYR in (4,5) ;     /*Input Here*/
                  BY SDDSRVYR ;
                  CLUSTER sdmvpsu ;
                  STRATA sdmvstra ;
                  TABLES URDSCNLC;                    /*Input Here*/
                  WEIGHT  WTMEC2YR;
            run;
/*****************************
B)  Vars w/o comment code vars
      Careful to mind year & weights in both steps.
```

```
      LOD was hard-coded in this section.
*******************************/
      /*Urinary Mercury - just for 5 & 6*/
            data tempy;
                  set source.all;
                  where SDDSRVYR = 5 and  WTSA2YR > 0 and URXUHG ^= .;
                  if URXUHG   > 0.08 then CHECK =1;
                  if URXUHG   <= 0.08 then CHECK =2;
            run;
            PROC SURVEYFREQ data = tempy;
                  BY SDDSRVYR ;
                  CLUSTER sdmvpsu ;
                  STRATA sdmvstra ;
                  TABLES CHECK ;
                  WEIGHT  WTSA2YR;
            run;
            data tempy;
                  set source.all;
                  where SDDSRVYR = 6 and  WTSA2YR > 0 and URXUHG ^= .;
                  if URXUHG   > 0.08 then CHECK =1;
                  if URXUHG   <= 0.08 then CHECK =2;
            run;
            PROC SURVEYFREQ data = tempy;
                  BY SDDSRVYR ;
                  CLUSTER sdmvpsu ;
                  STRATA sdmvstra ;
                  TABLES CHECK ;
                  WEIGHT  WTSA2YR;
            run;
/*BLOOD Lead, Cadmium, & Mercury - MEC wgts*/
      /*BLOOD Cadmium*/
            data tempy;
                  set source.all;
                  where SDDSRVYR = 3 and  WTMEC2YR > 0 and LBXBCD ^= .;
                  if LBXBCD   > 0.14 then CHECK =1;
                  if LBXBCD   <= 0.14 then CHECK =2;
            run;
            PROC SURVEYFREQ data = tempy;
                  BY SDDSRVYR ;
                  CLUSTER sdmvpsu ;
                  STRATA sdmvstra ;
                  TABLES CHECK;
                  WEIGHT  WTMEC2YR;
            run;
            data tempy;
                  set source.all;
                  where SDDSRVYR = 4 and  WTMEC2YR > 0 and LBXBCD ^= .;
                  if LBXBCD   > 0.02 then CHECK =1;
                  if LBXBCD   <= 0.02 then CHECK =2;
            run;
            PROC SURVEYFREQ data = tempy;
                  BY SDDSRVYR ;
                  CLUSTER sdmvpsu ;
                  STRATA sdmvstra ;
                  TABLES CHECK;
                  WEIGHT  WTMEC2YR;
            run;
```

```
      data tempy;
            set source.all;
            where SDDSRVYR = 5 and  WTMEC2YR > 0 and LBXBCD ^= .;
            if LBXBCD   > 0.02 then CHECK =1;
            if LBXBCD   <= 0.02 then CHECK =2;
      run;
      PROC SURVEYFREQ data = tempy;
            BY SDDSRVYR ;
            CLUSTER sdmvpsu ;
            STRATA sdmvstra ;
            TABLES CHECK;
            WEIGHT  WTMEC2YR;
      run;
      data tempy;
            set source.all;
            where SDDSRVYR = 6 and  WTMEC2YR > 0 and LBXBCD ^= .;
            if LBXBCD   > 0.02 then CHECK =1;
            if LBXBCD   <= 0.02 then CHECK =2;
      run;
      PROC SURVEYFREQ data = tempy;
            BY SDDSRVYR ;
            CLUSTER sdmvpsu ;
            STRATA sdmvstra ;
            TABLES CHECK;
            WEIGHT  WTMEC2YR;
      run;
/*BLOOD Lead*/
      data tempy;
            set source.all;
            where SDDSRVYR = 3 and  WTMEC2YR > 0 and LBXBPB ^= .;
            if LBXBPB   > 0.28 then CHECK =1;
            if LBXBPB   <= 0.28 then CHECK =2;
      run;
      PROC SURVEYFREQ data = tempy;
            BY SDDSRVYR ;
            CLUSTER sdmvpsu ;
            STRATA sdmvstra ;
            TABLES CHECK;
            WEIGHT  WTMEC2YR;
      run;
      data tempy;
            set source.all;
            where SDDSRVYR = 4 and  WTMEC2YR > 0 and LBXBPB ^=.;
            if LBXBPB   > 0.25 then CHECK =1;
            if LBXBPB   <= 0.25 then CHECK =2;
      run;
      PROC SURVEYFREQ data = tempy;
            BY SDDSRVYR ;
            CLUSTER sdmvpsu ;
            STRATA sdmvstra ;
            TABLES CHECK;
            WEIGHT  WTMEC2YR;
      run;
      data tempy;
            set source.all;
            where SDDSRVYR = 5 and  WTMEC2YR > 0 and LBXBPB ^=.;
            if LBXBPB   > 0.25 then CHECK =1;
```

```
            if LBXBPB   <= 0.25 then CHECK =2;
      run;
      PROC SURVEYFREQ data = tempy;
            BY SDDSRVYR ;
            CLUSTER sdmvpsu ;
            STRATA sdmvstra ;
            TABLES CHECK;
            WEIGHT  WTMEC2YR;
      run;
      data tempy;
            set source.all;
            where SDDSRVYR = 6 and  WTMEC2YR > 0 and LBXBPB ^=.;
            if LBXBPB   > 0.25 then CHECK =1;
            if LBXBPB   <= 0.25 then CHECK =2;
      run;
      PROC SURVEYFREQ data = tempy;
            BY SDDSRVYR ;
            CLUSTER sdmvpsu ;
            STRATA sdmvstra ;
            TABLES CHECK;
            WEIGHT  WTMEC2YR;
      run;
/*BLOOD Mercury - Inorganic*/
      data tempy;
            set source.all;
            where SDDSRVYR = 3 and  WTMEC2YR > 0 and LBXIHG^= .;
            if LBXIHG   > 0.42 then CHECK =1;
            if LBXIHG   <= 0.42 then CHECK =2;
      run;
      PROC SURVEYFREQ data = tempy;
            BY SDDSRVYR ;
            CLUSTER sdmvpsu ;
            STRATA sdmvstra ;
            TABLES CHECK;
            WEIGHT  WTMEC2YR;
      run;
      data tempy;
            set source.all;
            where SDDSRVYR =4 and  WTMEC2YR > 0 and LBXIHG ^= .;
            if LBXIHG   > 0.4 then CHECK =1;
            if LBXIHG   <= 0.4 then CHECK =2;
      run;
      PROC SURVEYFREQ data = tempy;
            BY SDDSRVYR ;
            CLUSTER sdmvpsu ;
            STRATA sdmvstra ;
            TABLES CHECK;
            WEIGHT  WTMEC2YR;
      run;
      data tempy;
            set source.all;
            where SDDSRVYR = 5 and  WTMEC2YR > 0 and LBXIHG ^=.;
            if  LBXIHG   > 0.35 then CHECK =1;
            if LBXIHG   <= 0.35 then CHECK =2;
      run;
      PROC SURVEYFREQ data = tempy;
            BY SDDSRVYR ;
```

```
      CLUSTER sdmvpsu ;
      STRATA sdmvstra ;
      TABLES CHECK;
      WEIGHT  WTMEC2YR;
run;
data tempy;
      set source.all;
      where SDDSRVYR = 6 and  WTMEC2YR > 0 and LBXIHG ^=.;
      if LBXIHG   > 0.35 then CHECK =1;
      if LBXIHG   <= 0.35 then CHECK =2;
run;
PROC SURVEYFREQ data = tempy;
      BY SDDSRVYR ;
      CLUSTER sdmvpsu ;
      STRATA sdmvstra ;
      TABLES CHECK;
      WEIGHT  WTMEC2YR;
run;
/*BLOOD Mercury - Total*/
data tempy;
      set source.all;
      where SDDSRVYR = 3 and  WTMEC2YR > 0 and LBXTHG ^= .;
      if LBXTHG   > 0.2 then CHECK =1;
      if LBXTHG   <= 0.2 then CHECK =2;
run;
PROC SURVEYFREQ data = tempy;
      BY SDDSRVYR ;
      CLUSTER sdmvpsu ;
      STRATA sdmvstra ;
      TABLES CHECK;
      WEIGHT  WTMEC2YR;
run;
data tempy;
      set source.all;
      where SDDSRVYR = 4 and  WTMEC2YR > 0 and LBXTHG ^= .;
      if LBXTHG   > 0.33 then CHECK =1;
      if LBXTHG   <= 0.33 then CHECK =2;
run;
PROC SURVEYFREQ data = tempy;
      BY SDDSRVYR ;
      CLUSTER sdmvpsu ;
      STRATA sdmvstra ;
      TABLES CHECK;
      WEIGHT  WTMEC2YR;
run;
data tempy;
      set source.all;
      where SDDSRVYR = 5 and  WTMEC2YR > 0 and LBXTHG ^= .;
      if LBXTHG   > 0.33 then CHECK =1;
      if LBXTHG   <= 0.33 then CHECK =2;
run;
PROC SURVEYFREQ data = tempy;
      BY SDDSRVYR ;
      CLUSTER sdmvpsu ;
      STRATA sdmvstra ;
      TABLES CHECK;
      WEIGHT  WTMEC2YR;
```

```
run;
data tempy;
      set source.all;
      where SDDSRVYR = 6 and  WTMEC2YR > 0 and LBXTHG ^= .;
      if LBXTHG   > 0.33 then CHECK =1;
      if LBXTHG   <= 0.33 then CHECK =2;
run;
PROC SURVEYFREQ data = tempy;
      BY SDDSRVYR ;
      CLUSTER sdmvpsu ;
      STRATA sdmvstra ;
      TABLES CHECK;
      WEIGHT  WTMEC2YR;
run;
/*2003 data for Phytoestrogens (that yr didn't include a comment code var)*/
data tempy;
      set source.all;
      where SDDSRVYR = 3 and  WTSB2YR > 0 and URXDMA ^=.;
      if URXDMA  > 0.4 then CHECK =1;
      if URXDMA   <= 0.4 then CHECK =2;
run;
PROC SURVEYFREQ data = tempy;
      BY SDDSRVYR ;
      CLUSTER sdmvpsu ;
      STRATA sdmvstra ;
      TABLES CHECK ;
      WEIGHT  WTSB2YR;
run;
/*2009 phytoestrogen -- Group A*/
PROC SURVEYFREQ data = source.all;
      where SDDSRVYR = 6;
      BY SDDSRVYR ;
      CLUSTER sdmvpsu ;
      STRATA sdmvstra ;
      TABLES URDDMALC ;
      WEIGHT  WTSA2YR;
run;
/*NNAL*/
data tempy;
      set source.all;
      where SDDSRVYR = 6 and  WTMEC2YR > 0 and URXNAL^= . ;
      if URXNAL   > 0.6 then CHECK =1;
      if URXNAL   <= 0.6 then CHECK =2;
run;
PROC SURVEYFREQ data = tempy;
      BY SDDSRVYR ;
      CLUSTER sdmvpsu ;
      STRATA sdmvstra ;
      TABLES CHECK ;
      WEIGHT  WTMEC2YR;
run;

/*************************************************************
                        SECTION FIVE
Purpose: I.  Regression analysis w/covariates on cycle effect.
         II.  Contrast to compare each cycle to reference
                  cycle (2003-2004).
```

```
         III.  Adjusted LSGMs, 90% CI
Notes: --Run Formats, Above, PRIOR to using this section.
         --Section is meant to be run based upon type of specimen
                  (urine or blood)
         --Dataset must only include cycles over which you are
                  analyzing (see last section for those w/less than 4)
*************************************************************/
      /************************************
                  Urine Variables
      ************************************/
            /*************************
                  Define Variable
                  & Denote Weights
            *************************/
            options mprint mlogic symbolgen;
            %let varname = URXBPH;                        /*ENTER VAR HERE*/
            %let ln_varname = LN_&varname;
            %let EL_varname = EL_&varname;            /*Creates eligibility
flag for that chemical*/
                  data source.all;
                        set source.all;
                        IF SDDSRVYR = 3 then my_wgt = WTSC2YR;  /*Enter
Subsample Group Weight Here*/
                        IF SDDSRVYR = 4 then my_wgt = WTSB2YR;    /*Enter
Here*/
                        IF SDDSRVYR = 5 then my_wgt = WTSB2YR;    /*Enter
Here*/
                        IF SDDSRVYR = 6 then my_wgt = WTSB2YR;    /*Enter
Here*/
                  run;
            /*********************************************
            A) Define Eligibile Group.
                        These are those that have the data to be analyzed;
                        also specifically, where they have weight values >0.
                        AND those that in the cycles of interest.

                        *When comparing cycles, cycles of interest
                        MUST be defined in the Eligibility statement, so
                        that only years of interest are analyzed.
                        Here, I define it by limiting the dataset.
            *********************************************/
            data source.all;
                  set source.all;
                  &ln_varname = log(&varname);
                  if &ln_varname ^=. and RIDAGEYR ^=. and eth ^=. and  grad
^= . and kids ^=.
                              and BMXBMI ^= . and smoker ^= . and LBXSAL ^= .
and fast ^=. and URXUCR ^=. and my_wgt >0
                        then &EL_varname =1 and ELIGIBLE=1;
                        label RIDAGEYR = "Age"
                                    eth = "Race/Ethnicity"
                                    grad = "Education"
                                    kids = "Parity"
                                    BMXBMI = "Body Mass Index"
                                    smoker = "Smoking Status"
                                    LBXSAL = "Serum Albumin"
                                    Fast = "Length of Fasting"
```

```
                                    URXUCR = "Urinary Creatinine";
                  run;

            /*Sort by strata and PSU required in Sudaan*/
                  proc sort data = source.all;
                        by sdmvstra sdmvpsu ;
                  run;

            /*Sudaan analysis for urine vars*/
                  proc regress conf_lim = 90 data = source.all;
                        subpopn ELIGIBLE=1;
                        nest sdmvstra sdmvpsu / missunit;
            /*Allows for single PSU obs*/
                        weight my_wgt;
                        class  cycle eth grad kids smoker fast / nofreq;
                        reflevel cycle=2003;
                  /*2003 is the reference level */
                        model &ln_varname =  cycle RIDAGEYR eth grad kids
BMXBMI
                                                      smoker LBXSAL fast
URXUCR;
                        effects cycle = (1 -1 0 0) / name = "Cycle 2003 vs
2005";
                        effects cycle = (1  0 -1 0) / name = "Cycle 2003 vs
2007";
                        effects cycle = (1  0 0 -1) / name = "Cycle 2003 vs
2009";
                        lsmeans cycle;
                        rformat cycle cycle.; rformat eth eth.; rformat grad
grad.;
                              rformat kids kids.; rformat fast fast.; rformat
smoker smoker.;
                        test satadjf satadjchi;
                        output  / lsmeans=all filename= &ln_varname replace ;
                  run;

            /*Clean up dataset after each run*/
                  data source.all (drop = ELIGIBLE my_wgt &ln_varname);
                        set source.all;
                  run;

      /************************************
                  Blood Variables
                        *These do not include urinary creatinine in the model
(URXUCR)
      ************************************/
            /*************************
                  Define Variable
                  & Denote Weights
            *************************/
            options mprint mlogic symbolgen;
            %let varname = LBXCOT;                    /*ENTER VAR HERE*/
            %let ln_varname = LN_&varname;
            %let EL_varname = EL_&varname;            /*Creates eligibility
flag for that chemical*/
                  data source.all;
                        set source.all;
```

```
                        IF SDDSRVYR = 3 then my_wgt = WTMEC2YR; /*Enter
Subsample Group Weight Here, or MEC wgt*/
                        IF SDDSRVYR = 4 then my_wgt = WTMEC2YR;   /*Enter
Here*/
                        IF SDDSRVYR = 5 then my_wgt = WTMEC2YR;   /*Enter
Here*/
                        IF SDDSRVYR = 6 then my_wgt = WTMEC2YR;   /*Enter
Here*/
                  run;
                  data source.all;
                        set source.all;
                        &ln_varname = log(&varname);
                        if &ln_varname ^=. and RIDAGEYR ^=. and eth ^=. and
grad ^= . and kids ^=.
                                          and BMXBMI ^= . and smoker ^= . and
LBXSAL ^= . and fast ^=. and my_wgt >0
                        then &EL_varname =1 and ELIGIBLE=1;
                              label RIDAGEYR = "Age"
                                    eth = "Race/Ethnicity"
                                    grad = "Education"
                                    kids = "Parity"
                                    BMXBMI = "Body Mass Index"
                                    smoker = "Smoking Status"
                                    LBXSAL = "Serum Albumin"
                                    Fast = "Length of Fasting";
                  run;

            /*Sort by strata and PSU required in Sudaan*/
                  proc sort data = source.all;
                        by sdmvstra sdmvpsu ;
                  run;

            /*Sudaan analysis for urine vars*/
                  proc regress conf_lim = 90 data = source.all;
                        subpopn ELIGIBLE=1;
                        nest sdmvstra sdmvpsu / missunit;
            /*Allows for single PSU obs*/
                        weight my_wgt;
                        class  cycle eth grad kids smoker fast / nofreq;
                        reflevel cycle=2003;
                  /*2003 is the reference level */
                        model &ln_varname =  cycle RIDAGEYR eth grad kids
BMXBMI
                                                      smoker LBXSAL fast;
                        effects cycle = (1 -1 0 0) / name = "Cycle 2003 vs
2005";
                        effects cycle = (1  0 -1 0) / name = "Cycle 2003 vs
2007";
                        effects cycle = (1  0 0 -1) / name = "Cycle 2003 vs
2009";
                        lsmeans cycle;
                        rformat cycle cycle.; rformat eth eth.; rformat grad
grad.;
                              rformat kids kids.; rformat fast fast.; rformat
smoker smoker.;
                        test satadjf satadjchi;
                        output  / lsmeans=all filename= &ln_varname replace;
```

```
                  run;

            /*Clean up dataset after each run*/
                  data source.all (drop = ELIGIBLE my_wgt &ln_varname );
                        set source.all;
                  run;

      /*************************************
                  Urine Variables
                  MISSING CYCLE 2009

            * Uses different data set (Excludes 2009)
      *************************************/
      options mprint mlogic symbolgen;
      %let varname = URXUP8;                        /*ENTER VAR HERE*/
      %let ln_varname = LN_&varname;
      %let EL_varname = EL_&varname;                /*Creates eligibility flag
for that chemical*/
            data source.all;
                  set source.all;
                  IF SDDSRVYR = 3 then my_wgt = WTSC2YR;  /*Enter Subsample
Group Weight Here*/
                  IF SDDSRVYR = 4 then my_wgt = WTMEC2YR;   /*Enter Here*/
                  IF SDDSRVYR = 5 then my_wgt = WTMEC2YR;   /*Enter Here*/
            run;
            data source.all;
                  set source.all;
                  &ln_varname = log(&varname);
                  if &ln_varname ^=. and RIDAGEYR ^=. and eth ^=. and  grad
^= . and kids ^=.
                              and BMXBMI ^= . and smoker ^= . and LBXSAL ^= .
and fast ^=. and URXUCR ^=. and my_wgt >0
                        then &EL_varname =1 and ELIGIBLE=1;
                        label RIDAGEYR = "Age"
                                    eth = "Race/Ethnicity"
                                    grad = "Education"
                                    kids = "Parity"
                                    BMXBMI = "Body Mass Index"
                                    smoker = "Smoking Status"
                                    LBXSAL = "Serum Albumin"
                                    Fast = "Length of Fasting"
                                    URXUCR = "Urinary Creatinine";
                  run;
      /*Sort by strata and PSU required in Sudaan*/
            proc sort data = source.all;
                  by sdmvstra sdmvpsu ;
            run;
      /*Sudaan analysis for urine vars*/
            proc regress conf_lim = 90 data = source.all;
                  subpopn ELIGIBLE=1;
                  nest sdmvstra sdmvpsu / missunit;
      /*Allows for single PSU obs*/
                  weight my_wgt;
                  class  cycle eth grad kids smoker fast / nofreq;
                  reflevel cycle=2003;
            /*2003 is the reference level */
                  model &ln_varname =  cycle RIDAGEYR eth grad kids BMXBMI
```

```
                                                  smoker LBXSAL fast URXUCR;
                  effects cycle = (1 -1 0) / name = "Cycle 2003 vs 2005";
                  effects cycle = (1  0 -1 ) / name = "Cycle 2003 vs 2007";
                  lsmeans cycle;
                  rformat cycle cycle.; rformat eth eth.; rformat grad grad.;
                        rformat kids kids.; rformat fast fast.; rformat
smoker smoker.;
                  test satadjf satadjchi;
                  output  / lsmeans=all filename= &ln_varname replace;
            run;
      /*Clean up dataset after each run*/
            data source.all (drop = ELIGIBLE my_wgt &ln_varname);
                  set source.all;
            run;


/************************************************************
                           SECTION SIX
Purpose:  Obtain Frequency Graphs by Chemical Group
            --By chemical group, determine how many chemicals a woman
            was eligible for.  If that is equal to the total # of
            chemicals measured in that chem group, include woman
            in analysis; else exclude.
            --By chemical group, determine the total # of chemicals
            detected that were > LOD.
            --Send data to Excel for graphing.
Note;    Utilizes the Eligibility var created in last section.
NAMING CONVENTION:
            VarName = EL_Chemname (ex, Barium is EL_URXUBA);
                  1 is Eligible, 0 is Ineligible for inclusion.
            VarName = LOD_Chemical (ex, Barium is LOD_URXUBA)
                  1 is Detected, 0 is not detected.
***DATA IS UNWEIGHTED***
************************************************************/

      /*********************************
      Set Missing Eligibility Flags to Zero
      *********************************/
      /*Phthalates (for all cycles)*/
            data source.all;
                  set source.all;
                  if EL_URXMZP = . then EL_URXMZP = 0;
                  if EL_URXMIB = . then EL_URXMIB = 0;
                  if EL_URXMBP = . then EL_URXMBP = 0;
                  if EL_URXMCP = . then EL_URXMCP = 0;
                  if EL_URXMEP = . then EL_URXMEP = 0;
                  if EL_URXMHP = . then EL_URXMHP = 0;
                  if EL_URXMHH = . then EL_URXMHH = 0;
                  if EL_URXMOH = . then EL_URXMOH = 0;
                  if EL_URXECP = . then EL_URXECP = 0;
                  if EL_URXCNP = . then EL_URXCNP = 0; /*no 2003*/
                  if EL_URXMNP = . then EL_URXMNP = 0;
                  if EL_URXCOP = . then EL_URXCOP = 0; /*no 2003*/
                  if EL_URXMNM = . then EL_URXMNM = 0;
                  if EL_URXMC1 = . then EL_URXMC1 = 0;
                  if EL_URXMOP = . then EL_URXMOP = 0;
            run;
```

```
/*Urinary Heavy Metals*/
      data source.all;
            set source.all;
            if EL_URXUBA = . then EL_URXUBA = 0;
            if EL_URXUBE = . then EL_URXUBE = 0;
            if EL_URXUCD = . then EL_URXUCD = 0;
            if EL_URXUCO = . then EL_URXUCO = 0;
            if EL_URXUCS = . then EL_URXUCS = 0;
            if EL_URXUMO = . then EL_URXUMO = 0;
            if EL_URXUPB = . then EL_URXUPB = 0;
            if EL_URXUPT = . then EL_URXUPT = 0;
            if EL_URXUSB = . then EL_URXUSB = 0;
            if EL_URXUTL = . then EL_URXUTL = 0;
            if EL_URXUTU = . then EL_URXUTU = 0;
            if EL_URXUUR = . then EL_URXUUR = 0;
            if EL_URXUHG = . then EL_URXUHG = 0;
      run;
/*Environmental Pesticides*/
      data source.all;
            set source.all;
            if EL_URXOPP = . then EL_URXOPP = 0;
            if EL_URXDCB = . then EL_URXDCB = 0;
            if EL_URX1TB = . then EL_URX1TB = 0;
            if EL_URX3TB = . then EL_URX3TB = 0;
            if EL_URX14D = . then EL_URX14D = 0;
      run;
/*Phytoestrogens & Metabolites*/
      data source.all;
            set source.all;
            if EL_URXDAZ = . then EL_URXDAZ = 0;
            if EL_URXETD = . then EL_URXETD = 0;
            if EL_URXETL = . then EL_URXETL = 0;
            if EL_URXEQU = . then EL_URXEQU = 0;
            if EL_URXGNS = . then EL_URXGNS = 0;
            if EL_URXDMA = . then EL_URXDMA = 0;
      run;
/*Arsenics*/
      data source.all;
            set source.all;
            if EL_URXUAS  = . then EL_URXUAS  = 0;
            if EL_URXUAS3 = . then EL_URXUAS3 = 0;
            if EL_URXUAS5 = . then EL_URXUAS5 = 0;
            if EL_URXUAB  = . then EL_URXUAB  = 0;
            if EL_URXUAC  = . then EL_URXUAC  = 0;
            if EL_URXUDMA  = . then EL_URXUDMA  = 0;
            if EL_URXUMMA  = . then EL_URXUMMA  = 0;
            if EL_URXUTM  = . then EL_URXUTM  = 0;
      run;
/*Blood Metals*/
      data source.all;
            set source.all;
            if EL_LBXBCD = . then EL_LBXBCD = 0;
            if EL_LBXBPB = . then EL_LBXBPB = 0;
            if EL_LBXIHG = . then EL_LBXIHG = 0;
            if EL_LBXTHG = . then EL_LBXTHG = 0;
      run;
/*Perflourinated Compounds*/
```

```
            data source.all;
                  set source.all;
                  if EL_LBXPFBS = . then EL_LBXPFBS = 0;
                  if EL_LBXPFDE = . then EL_LBXPFDE = 0;
                  if EL_LBXPFDO = . then EL_LBXPFDO = 0;
                  if EL_LBXPFHP = . then EL_LBXPFHP = 0;
                  if EL_LBXPFHS = . then EL_LBXPFHS = 0;
                  if EL_LBXPFNA = . then EL_LBXPFNA = 0;
                  if EL_LBXPFOA = . then EL_LBXPFOA = 0;
                  if EL_LBXPFOS = . then EL_LBXPFOS = 0;
                  if EL_LBXPFSA = . then EL_LBXPFSA = 0;
                  if EL_LBXEPAH = . then EL_LBXEPAH = 0;
                  if EL_LBXMPAH = . then EL_LBXMPAH = 0;
                  if EL_LBXPFUA = . then EL_LBXPFUA = 0;
            run;
      /*PAHs:  No data for this category in 2009*/
            data source.all;
                  set source.all;
                  if EL_URXP01 = . then EL_URXP01 = 0;
                  if EL_URXP02 = . then EL_URXP02 = 0;
                  if EL_URXP03 = . then EL_URXP03 = 0;
                  if EL_URXP04 = . then EL_URXP04 = 0;
                  if EL_URXP05 = . then EL_URXP05 = 0;
                  if EL_URXP06 = . then EL_URXP06 = 0;
                  if EL_URXP07 = . then EL_URXP07 = 0;
                  if EL_URXP10 = . then EL_URXP10 = 0;
                  if EL_URXP17 = . then EL_URXP17 = 0;
                  if EL_URXP19 = . then EL_URXP19 = 0;  /*Should be left out.
No data 2007, 2009*/
            run;
      /*Cotinine*/
            data source.all;
                  set source.all;
                  if EL_LBXCOT = . then EL_LBXCOT = 0;
            run;
      /*Phenols & Parabens*/
            data source.all;
                  set source.all;
                  if EL_URXBPH = . then EL_URXBPH = 0;
                  if EL_URXTRS = . then EL_URXTRS = 0;
                  if EL_URXBP3 = . then EL_URXBP3 = 0;
                  if EL_URX4TO = . then EL_URX4TO = 0;  /*Exclude this b/c,
per NHANES, corrupted 2003 data*/
                  if EL_URXBUP = . then EL_URXBUP = 0;  /*No 2003 data */
                  if EL_URXEPB = . then EL_URXEPB = 0;  /*No 2003 data */
                  if EL_URXMPB = . then EL_URXMPB = 0;  /*No 2003 data */
                  if EL_URXPPB = . then EL_URXPPB = 0;  /*No 2003 data */
            run;
      /*Current Use Pesticides*/
            data source.all;
                  set source.all;
                  if EL_URXBSM = . then EL_URXBSM = 0;
                  if EL_URXCHS = . then EL_URXCHS = 0;
                  if EL_URXEMM = . then EL_URXEMM = 0;
                  if EL_URXFRM = . then EL_URXFRM = 0;
                  if EL_URXHLS = . then EL_URXHLS = 0;
                  if EL_URXMSM = . then EL_URXMSM = 0;
```

```
                  if EL_URXMTM = . then EL_URXMTM = 0;
                  if EL_URXNOS = . then EL_URXNOS = 0;
                  if EL_URXOXS = . then EL_URXOXS = 0;
                  if EL_URXPIM = . then EL_URXPIM = 0;
                  if EL_URXPRO = . then EL_URXPRO = 0;
                  if EL_URXRIM = . then EL_URXRIM = 0;
                  if EL_URXSMM = . then EL_URXSMM = 0;
                  if EL_URXSSF = . then EL_URXSSF = 0;
                  if EL_URXTHF = . then EL_URXTHF = 0;
                  if EL_URXTRA = . then EL_URXTRA = 0;
                  if EL_URXTRN = . then EL_URXTRN = 0;
            run;
      /*Percholates*/
            data source.all;
                  set source.all;
                  if EL_URXUP8 = . then EL_URXUP8 = 0;
                  if EL_URXNO3 = . then EL_URXNO3 = 0;
                  if EL_URXSCN = . then EL_URXSCN = 0;
            run;

/*******************************************************
      For each cycle, chemical group,
                  and for EACH WOMEN,
                  determine how many chemicals
                  per chemical group (in 1 cycle)
                  she was measured for.
      Determine how many were detected above the LOD
                  for that woman (in that cycle, that group).
*******************************************************/
/**********************
      Phthalates 2003
**********************/
            proc sql;
                  create table temp as
                  select  seqn, sum(EL_URXMZP, EL_URXMIB, EL_URXMBP,
EL_URXMCP, EL_URXMEP, EL_URXMHP, EL_URXMHH,
                        EL_URXMOH, EL_URXECP, /*EL_URXCNP, NO 2003*/
EL_URXMNP, /*EL_URXCOP, NO 2003*/ EL_URXMNM,
                        EL_URXMC1, EL_URXMOP) as total_ELs_phth
                  from source.all
                  where SDDSRVYR = 3;
            run;
            proc sql;
                  create table work.new as
                  select a.seqn, a.total_ELs_phth, b.URXMZP, b.EL_URXMZP,
b.URXMIB, b.EL_URXMIB, b.URXMBP,
                        b.EL_URXMBP, b.URXMCP, b.EL_URXMCP, b.URXMEP,
b.EL_URXMEP, b.URXMHP, b.EL_URXMHP, b.URXMHH,
                        b.EL_URXMHH, b.URXMOH, b.EL_URXMOH, b.URXECP,
b.EL_URXECP, /*b.URXCNP, b.EL_URXCNP,*/
                        b.URXMNP, b.EL_URXMNP, /*b.URXCOP, b.EL_URXCOP,*/
b.URXMNM, b.EL_URXMNM, b.URXMC1,
                        b.EL_URXMC1, b.URXMOP, b.EL_URXMOP
                  from temp as a, source.all as b
                  where a.seqn = b.seqn
                        and a.total_ELs_phth = 13;
            run;
```

```
            data Phthalates_03a;
                  set work.new;
                  IF URXMZP > 0.072       then LOD_URXMZP = 1; else
LOD_URXMZP =0;
                  IF URXMIB > 0.3   then LOD_URXMIB = 1; else LOD_URXMIB =0;
                  IF URXMBP > 0.4   then LOD_URXMBP = 1; else LOD_URXMBP =0;
                  IF URXMCP > 0.402       then LOD_URXMCP = 1; else
LOD_URXMCP =0;
                  IF URXMEP > 0.264       then LOD_URXMEP = 1; else
LOD_URXMEP =0;
                  IF URXMHP > 0.9   then LOD_URXMHP = 1; else LOD_URXMHP =0;
                  IF URXMHH > 0.3   then LOD_URXMHH = 1; else LOD_URXMHH =0;
                  IF URXMOH > 0.5   then LOD_URXMOH = 1; else LOD_URXMOH =0;
                  IF URXECP > 0.3   then LOD_URXECP = 1; else LOD_URXECP =0;
                  IF URXMNP > 1.54  then LOD_URXMNP = 1; else LOD_URXMNP =0;
                  IF URXMNM > 1           then LOD_URXMNM = 1; else
LOD_URXMNM =0;
                  IF URXMC1 > 0.2   then LOD_URXMC1 = 1; else LOD_URXMC1 =0;
                  IF URXMOP > 1.68  then LOD_URXMOP = 1; else LOD_URXMOP =0;
            run;
            proc sql;
                  create table source.Phthalates_03b as
                  select *, sum(LOD_URXMZP, LOD_URXMIB, LOD_URXMBP,
LOD_URXMCP, LOD_URXMEP, LOD_URXMHP, LOD_URXMHH,
                        LOD_URXMOH, LOD_URXECP, LOD_URXMNP, LOD_URXMNM,
LOD_URXMC1, LOD_URXMOP) as LODSUM_phthal
                  from Phthalates_03a;
            run;
            proc freq data=source.Phthalates_03b;
                  table LODSUM_phthal;
            run;
            proc sql;
                  drop table temp, temp2, new;
            quit;
                  /*Results taken from here and input into Excel for
graphing*/

/**********************
      Phthalates 2005
**********************/
            proc sql;
                  create table work.temp2 as
                  select  seqn, sum(EL_URXMZP, EL_URXMIB, EL_URXMBP,
EL_URXMCP, EL_URXMEP, EL_URXMHP, EL_URXMHH,
                        EL_URXMOH, EL_URXECP, /*EL_URXCNP, NO 2003*/
EL_URXMNP, /*EL_URXCOP, NO 2003*/ EL_URXMNM,
                        EL_URXMC1, EL_URXMOP) as total_ELs_phth
                  from source.all
                  where SDDSRVYR = 4;  /*cycle=2005*/
            run;
            proc sql;
                  create table work.new as
                  select a.seqn, a.total_ELs_phth, b.URXMZP, b.EL_URXMZP,
b.URXMIB, b.EL_URXMIB, b.URXMBP, b.EL_URXMBP,
                        b.URXMCP, b.EL_URXMCP, b.URXMEP, b.EL_URXMEP,
b.URXMHP, b.EL_URXMHP, b.URXMHH, b.EL_URXMHH,
```

```
                        b.URXMOH, b.EL_URXMOH, b.URXECP, b.EL_URXECP,
/*b.URXCNP, b.EL_URXCNP,*/ b.URXMNP, b.EL_URXMNP,
                        /*b.URXCOP, b.EL_URXCOP,*/ b.URXMNM, b.EL_URXMNM,
b.URXMC1, b.EL_URXMC1, b.URXMOP, b.EL_URXMOP
                  from temp2 as a, source.all as b
                  where a.seqn = b.seqn
                        and a.total_ELs_phth = 13;
            run;
            data Phthalates_05a;
                  set work.new;
                  IF URXMZP > 0.216       then LOD_URXMZP = 1; else
LOD_URXMZP =0;
                  IF URXMIB > 0.3   then LOD_URXMIB = 1; else LOD_URXMIB =0;
                  IF URXMBP > 0.6   then LOD_URXMBP = 1; else LOD_URXMBP =0;
                  IF URXMCP > 0.603       then LOD_URXMCP = 1; else
LOD_URXMCP =0;
                  IF URXMEP > 0.528       then LOD_URXMEP = 1; else
LOD_URXMEP =0;
                  IF URXMHP > 1.2   then LOD_URXMHP = 1; else LOD_URXMHP =0;
                  IF URXMHH > 0.7   then LOD_URXMHH = 1; else LOD_URXMHH =0;
                  IF URXMOH > 0.7   then LOD_URXMOH = 1; else LOD_URXMOH =0;
                  IF URXECP > 0.6   then LOD_URXECP = 1; else LOD_URXECP =0;
                  IF URXMNP > 1.23  then LOD_URXMNP = 1; else LOD_URXMNP =0;
                  IF URXMNM > 1.1         then LOD_URXMNM = 1; else
LOD_URXMNM =0;
                  IF URXMC1 > 0.2   then LOD_URXMC1 = 1; else LOD_URXMC1 =0;
                  IF URXMOP > 1.85  then LOD_URXMOP = 1; else LOD_URXMOP =0;
            run;
                  /*IMPORTANT: I SKIPPED OVER THE TWO NEW PTHALATES FOR 2005
for consistency*/
            proc sql;
                  create table source.Phthalates_05b as
                  select *, sum(LOD_URXMZP, LOD_URXMIB, LOD_URXMBP,
LOD_URXMCP, LOD_URXMEP, LOD_URXMHP, LOD_URXMHH,
                        LOD_URXMOH, LOD_URXECP, LOD_URXMNP, LOD_URXMNM,
LOD_URXMC1, LOD_URXMOP) as LODSUM_phthal
                  from Phthalates_05a;
            run;
            proc freq data=source.Phthalates_05b;
                  table LODSUM_phthal;
            run;
            proc sql;
                  drop table temp2, new;
            quit;

/**********************
      Phthalates 2007
**********************/
            proc sql;
                  create table work.temp2 as
                  select  seqn, sum(EL_URXMZP, EL_URXMIB, EL_URXMBP,
EL_URXMCP, EL_URXMEP, EL_URXMHP, EL_URXMHH, EL_URXMOH,
                        EL_URXECP, /*EL_URXCNP, NO 2003*/ EL_URXMNP,
/*EL_URXCOP, NO 2003*/ EL_URXMNM, EL_URXMC1,
                        EL_URXMOP) as total_ELs_phth
                  from source.all
                  where SDDSRVYR = 5;  /*cycle=2007*/
```

```
run;
                  /*Get Total Number of Chems in the Grp*/
                  proc freq data = work.temp2;
                        tables total_ELs_phth;
                  run;
proc sql;
      create table work.new as
      select a.seqn, a.total_ELs_phth, b.URXMZP, b.EL_URXMZP,
b.URXMIB, b.EL_URXMIB, b.URXMBP, b.EL_URXMBP,
                  b.URXMCP, b.EL_URXMCP, b.URXMEP, b.EL_URXMEP,
b.URXMHP, b.EL_URXMHP, b.URXMHH, b.EL_URXMHH, b.URXMOH,
                  b.EL_URXMOH, b.URXECP, b.EL_URXECP, /*b.URXCNP,
b.EL_URXCNP,*/ b.URXMNP, b.EL_URXMNP,
                  /*b.URXCOP, b.EL_URXCOP,*/ b.URXMNM, b.EL_URXMNM,
b.URXMC1, b.EL_URXMC1, b.URXMOP, b.EL_URXMOP
      from temp2 as a, source.all as b
      where a.seqn = b.seqn
            and a.total_ELs_phth = 13;
run;
data Phthalates_07a;
      set work.new;
      IF URXMZP > 0.216       then LOD_URXMZP = 1; else
LOD_URXMZP =0;
      IF URXMIB > 0.3   then LOD_URXMIB = 1; else LOD_URXMIB =0;
      IF URXMBP > 0.6   then LOD_URXMBP = 1; else LOD_URXMBP =0;
      IF URXMCP > 0.603       then LOD_URXMCP = 1; else
LOD_URXMCP =0;
      IF URXMEP > 0.462       then LOD_URXMEP = 1; else
LOD_URXMEP =0;
      IF URXMHP > 1.1   then LOD_URXMHP = 1; else LOD_URXMHP =0;
      IF URXMHH > 0.7   then LOD_URXMHH = 1; else LOD_URXMHH =0;
      IF URXMOH > 0.6   then LOD_URXMOH = 1; else LOD_URXMOH =0;
      IF URXECP > 0.5   then LOD_URXECP = 1; else LOD_URXECP =0;
      IF URXMNP > 1.23  then LOD_URXMNP = 1; else LOD_URXMNP =0;
      IF URXMNM > 1.1         then LOD_URXMNM = 1; else
LOD_URXMNM =0;
      IF URXMC1 > 0.2   then LOD_URXMC1 = 1; else LOD_URXMC1 =0;
      IF URXMOP > 1.85  then LOD_URXMOP = 1; else LOD_URXMOP =0;
run;
/*IMPORTANT: I SKIPPED OVER THE TWO NEW in 2005 PTHALATES FOR
2007!!!*/
proc sql;
      create table source.Phthalates_07b as
      select *, sum(LOD_URXMZP, LOD_URXMIB, LOD_URXMBP,
LOD_URXMCP, LOD_URXMEP, LOD_URXMHP, LOD_URXMHH,
                  LOD_URXMOH, LOD_URXECP, LOD_URXMNP, LOD_URXMNM,
LOD_URXMC1, LOD_URXMOP) as LODSUM_phthal
      from Phthalates_07a;
run;
proc freq data=source.Phthalates_07b;
      table LODSUM_phthal;
run;
proc sql;
      drop table temp2, new;
quit;

/**********************
```

```
      Phthalates 2009
**********************/
            proc sql;
                  create table work.temp2 as
                  select  seqn, sum(EL_URXMZP, EL_URXMIB, EL_URXMBP,
EL_URXMCP, EL_URXMEP, EL_URXMHP, EL_URXMHH,
                        EL_URXMOH, EL_URXECP, /*EL_URXCNP, NO 2003*/
EL_URXMNP, /*EL_URXCOP, NO 2003*/ EL_URXMNM,
                        EL_URXMC1, EL_URXMOP) as total_ELs_phth
                  from source.all
                  where SDDSRVYR = 6;  /*cycle=2009*/
            run;
                        proc freq data = work.temp2;
                              tables total_ELs_phth;
                        run;
            proc sql;
                  create table work.new as
                  select a.seqn, a.total_ELs_phth, b.URXMZP, b.EL_URXMZP,
b.URXMIB, b.EL_URXMIB, b.URXMBP, b.EL_URXMBP,
                        b.URXMCP, b.EL_URXMCP, b.URXMEP, b.EL_URXMEP,
b.URXMHP, b.EL_URXMHP, b.URXMHH, b.EL_URXMHH,
                        b.URXMOH, b.EL_URXMOH, b.URXECP, b.EL_URXECP,
/*b.URXCNP, b.EL_URXCNP,*/  b.URXMNP, b.EL_URXMNP,
                        /*b.URXCOP, b.EL_URXCOP,*/ b.URXMNM, b.EL_URXMNM,
b.URXMC1, b.EL_URXMC1, b.URXMOP, b.EL_URXMOP
                  from temp2 as a, source.all as b
                  where a.seqn = b.seqn
                        and a.total_ELs_phth = 13;
            run;
            data Phthalates_09a;
                  set work.new;
                  IF URXMZP > 0.216       then LOD_URXMZP = 1; else
LOD_URXMZP =0;
                  IF URXMIB > 0.2   then LOD_URXMIB = 1; else LOD_URXMIB =0;
                  IF URXMBP > 0.4   then LOD_URXMBP = 1; else LOD_URXMBP =0;
                  IF URXMCP > 0.402       then LOD_URXMCP = 1; else
LOD_URXMCP =0;
                  IF URXMEP > 0.462       then LOD_URXMEP = 1; else
LOD_URXMEP =0;
                  IF URXMHP > 0.5   then LOD_URXMHP = 1; else LOD_URXMHP =0;
                  IF URXMHH > 0.2   then LOD_URXMHH = 1; else LOD_URXMHH =0;
                  IF URXMOH > 0.2   then LOD_URXMOH = 1; else LOD_URXMOH =0;
                  IF URXECP > 0.2   then LOD_URXECP = 1; else LOD_URXECP =0;
                  IF URXMNP > 0.77  then LOD_URXMNP = 1; else LOD_URXMNP =0;
                  IF URXMNM > 0.5         then LOD_URXMNM = 1; else
LOD_URXMNM =0;
                  IF URXMC1 > 0.2   then LOD_URXMC1 = 1; else LOD_URXMC1 =0;
                  IF URXMOP > 0.84  then LOD_URXMOP = 1; else LOD_URXMOP =0;
            run;
            /*IMPORTANT: I SKIPPED OVER THE TWO NEW in 2005 PTHALATES FOR
2009!!!*/
            proc sql;
                  create table source.Phthalates_09b as
                  select *, sum(LOD_URXMZP, LOD_URXMIB, LOD_URXMBP,
LOD_URXMCP, LOD_URXMEP, LOD_URXMHP, LOD_URXMHH,
                        LOD_URXMOH, LOD_URXECP, LOD_URXMNP, LOD_URXMNM,
LOD_URXMC1, LOD_URXMOP) as LODSUM_phthal
```

```
                  from Phthalates_09a;
            run;
            proc freq data=source.Phthalates_09b;
                  table LODSUM_phthal;
            run;
            proc sql;
                  drop table work.temp, temp2, new;
            quit;

/*************************************
*************************************
            Urinary Heavy Metals (13)
      *2003 and 2005 had women that were
      not measured for all available metals.
      These women were excluded from this
      analysis.
*************************************
*************************************/

/***********************
      Metals 2003
***********************/
            proc sql;
                  create table temp as
                  select  seqn, sum(EL_URXUBA, EL_URXUBE,
EL_URXUCD,EL_URXUCO,EL_URXUCS,EL_URXUMO,EL_URXUPB,EL_URXUPT,
                        EL_URXUSB,EL_URXUTL,EL_URXUTU,EL_URXUUR,EL_URXUHG) as
total_ELs_metal
                  from source.all
                  where SDDSRVYR = 3;
            run;
            proc freq data = temp;
                  tables total_ELs_metal;
            run;
            proc sql;
                  create table work.new as
                  select a.seqn, a.total_ELs_metal,
                        b.URXUBA, b.EL_URXUBA,
                        b.URXUBE, b.EL_URXUBE,
                        b.URXUCD, b.EL_URXUCD,
                        b.URXUCO, b.EL_URXUCO,
                        b.URXUCS, b.EL_URXUCS,
                        b.URXUMO, b.EL_URXUMO,
                        b.URXUPB, b.EL_URXUPB,
                        b.URXUPT, b.EL_URXUPT,
                        b.URXUSB, b.EL_URXUSB,
                        b.URXUTL, b.EL_URXUTL,
                        b.URXUTU, b.EL_URXUTU,
                        b.URXUUR, b.EL_URXUUR,
                        b.URXUHG, b.EL_URXUHG
                  from temp as a, source.all as b
                  where a.seqn = b.seqn
                        and a.total_ELs_metal = 13;
            run;
      data Metals_03a;
            set work.new;
            IF URXUBA > 0.31  then LOD_URXUBA= 1; else LOD_URXUBA =0;
```

```
            IF URXUBE > 0.13  then LOD_URXUBE= 1; else LOD_URXUBE =0;
            IF URXUCD > 0.06  then LOD_URXUCD= 1; else LOD_URXUCD =0;
            IF URXUCO > 0.08  then LOD_URXUCO= 1; else LOD_URXUCO =0;
            IF URXUCS > 0.2   then LOD_URXUCS= 1; else LOD_URXUCS =0;
            IF URXUMO > 1.5   then LOD_URXUMO= 1; else LOD_URXUMO =0;
            IF URXUPB > 0.33  then LOD_URXUPB= 1; else LOD_URXUPB =0;
            IF URXUPT > 0.07  then LOD_URXUPT= 1; else LOD_URXUPT =0;
            IF URXUSB > 0.07  then LOD_URXUSB= 1; else LOD_URXUSB =0;
            IF URXUTL > 0.02  then LOD_URXUTL= 1; else LOD_URXUTL =0;
            IF URXUTU > 0.04  then LOD_URXUTU= 1; else LOD_URXUTU =0;
            IF URXUUR > 0.005       then LOD_URXUUR= 1; else LOD_URXUUR =0;
            IF URXUHG > 0.14  then LOD_URXUHG= 1; else LOD_URXUHG =0;
      run;
      proc sql;
            create table source.Metals_03b as
            select *,
sum(LOD_URXUBA,LOD_URXUBE,LOD_URXUCD,LOD_URXUCO,LOD_URXUCS,LOD_URXUMO,LOD_URX
UPB,LOD_URXUPT,
                  LOD_URXUSB,LOD_URXUTL,LOD_URXUTU,LOD_URXUUR,LOD_URXUHG ) as
LODSUM_metals
            from Metals_03a;
      run;
      proc freq data=source.Metals_03b;
            table LODSUM_metals;
      run;
      proc sql;
            drop table work.temp, temp2, new;
      quit;

/***********************
      Metals 2005
***********************/
            proc sql;
                  create table temp as
                  select  seqn, sum(EL_URXUBA, EL_URXUBE,
EL_URXUCD,EL_URXUCO,EL_URXUCS,EL_URXUMO,EL_URXUPB,EL_URXUPT,
                        EL_URXUSB,EL_URXUTL,EL_URXUTU,EL_URXUUR,EL_URXUHG) as
total_ELs_metal
                  from source.all
                  where SDDSRVYR = 4;     /*4 = 2005 cycle*/
            run;
            /*1 person with only 1 measured; another person w/only 12
measured: they're excluded*/
            proc freq data = temp;
                  tables total_ELs_metal;
            run;
            proc sql;
                  create table work.new as
                  select a.seqn, a.total_ELs_metal,
                        b.URXUBA, b.EL_URXUBA,
                        b.URXUBE, b.EL_URXUBE,
                        b.URXUCD, b.EL_URXUCD,
                        b.URXUCO, b.EL_URXUCO,
                        b.URXUCS, b.EL_URXUCS,
                        b.URXUMO, b.EL_URXUMO,
                        b.URXUPB, b.EL_URXUPB,
                        b.URXUPT, b.EL_URXUPT,
```

```
                        b.URXUSB, b.EL_URXUSB,
                        b.URXUTL, b.EL_URXUTL,
                        b.URXUTU, b.EL_URXUTU,
                        b.URXUUR, b.EL_URXUUR,
                        b.URXUHG, b.EL_URXUHG
                  from temp as a, source.all as b
                  where a.seqn = b.seqn
                        and a.total_ELs_metal = 13;
            run;
            data Metals_05a;
                  set work.new;
                  IF URXUBA > 0.12  then LOD_URXUBA= 1; else LOD_URXUBA =0;
                  IF URXUBE > 0.072 then LOD_URXUBE= 1; else LOD_URXUBE =0;
                  IF URXUCD > 0.042 then LOD_URXUCD= 1; else LOD_URXUCD =0;
                  IF URXUCO > 0.041 then LOD_URXUCO= 1; else LOD_URXUCO =0;
                  IF URXUCS > 0.066       then LOD_URXUCS= 1; else LOD_URXUCS
=0;
                  IF URXUMO > 0.92  then LOD_URXUMO= 1; else LOD_URXUMO =0;
                  IF URXUPB > 0.1   then LOD_URXUPB= 1; else LOD_URXUPB =0;
                  IF URXUPT > 0.009       then LOD_URXUPT= 1; else LOD_URXUPT
=0;
                  IF URXUSB > 0.032 then LOD_URXUSB= 1; else LOD_URXUSB =0;
                  IF URXUTL > 0.015       then LOD_URXUTL= 1; else LOD_URXUTL
=0;
                  IF URXUTU > 0.021 then LOD_URXUTU= 1; else LOD_URXUTU =0;
                  IF URXUUR > 0.002       then LOD_URXUUR= 1; else LOD_URXUUR
=0;
                  IF URXUHG > 0.11  then LOD_URXUHG= 1; else LOD_URXUHG =0;
            run;
            proc sql;
                  create table source.Metals_05b as
                  select *,
sum(LOD_URXUBA,LOD_URXUBE,LOD_URXUCD,LOD_URXUCO,LOD_URXUCS,LOD_URXUMO,LOD_URX
UPB,LOD_URXUPT,

      LOD_URXUSB,LOD_URXUTL,LOD_URXUTU,LOD_URXUUR,LOD_URXUHG ) as
LODSUM_metals
                  from Metals_05a;
            run;
            proc freq data=source.Metals_05b;
                  table LODSUM_metals;
            run;
            proc sql;
                  drop table work.temp, temp2, new;
            quit;

/**********************
      Metals 2007
**********************/
            proc sql;
                  create table temp as
                  select  seqn, sum(EL_URXUBA, EL_URXUBE,
EL_URXUCD,EL_URXUCO,EL_URXUCS,EL_URXUMO,EL_URXUPB,EL_URXUPT,
                        EL_URXUSB,EL_URXUTL,EL_URXUTU,EL_URXUUR,EL_URXUHG) as
total_ELs_metal
                  from source.all
                  where SDDSRVYR = 5;     /*5 = 2007 cycle*/
```

```
run;
proc freq data = temp;
      tables total_ELs_metal;
run;
proc sql;
      create table work.new as
      select a.seqn, a.total_ELs_metal,
            b.URXUBA, b.EL_URXUBA,
            b.URXUBE, b.EL_URXUBE,
            b.URXUCD, b.EL_URXUCD,
            b.URXUCO, b.EL_URXUCO,
            b.URXUCS, b.EL_URXUCS,
            b.URXUMO, b.EL_URXUMO,
            b.URXUPB, b.EL_URXUPB,
            b.URXUPT, b.EL_URXUPT,
            b.URXUSB, b.EL_URXUSB,
            b.URXUTL, b.EL_URXUTL,
            b.URXUTU, b.EL_URXUTU,
            b.URXUUR, b.EL_URXUUR,
            b.URXUHG, b.EL_URXUHG
      from temp as a, source.all as b
      where a.seqn = b.seqn
            and a.total_ELs_metal = 13;
run;
data Metals_07a;
      set work.new;
      IF URXUBA > 0.12  then LOD_URXUBA= 1; else LOD_URXUBA =0;
      IF URXUBE > 0.072 then LOD_URXUBE= 1; else LOD_URXUBE =0;
      IF URXUCD > 0.042 then LOD_URXUCD= 1; else LOD_URXUCD =0;
      IF URXUCO > 0.066 then LOD_URXUCO= 1; else LOD_URXUCO =0;
      IF URXUCS > 0.041       then LOD_URXUCS= 1; else LOD_URXUCS
=0;
      IF URXUMO > 0.92  then LOD_URXUMO= 1; else LOD_URXUMO =0;
      IF URXUPB > 0.1   then LOD_URXUPB= 1; else LOD_URXUPB =0;
      IF URXUPT > 0.009       then LOD_URXUPT= 1; else LOD_URXUPT
=0;
      IF URXUSB > 0.032 then LOD_URXUSB= 1; else LOD_URXUSB =0;
      IF URXUTL > 0.015       then LOD_URXUTL= 1; else LOD_URXUTL
=0;
      IF URXUTU > 0.021 then LOD_URXUTU= 1; else LOD_URXUTU =0;
      IF URXUUR > 0.002       then LOD_URXUUR= 1; else LOD_URXUUR
=0;
      IF URXUHG > 0.08  then LOD_URXUHG= 1; else LOD_URXUHG =0;
run;
proc sql;
      create table source.Metals_07b as
      select *,
sum(LOD_URXUBA,LOD_URXUBE,LOD_URXUCD,LOD_URXUCO,LOD_URXUCS,LOD_URXUMO,LOD_URX
UPB,

      LOD_URXUPT,LOD_URXUSB,LOD_URXUTL,LOD_URXUTU,LOD_URXUUR,LOD_URXUHG ) as
LODSUM_metals
      from Metals_07a;
run;
proc freq data=source.Metals_07b;
      table LODSUM_metals;
run;
```

```
            proc sql;
                  drop table work.temp, temp2, new;
            quit;

/**********************
      Metals 2009
**********************/
            proc sql;
                  create table temp as
                  select  seqn, sum(EL_URXUBA, EL_URXUBE,
EL_URXUCD,EL_URXUCO,EL_URXUCS,EL_URXUMO,EL_URXUPB,EL_URXUPT,
                        EL_URXUSB,EL_URXUTL,EL_URXUTU,EL_URXUUR,EL_URXUHG) as
total_ELs_metal
                  from source.all
                  where SDDSRVYR = 6;     /*6 = 2009 cycle*/
            run;
            proc freq data = temp;
                  tables total_ELs_metal;
            run;
            proc sql;
                  create table work.new as
                  select a.seqn, a.total_ELs_metal,
                        b.URXUBA, b.EL_URXUBA,
                        b.URXUBE, b.EL_URXUBE,
                        b.URXUCD, b.EL_URXUCD,
                        b.URXUCO, b.EL_URXUCO,
                        b.URXUCS, b.EL_URXUCS,
                        b.URXUMO, b.EL_URXUMO,
                        b.URXUPB, b.EL_URXUPB,
                        b.URXUPT, b.EL_URXUPT,
                        b.URXUSB, b.EL_URXUSB,
                        b.URXUTL, b.EL_URXUTL,
                        b.URXUTU, b.EL_URXUTU,
                        b.URXUUR, b.EL_URXUUR,
                        b.URXUHG, b.EL_URXUHG
                  from temp as a, source.all as b
                  where a.seqn = b.seqn
                        and a.total_ELs_metal = 13;
            run;
      data Metals_09a;
            set work.new;
            IF URXUBA > 0.12  then LOD_URXUBA= 1; else LOD_URXUBA =0;
            IF URXUBE > 0.072 then LOD_URXUBE= 1; else LOD_URXUBE =0;
            IF URXUCD > 0.042 then LOD_URXUCD= 1; else LOD_URXUCD =0;
            IF URXUCO > 0.041 then LOD_URXUCO= 1; else LOD_URXUCO =0;
            IF URXUCS > 0.066       then LOD_URXUCS= 1; else LOD_URXUCS =0;
            IF URXUMO > 0.92  then LOD_URXUMO= 1; else LOD_URXUMO =0;
            IF URXUPB > 0.1   then LOD_URXUPB= 1; else LOD_URXUPB =0;
            IF URXUPT > 0.009       then LOD_URXUPT= 1; else LOD_URXUPT =0;
            IF URXUSB > 0.032 then LOD_URXUSB= 1; else LOD_URXUSB =0;
            IF URXUTL > 0.015       then LOD_URXUTL= 1; else LOD_URXUTL =0;
            IF URXUTU > 0.021 then LOD_URXUTU= 1; else LOD_URXUTU =0;
            IF URXUUR > 0.0017      then LOD_URXUUR= 1; else LOD_URXUUR =0;
            IF URXUHG > 0.08  then LOD_URXUHG= 1; else LOD_URXUHG =0;
      run;
      proc sql;
            create table source.Metals_09b as
```

```
            select *,
sum(LOD_URXUBA,LOD_URXUBE,LOD_URXUCD,LOD_URXUCO,LOD_URXUCS,LOD_URXUMO,LOD_URX
UPB,

      LOD_URXUPT,LOD_URXUSB,LOD_URXUTL,LOD_URXUTU,LOD_URXUUR,LOD_URXUHG ) as
LODSUM_metals
            from Metals_09a;
      run;
      proc freq data=source.Metals_09b;
            table LODSUM_metals;
      run;
      proc sql;
            drop table work.temp, temp2, new;
      quit;

/*************************************
*************************************
      Urinary Environmental Pesticides
                        (5)
*************************************
*************************************/

/***********************
       Pesticides 2003
***********************/
            proc sql;
                  create table temp as
                  select  seqn,
sum(EL_URXOPP,EL_URXDCB,EL_URX1TB,EL_URX3TB,EL_URX14D) as total_ELs_pest
                  from source.all
                  where SDDSRVYR = 3;  /*2003*/
            run;
            proc freq data = temp;
                  tables total_ELs_pest;
            run;
            proc sql;
                  create table work.new as
                  select a.seqn, a.total_ELs_pest,
                        b.URXOPP, b.EL_URXOPP,
                        b.URXDCB, b.EL_URXDCB,
                        b.URX1TB, b.EL_URX1TB,
                        b.URX3TB, b.EL_URX3TB,
                        b.URX14D, b.EL_URX14D
                  from temp as a, source.all as b
                  where a.seqn = b.seqn
                        and a.total_ELs_pest = 5;
            run;
            data Pesticides_03a;
                  set work.new;
                  IF URXOPP > 0.1   then LOD_URXOPP= 1; else LOD_URXOPP =0;
                  IF URXDCB > 0.17  then LOD_URXDCB= 1; else LOD_URXDCB =0;
                  IF URX1TB > 0.1         then LOD_URX1TB= 1; else LOD_URX1TB
=0;
                  IF URX3TB > 0.5   then LOD_URX3TB= 1; else LOD_URX3TB =0;
                  IF URX14D > 0.12  then LOD_URX14D= 1; else LOD_URX14D =0;
            run;
            proc sql;
```

```
                  create table source.Pesticides_03b as
                  select *,
sum(LOD_URXOPP,LOD_URXDCB,LOD_URX1TB,LOD_URX3TB,LOD_URX14D ) as LODSUM_Pests
                  from Pesticides_03a;
            run;
            proc freq data=source.Pesticides_03b;
                  table LODSUM_Pests;
            run;
            proc sql;
                  drop table work.temp, temp2, new;
            quit;

/***********************
       Pesticides 2005
***********************/
            proc sql;
                  create table temp as
                  select  seqn,
sum(EL_URXOPP,EL_URXDCB,EL_URX1TB,EL_URX3TB,EL_URX14D) as total_ELs_pest
                  from source.all
                  where SDDSRVYR = 4;  /*2005*/
            run;
            proc freq data = temp;
                  tables total_ELs_pest;
            run;
            proc sql;
                  create table work.new as
                  select a.seqn, a.total_ELs_pest,
                        b.URXOPP, b.EL_URXOPP,
                        b.URXDCB, b.EL_URXDCB,
                        b.URX1TB, b.EL_URX1TB,
                        b.URX3TB, b.EL_URX3TB,
                        b.URX14D, b.EL_URX14D
                  from temp as a, source.all as b
                  where a.seqn = b.seqn
                        and a.total_ELs_pest = 5;
            run;
            data Pesticides_05a;
                  set work.new;
                  IF URXOPP > 0.1   then LOD_URXOPP= 1; else LOD_URXOPP =0;
                  IF URXDCB > 0.2         then LOD_URXDCB= 1; else LOD_URXDCB
=0;
                  IF URX1TB > 0.1         then LOD_URX1TB= 1; else LOD_URX1TB
=0;
                  IF URX3TB > 0.5   then LOD_URX3TB= 1; else LOD_URX3TB =0;
                  IF URX14D > 0.2   then LOD_URX14D= 1; else LOD_URX14D =0;
            run;
            proc sql;
                  create table source.Pesticides_05b as
                  select *,
sum(LOD_URXOPP,LOD_URXDCB,LOD_URX1TB,LOD_URX3TB,LOD_URX14D ) as LODSUM_Pests
                  from Pesticides_05a;
            run;
            proc freq data=source.Pesticides_05b;
                  table LODSUM_Pests;
            run;
            proc sql;
```

```
                  drop table work.temp, temp2, new;
            quit;

/**********************
      Pesticides 2007
**********************/
            proc sql;
                  create table temp as
                  select  seqn,
sum(EL_URXOPP,EL_URXDCB,EL_URX1TB,EL_URX3TB,EL_URX14D) as total_ELs_pest
                  from source.all
                  where SDDSRVYR = 5;  /*2007*/
            run;
            proc freq data = temp;
                  tables total_ELs_pest;
            run;
            proc sql;
                  create table work.new as
                  select a.seqn, a.total_ELs_pest,
                        b.URXOPP, b.EL_URXOPP,
                        b.URXDCB, b.EL_URXDCB,
                        b.URX1TB, b.EL_URX1TB,
                        b.URX3TB, b.EL_URX3TB,
                        b.URX14D, b.EL_URX14D
                  from temp as a, source.all as b
                  where a.seqn = b.seqn
                        and a.total_ELs_pest = 5;
            run;
            data Pesticides_07a;
                  set work.new;
                  IF URXOPP > 0.1   then LOD_URXOPP= 1; else LOD_URXOPP =0;
                  IF URXDCB > 0.2         then LOD_URXDCB= 1; else LOD_URXDCB
=0;
                  IF URX1TB > 0.1         then LOD_URX1TB= 1; else LOD_URX1TB
=0;
                  IF URX3TB > 0.5   then LOD_URX3TB= 1; else LOD_URX3TB =0;
                  IF URX14D > 0.2   then LOD_URX14D= 1; else LOD_URX14D =0;
            run;
            proc sql;
                  create table source.Pesticides_07b as
                  select *,
sum(LOD_URXOPP,LOD_URXDCB,LOD_URX1TB,LOD_URX3TB,LOD_URX14D ) as LODSUM_Pests
                  from Pesticides_07a;
            run;
            proc freq data=source.Pesticides_07b;
                  table LODSUM_Pests;
            run;
            proc sql;
                  drop table work.temp, temp2, new;
            quit;

/**********************
      Pesticides 2009
**********************/
            proc sql;
                  create table temp as
```

```
                  select  seqn,
sum(EL_URXOPP,EL_URXDCB,EL_URX1TB,EL_URX3TB,EL_URX14D) as total_ELs_pest
                  from source.all
                  where SDDSRVYR = 6;  /*2009*/
            run;
            proc freq data = temp;
                  tables total_ELs_pest;
            run;
            proc sql;
                  create table work.new as
                  select a.seqn, a.total_ELs_pest,
                        b.URXOPP, b.EL_URXOPP,
                        b.URXDCB, b.EL_URXDCB,
                        b.URX1TB, b.EL_URX1TB,
                        b.URX3TB, b.EL_URX3TB,
                        b.URX14D, b.EL_URX14D
                  from temp as a, source.all as b
                  where a.seqn = b.seqn
                        and a.total_ELs_pest = 5;
            run;
            data Pesticides_09a;
                  set work.new;
                  IF URXOPP > 0.2   then LOD_URXOPP= 1; else LOD_URXOPP =0;
                  IF URXDCB > 0.2         then LOD_URXDCB= 1; else LOD_URXDCB
=0;
                  IF URX1TB > 0.1         then LOD_URX1TB= 1; else LOD_URX1TB
=0;
                  IF URX3TB > 0.5   then LOD_URX3TB= 1; else LOD_URX3TB =0;
                  IF URX14D > 0.2   then LOD_URX14D= 1; else LOD_URX14D =0;
            run;
            proc sql;
                  create table source.Pesticides_09b as
                  select *,
sum(LOD_URXOPP,LOD_URXDCB,LOD_URX1TB,LOD_URX3TB,LOD_URX14D ) as LODSUM_Pests
                  from Pesticides_09a;
            run;
            proc freq data=source.Pesticides_09b;
                  table LODSUM_Pests;
            run;
            proc sql;
                  drop table work.temp, temp2, new;
            quit;

/*************************************
*************************************
            Urinary Phytoestrogens
                        (6)
*************************************
*************************************/

/***********************
  Phytoestrogens 2003
***********************/
            proc sql;
                  create table temp as
```

```
                  select  seqn,
sum(EL_URXDAZ,EL_URXETD,EL_URXETL,EL_URXEQU,EL_URXGNS,EL_URXDMA) as
total_ELs_phyto
                  from source.all
                  where SDDSRVYR = 3;  /*2003*/
            run;
            proc freq data = temp;
                  tables total_ELs_phyto;
            run;
            proc sql;
                  create table work.new as
                  select a.seqn, a.total_ELs_phyto,
                        b.URXDAZ, b.EL_URXDAZ,
                        b.URXETD, b.EL_URXETD,
                        b.URXETL, b.EL_URXETL,
                        b.URXEQU, b.EL_URXEQU,
                        b.URXGNS, b.EL_URXGNS,
                        b.URXDMA, b.EL_URXDMA
                  from temp as a, source.all as b
                  where a.seqn = b.seqn
                        and a.total_ELs_phyto = 6;
            run;
            data Phyto_03a;
                  set work.new;
                  IF URXDAZ > 1.6   then LOD_URXDAZ= 1; else LOD_URXDAZ =0;
                  IF URXETD > 1.5         then LOD_URXETD= 1; else LOD_URXETD
=0;
                  IF URXETL > 1.9         then LOD_URXETL= 1; else LOD_URXETL
=0;
                  IF URXEQU > 3.3   then LOD_URXEQU= 1; else LOD_URXEQU =0;
                  IF URXGNS > 0.8   then LOD_URXGNS= 1; else LOD_URXGNS =0;
                  IF URXDMA > 0.4   then LOD_URXDMA= 1; else LOD_URXDMA =0;
            run;
            proc sql;
                  create table source.Phyto_03b as
                  select *,
sum(LOD_URXDAZ,LOD_URXETD,LOD_URXETL,LOD_URXEQU,LOD_URXGNS,LOD_URXDMA) as
LODSUM_phyto
                  from Phyto_03a;
            run;
            proc freq data=source.Phyto_03b;
                  table LODSUM_phyto;
            run;
            proc sql;
                  drop table work.temp, temp2, new;
            quit;

/**********************
  Phytoestrogens 2005
**********************/
            proc sql;
                  create table temp as
                  select  seqn,
sum(EL_URXDAZ,EL_URXETD,EL_URXETL,EL_URXEQU,EL_URXGNS,EL_URXDMA) as
total_ELs_phyto
                  from source.all
                  where SDDSRVYR = 4;  /*2005*/
```

```
            run;
            proc freq data = temp;
                  tables total_ELs_phyto;
            run;
            proc sql;
                  create table work.new as
                  select a.seqn, a.total_ELs_phyto,
                        b.URXDAZ, b.EL_URXDAZ,
                        b.URXETD, b.EL_URXETD,
                        b.URXETL, b.EL_URXETL,
                        b.URXEQU, b.EL_URXEQU,
                        b.URXGNS, b.EL_URXGNS,
                        b.URXDMA, b.EL_URXDMA
                  from temp as a, source.all as b
                  where a.seqn = b.seqn
                        and a.total_ELs_phyto = 6;
            run;
            data Phyto_05a;
                  set work.new;
                  IF URXDAZ > 0.4   then LOD_URXDAZ= 1; else LOD_URXDAZ =0;
                  IF URXETD > 0.04  then LOD_URXETD= 1; else LOD_URXETD =0;
                  IF URXETL > 0.1         then LOD_URXETL= 1; else LOD_URXETL
=0;
                  IF URXEQU > 0.06  then LOD_URXEQU= 1; else LOD_URXEQU =0;
                  IF URXGNS > 1           then LOD_URXGNS= 1; else LOD_URXGNS
=0;
                  IF URXDMA > 0.2   then LOD_URXDMA= 1; else LOD_URXDMA =0;
            run;
            proc sql;
                  create table source.Phyto_05b as
                  select *,
sum(LOD_URXDAZ,LOD_URXETD,LOD_URXETL,LOD_URXEQU,LOD_URXGNS,LOD_URXDMA) as
LODSUM_phyto
                  from Phyto_05a;
            run;
            proc freq data=source.Phyto_05b;
                  table LODSUM_phyto;
            run;
            proc sql;
                  drop table work.temp, temp2, new;
            quit;

/**********************
  Phytoestrogens 2007
**********************/
            proc sql;
                  create table temp as
                  select  seqn,
sum(EL_URXDAZ,EL_URXETD,EL_URXETL,EL_URXEQU,EL_URXGNS,EL_URXDMA) as
total_ELs_phyto
                  from source.all
                  where SDDSRVYR = 5;  /*2007*/
            run;
            proc freq data = temp;
                  tables total_ELs_phyto;
            run;
            proc sql;
```

```
                  create table work.new as
                  select a.seqn, a.total_ELs_phyto,
                        b.URXDAZ, b.EL_URXDAZ,
                        b.URXETD, b.EL_URXETD,
                        b.URXETL, b.EL_URXETL,
                        b.URXEQU, b.EL_URXEQU,
                        b.URXGNS, b.EL_URXGNS,
                        b.URXDMA, b.EL_URXDMA
                  from temp as a, source.all as b
                  where a.seqn = b.seqn
                        and a.total_ELs_phyto = 6;
            run;
            data Phyto_07a;
                  set work.new;
                  IF URXDAZ > 0.4   then LOD_URXDAZ= 1; else LOD_URXDAZ =0;
                  IF URXETD > 0.04  then LOD_URXETD= 1; else LOD_URXETD =0;
                  IF URXETL > 0.1         then LOD_URXETL= 1; else LOD_URXETL
=0;
                  IF URXEQU > 0.06  then LOD_URXEQU= 1; else LOD_URXEQU =0;
                  IF URXGNS > 0.2         then LOD_URXGNS= 1; else LOD_URXGNS
=0;
                  IF URXDMA > 0.2   then LOD_URXDMA= 1; else LOD_URXDMA =0;
            run;
            proc sql;
                  create table source.Phyto_07b as
                  select *,
sum(LOD_URXDAZ,LOD_URXETD,LOD_URXETL,LOD_URXEQU,LOD_URXGNS,LOD_URXDMA) as
LODSUM_phyto
                  from Phyto_07a;
            run;
            proc freq data=source.Phyto_07b;
                  table LODSUM_phyto;
            run;
            proc sql;
                  drop table work.temp, temp2, new;
            quit;

/**********************
  Phytoestrogens 2009
**********************/
            proc sql;
                  create table temp as
                  select  seqn,
sum(EL_URXDAZ,EL_URXETD,EL_URXETL,EL_URXEQU,EL_URXGNS,EL_URXDMA) as
total_ELs_phyto
                  from source.all
                  where SDDSRVYR = 6;  /*2009*/
            run;
            proc freq data = temp;
                  tables total_ELs_phyto;
            run;
            proc sql;
                  create table work.new as
                  select a.seqn, a.total_ELs_phyto,
                        b.URXDAZ, b.EL_URXDAZ,
                        b.URXETD, b.EL_URXETD,
                        b.URXETL, b.EL_URXETL,
```

```
                        b.URXEQU, b.EL_URXEQU,
                        b.URXGNS, b.EL_URXGNS,
                        b.URXDMA, b.EL_URXDMA
                  from temp as a, source.all as b
                  where a.seqn = b.seqn
                        and a.total_ELs_phyto = 6;
            run;
            data Phyto_09a;
                  set work.new;
                  IF URXDAZ > 0.4   then LOD_URXDAZ= 1; else LOD_URXDAZ =0;
                  IF URXETD > 0.04  then LOD_URXETD= 1; else LOD_URXETD =0;
                  IF URXETL > 0.1         then LOD_URXETL= 1; else LOD_URXETL
=0;
                  IF URXEQU > 0.06  then LOD_URXEQU= 1; else LOD_URXEQU =0;
                  IF URXGNS > 0.2         then LOD_URXGNS= 1; else LOD_URXGNS
=0;
                  IF URXDMA > 0.2   then LOD_URXDMA= 1; else LOD_URXDMA =0;
            run;
            proc sql;
                  create table source.Phyto_09b as
                  select *,
sum(LOD_URXDAZ,LOD_URXETD,LOD_URXETL,LOD_URXEQU,LOD_URXGNS,LOD_URXDMA) as
LODSUM_phyto
                  from Phyto_09a;
            run;
            proc freq data=source.Phyto_09b;
                  table LODSUM_phyto;
            run;
            proc sql;
                  drop table work.temp, temp2, new;
            quit;

/*************************************
*************************************
 Total Arsenics and Speciated Arsenics
                        (8)
*************************************
*************************************/

/***********************
      Arsenics 2003
***********************/
            proc sql;
                  create table temp as
                  select  seqn,
sum(EL_URXUAS,EL_URXUAS3,EL_URXUAS5,EL_URXUAB,EL_URXUAC,EL_URXUDMA,EL_URXUMMA
,
                        EL_URXUTM) as total_ELs_ars
                  from source.all
                  where SDDSRVYR = 3;  /*2003*/
            run;
            proc freq data = temp;
                  tables total_ELs_ars;
            run;
            proc sql;
                  create table work.new as
                  select a.seqn, a.total_ELs_ars,
```

```
                        b.URXUAS , b.EL_URXUAS ,
                        b.URXUAS3, b.EL_URXUAS3,
                        b.URXUAS5, b.EL_URXUAS5,
                        b.URXUAB , b.EL_URXUAB ,
                        b.URXUAC , b.EL_URXUAC ,
                        b.URXUDMA, b.EL_URXUDMA,
                        b.URXUMMA, b.EL_URXUMMA,
                        b.URXUTM , b.EL_URXUTM
                  from temp as a, source.all as b
                  where a.seqn = b.seqn
                        and a.total_ELs_ars = 8;
            run;
            data Arsenics_03a;
                  set work.new;
                  IF URXUAS  > 0.74       then LOD_URXUAS  = 1; else
LOD_URXUAS =0;
                  IF URXUAS3 > 1.2  then LOD_URXUAS3 = 1; else LOD_URXUAS3=0;
                  IF URXUAS5 > 1.0  then LOD_URXUAS5 = 1; else LOD_URXUAS5=0;
                  IF URXUAB  > 0.4  then LOD_URXUAB  = 1; else LOD_URXUAB =0;
                  IF URXUAC  > 0.6  then LOD_URXUAC  = 1; else LOD_URXUAC =0;
                  IF URXUDMA > 1.7  then LOD_URXUDMA = 1; else LOD_URXUDMA=0;
                  IF URXUMMA > 0.9  then LOD_URXUMMA = 1; else LOD_URXUMMA=0;
                  IF URXUTM  > 1.0  then LOD_URXUTM  = 1; else LOD_URXUTM =0;
            run;
            proc sql;
                  create table source.Arsenics_03b as
                  select *,
sum(LOD_URXUAS,LOD_URXUAS3,LOD_URXUAS5,LOD_URXUAB,LOD_URXUAC,LOD_URXUDMA,LOD_
URXUMMA,
                        LOD_URXUTM) as LODSUM_arsenic
                  from Arsenics_03a;
            run;
            proc freq data=source.Arsenics_03b;
                  table LODSUM_arsenic;
            run;
            proc sql;
                  drop table work.temp, temp2, new;
            quit;

/***********************
      Arsenics 2005
***********************/
            proc sql;
                  create table temp as
                  select  seqn,
sum(EL_URXUAS,EL_URXUAS3,EL_URXUAS5,EL_URXUAB,EL_URXUAC,EL_URXUDMA,EL_URXUMMA
,
                        EL_URXUTM) as total_ELs_ars
                  from source.all
                  where SDDSRVYR = 4;  /*2005*/
            run;
            proc freq data = temp;
                  tables total_ELs_ars;
            run;
            proc sql;
                  create table work.new as
                  select a.seqn, a.total_ELs_ars,
```

```
                        b.URXUAS , b.EL_URXUAS ,
                        b.URXUAS3, b.EL_URXUAS3,
                        b.URXUAS5, b.EL_URXUAS5,
                        b.URXUAB , b.EL_URXUAB ,
                        b.URXUAC , b.EL_URXUAC ,
                        b.URXUDMA, b.EL_URXUDMA,
                        b.URXUMMA, b.EL_URXUMMA,
                        b.URXUTM , b.EL_URXUTM
                  from temp as a, source.all as b
                  where a.seqn = b.seqn
                        and a.total_ELs_ars = 8;
            run;
            data Arsenics_05a;
                  set work.new;
                  IF URXUAS  > 0.74       then LOD_URXUAS  = 1; else
LOD_URXUAS =0;
                  IF URXUAS3 > 1.2  then LOD_URXUAS3 = 1; else LOD_URXUAS3=0;
                  IF URXUAS5 > 1.0  then LOD_URXUAS5 = 1; else LOD_URXUAS5=0;
                  IF URXUAB  > 0.4  then LOD_URXUAB  = 1; else LOD_URXUAB =0;
                  IF URXUAC  > 0.6  then LOD_URXUAC  = 1; else LOD_URXUAC =0;
                  IF URXUDMA > 1.7  then LOD_URXUDMA = 1; else LOD_URXUDMA=0;
                  IF URXUMMA > 0.9  then LOD_URXUMMA = 1; else LOD_URXUMMA=0;
                  IF URXUTM  > 1.0  then LOD_URXUTM  = 1; else LOD_URXUTM =0;
            run;
            proc sql;
                  create table source.Arsenics_05b as
                  select *,
sum(LOD_URXUAS,LOD_URXUAS3,LOD_URXUAS5,LOD_URXUAB,LOD_URXUAC,LOD_URXUDMA,LOD_
URXUMMA,
                        LOD_URXUTM) as LODSUM_arsenic
                  from Arsenics_05a;
            run;
            proc freq data=source.Arsenics_05b;
                  table LODSUM_arsenic;
            run;
            proc sql;
                  drop table work.temp, temp2, new;
            quit;

/************************
      Arsenics 2007
************************/
            proc sql;
                  create table temp as
                  select  seqn,
sum(EL_URXUAS,EL_URXUAS3,EL_URXUAS5,EL_URXUAB,EL_URXUAC,EL_URXUDMA,EL_URXUMMA
,
                        EL_URXUTM) as total_ELs_ars
                  from source.all
                  where SDDSRVYR = 5;  /*2007*/
            run;
            proc freq data = temp;
                  tables total_ELs_ars;
            run;
            proc sql;
                  create table work.new as
                  select a.seqn, a.total_ELs_ars,
```

```
                        b.URXUAS , b.EL_URXUAS ,
                        b.URXUAS3, b.EL_URXUAS3,
                        b.URXUAS5, b.EL_URXUAS5,
                        b.URXUAB , b.EL_URXUAB ,
                        b.URXUAC , b.EL_URXUAC ,
                        b.URXUDMA, b.EL_URXUDMA,
                        b.URXUMMA, b.EL_URXUMMA,
                        b.URXUTM , b.EL_URXUTM
                  from temp as a, source.all as b
                  where a.seqn = b.seqn
                        and a.total_ELs_ars = 8;
            run;
      data Arsenics_07a;
            set work.new;
            IF URXUAS  > 0.74       then LOD_URXUAS  = 1; else LOD_URXUAS =0;
            IF URXUAS3 > 1.2  then LOD_URXUAS3 = 1; else LOD_URXUAS3=0;
            IF URXUAS5 > 1.0  then LOD_URXUAS5 = 1; else LOD_URXUAS5=0;
            IF URXUAB  > 0.4  then LOD_URXUAB  = 1; else LOD_URXUAB =0;
            IF URXUAC  > 0.6  then LOD_URXUAC  = 1; else LOD_URXUAC =0;
            IF URXUDMA > 1.7  then LOD_URXUDMA = 1; else LOD_URXUDMA=0;
            IF URXUMMA > 0.9  then LOD_URXUMMA = 1; else LOD_URXUMMA=0;
            IF URXUTM  > 1.0  then LOD_URXUTM  = 1; else LOD_URXUTM =0;
      run;
      proc sql;
            create table source.Arsenics_07b as
            select *,
sum(LOD_URXUAS,LOD_URXUAS3,LOD_URXUAS5,LOD_URXUAB,LOD_URXUAC,LOD_URXUDMA,LOD_
URXUMMA,
                  LOD_URXUTM) as LODSUM_arsenic
            from Arsenics_07a;
      run;
      proc freq data=source.Arsenics_07b;
            table LODSUM_arsenic;
      run;
      proc sql;
            drop table work.temp, temp2, new;
      quit;

/***********************
      Arsenics 2009
***********************/
            proc sql;
                  create table temp as
                  select  seqn,
sum(EL_URXUAS,EL_URXUAS3,EL_URXUAS5,EL_URXUAB,EL_URXUAC,EL_URXUDMA,EL_URXUMMA
,
                        EL_URXUTM) as total_ELs_ars
                  from source.all
                  where SDDSRVYR = 6;  /*2009*/
            run;
            proc freq data = temp;
                  tables total_ELs_ars;
            run;
            proc sql;
                  create table work.new as
                  select a.seqn, a.total_ELs_ars,
                        b.URXUAS , b.EL_URXUAS ,
```

```
                        b.URXUAS3, b.EL_URXUAS3,
                        b.URXUAS5, b.EL_URXUAS5,
                        b.URXUAB , b.EL_URXUAB ,
                        b.URXUAC , b.EL_URXUAC ,
                        b.URXUDMA, b.EL_URXUDMA,
                        b.URXUMMA, b.EL_URXUMMA,
                        b.URXUTM , b.EL_URXUTM
                  from temp as a, source.all as b
                  where a.seqn = b.seqn
                        and a.total_ELs_ars = 8;
            run;
            data Arsenics_09a;
                  set work.new;
                  IF URXUAS  > 0.74       then LOD_URXUAS  = 1; else
LOD_URXUAS =0;
                  IF URXUAS3 > 1.2  then LOD_URXUAS3 = 1; else LOD_URXUAS3=0;
                  IF URXUAS5 > 1.0  then LOD_URXUAS5 = 1; else LOD_URXUAS5=0;
                  IF URXUAB  > 0.4  then LOD_URXUAB  = 1; else LOD_URXUAB =0;
                  IF URXUAC  > 0.6  then LOD_URXUAC  = 1; else LOD_URXUAC =0;
                  IF URXUDMA > 1.7  then LOD_URXUDMA = 1; else LOD_URXUDMA=0;
                  IF URXUMMA > 0.9  then LOD_URXUMMA = 1; else LOD_URXUMMA=0;
                  IF URXUTM  > 1.0  then LOD_URXUTM  = 1; else LOD_URXUTM =0;
            run;
            proc sql;
                  create table source.Arsenics_09b as
                  select *,
sum(LOD_URXUAS,LOD_URXUAS3,LOD_URXUAS5,LOD_URXUAB,LOD_URXUAC,LOD_URXUDMA,LOD_
URXUMMA,
                        LOD_URXUTM) as LODSUM_arsenic
                  from Arsenics_09a;
            run;
            proc freq data=source.Arsenics_09b;
                  table LODSUM_arsenic;
            run;
            proc sql;
                  drop table work.temp, temp2, new;
            quit;

/*************************************
*************************************
            Blood Heavy Metals
      (Cadmium, Lead, Mercury -
            Total & Inorganic)
                        (4)

      *3 women in 2005 excluded bc they
      didn't have all blood metals measured.
*************************************
*************************************/

/***********************
  Blood Metals 2003
***********************/
            proc sql;
                  create table temp as
                  select  seqn, sum(EL_LBXBCD,EL_LBXBPB,EL_LBXIHG,EL_LBXTHG)
as total_ELs_BL
```

```
                  from source.all
                  where SDDSRVYR = 3;  /*2003*/
            run;
            proc freq data = temp;
                  tables total_ELs_BL;
            run;
            proc sql;
                  create table work.new as
                  select a.seqn, a.total_ELs_BL,
                        b.LBXBCD, b.EL_LBXBCD,
                        b.LBXBPB, b.EL_LBXBPB,
                        b.LBXIHG, b.EL_LBXIHG,
                        b.LBXTHG, b.EL_LBXTHG
                  from temp as a, source.all as b
                  where a.seqn = b.seqn
                        and a.total_ELs_BL = 4;
            run;
            data BloodMetal_03a;
                  set work.new;
                  IF LBXBCD > 0.14  then LOD_LBXBCD= 1; else LOD_LBXBCD =0;
                  IF LBXBPB > 0.28  then LOD_LBXBPB= 1; else LOD_LBXBPB =0;
                  IF LBXIHG > 0.42  then LOD_LBXIHG= 1; else LOD_LBXIHG =0;
                  IF LBXTHG > 0.2   then LOD_LBXTHG= 1; else LOD_LBXTHG =0;
            run;
            proc sql;
                  create table source.BloodMetal_03b as
                  select *, sum(LOD_LBXBCD,LOD_LBXBPB,LOD_LBXIHG,LOD_LBXTHG)
as LODSUM_BLMetal
                  from BloodMetal_03a;
            run;
            proc freq data=source.BloodMetal_03b;
                  table LODSUM_BLMetal;
            run;
            proc sql;
                  drop table work.temp, temp2, new;
            quit;

/***********************
  Blood Metals 2005
***********************/
            proc sql;
                  create table temp as
                  select  seqn, sum(EL_LBXBCD,EL_LBXBPB,EL_LBXIHG,EL_LBXTHG)
as total_ELs_BL
                  from source.all
                  where SDDSRVYR = 4;  /*2005*/
            run;
            proc freq data = temp;
                  tables total_ELs_BL;
            run;
            proc sql;
                  create table work.new as
                  select a.seqn, a.total_ELs_BL,
                        b.LBXBCD, b.EL_LBXBCD,
                        b.LBXBPB, b.EL_LBXBPB,
                        b.LBXIHG, b.EL_LBXIHG,
                        b.LBXTHG, b.EL_LBXTHG
```

```
                  from temp as a, source.all as b
                  where a.seqn = b.seqn
                        and a.total_ELs_BL = 4;
            run;
            data BloodMetal_05a;
                  set work.new;
                  IF LBXBCD > 0.2   then LOD_LBXBCD= 1; else LOD_LBXBCD =0;
                  IF LBXBPB > 0.25  then LOD_LBXBPB= 1; else LOD_LBXBPB =0;
                  IF LBXIHG > 0.4         then LOD_LBXIHG= 1; else LOD_LBXIHG
=0;
                  IF LBXTHG > 0.33  then LOD_LBXTHG= 1; else LOD_LBXTHG =0;
            run;
            proc sql;
                  create table source.BloodMetal_05b as
                  select *, sum(LOD_LBXBCD,LOD_LBXBPB,LOD_LBXIHG,LOD_LBXTHG)
as LODSUM_BLMetal
                  from BloodMetal_05a;
            run;
            proc freq data=source.BloodMetal_05b;
                  table LODSUM_BLMetal;
            run;
            proc sql;
                  drop table work.temp, temp2, new;
            quit;

/***********************
  Blood Metals 2007
***********************/
            proc sql;
                  create table temp as
                  select  seqn, sum(EL_LBXBCD,EL_LBXBPB,EL_LBXIHG,EL_LBXTHG)
as total_ELs_BL
                  from source.all
                  where SDDSRVYR = 5;  /*2007*/
            run;
            proc freq data = temp;
                  tables total_ELs_BL;
            run;
            proc sql;
                  create table work.new as
                  select a.seqn, a.total_ELs_BL,
                        b.LBXBCD, b.EL_LBXBCD,
                        b.LBXBPB, b.EL_LBXBPB,
                        b.LBXIHG, b.EL_LBXIHG,
                        b.LBXTHG, b.EL_LBXTHG
                  from temp as a, source.all as b
                  where a.seqn = b.seqn
                        and a.total_ELs_BL = 4;
            run;
            data BloodMetal_07a;
                  set work.new;
                  IF LBXBCD > 0.2   then LOD_LBXBCD= 1; else LOD_LBXBCD =0;
                  IF LBXBPB > 0.25  then LOD_LBXBPB= 1; else LOD_LBXBPB =0;
                  IF LBXIHG > 0.35  then LOD_LBXIHG= 1; else LOD_LBXIHG =0;
                  IF LBXTHG > 0.33  then LOD_LBXTHG= 1; else LOD_LBXTHG =0;
            run;
            proc sql;
```

```
                  create table source.BloodMetal_07b as
                  select *, sum(LOD_LBXBCD,LOD_LBXBPB,LOD_LBXIHG,LOD_LBXTHG)
as LODSUM_BLMetal
                  from BloodMetal_07a;
            run;
            proc freq data=source.BloodMetal_07b;
                  table LODSUM_BLMetal;
            run;
            proc sql;
                  drop table work.temp, temp2, new;
            quit;

/**********************
  Blood Metals 2009
**********************/
            proc sql;
                  create table temp as
                  select  seqn, sum(EL_LBXBCD,EL_LBXBPB,EL_LBXIHG,EL_LBXTHG)
as total_ELs_BL
                  from source.all
                  where SDDSRVYR = 6;  /*2009*/
            run;
            proc freq data = temp;
                  tables total_ELs_BL;
            run;
            proc sql;
                  create table work.new as
                  select a.seqn, a.total_ELs_BL,
                        b.LBXBCD, b.EL_LBXBCD,
                        b.LBXBPB, b.EL_LBXBPB,
                        b.LBXIHG, b.EL_LBXIHG,
                        b.LBXTHG, b.EL_LBXTHG
                  from temp as a, source.all as b
                  where a.seqn = b.seqn
                        and a.total_ELs_BL = 4;
            run;
            data BloodMetal_09a;
                  set work.new;
                  IF LBXBCD > 0.2   then LOD_LBXBCD= 1; else LOD_LBXBCD =0;
                  IF LBXBPB > 0.25  then LOD_LBXBPB= 1; else LOD_LBXBPB =0;
                  IF LBXIHG > 0.35  then LOD_LBXIHG= 1; else LOD_LBXIHG =0;
                  IF LBXTHG > 0.33  then LOD_LBXTHG= 1; else LOD_LBXTHG =0;
            run;
            proc sql;
                  create table source.BloodMetal_09b as
                  select *, sum(LOD_LBXBCD,LOD_LBXBPB,LOD_LBXIHG,LOD_LBXTHG)
as LODSUM_BLMetal
                  from BloodMetal_09a;
            run;
            proc freq data=source.BloodMetal_09b;
                  table LODSUM_BLMetal;
            run;
            proc sql;
                  drop table work.temp, temp2, new;
            quit;

/************************************
```

```
************************************
      Perflourinated Compounds (Blood)
                        (12)
************************************
************************************/

/*****************************
Perflourinated Compounds 2003
*****************************/
            proc sql;
                  create table temp as
                  select  seqn,
sum(EL_LBXPFBS,EL_LBXPFDE,EL_LBXPFDO,EL_LBXPFHP,EL_LBXPFHS,EL_LBXPFNA,EL_LBXP
FOA,

      EL_LBXPFOS,EL_LBXPFSA,EL_LBXEPAH,EL_LBXMPAH,EL_LBXPFUA ) as
total_ELs_perf
                  from source.all
                  where SDDSRVYR = 3;  /*2003*/
            run;
            proc freq data = temp;
                  tables total_ELs_perf;
            run;
            proc sql;
                  create table work.new as
                  select a.seqn, a.total_ELs_perf,
                        b.LBXPFBS, b.EL_LBXPFBS,
                        b.LBXPFDE, b.EL_LBXPFDE,
                        b.LBXPFDO, b.EL_LBXPFDO,
                        b.LBXPFHP, b.EL_LBXPFHP,
                        b.LBXPFHS, b.EL_LBXPFHS,
                        b.LBXPFNA, b.EL_LBXPFNA,
                        b.LBXPFOA, b.EL_LBXPFOA,
                        b.LBXPFOS, b.EL_LBXPFOS,
                        b.LBXPFSA, b.EL_LBXPFSA,
                        b.LBXEPAH, b.EL_LBXEPAH,
                        b.LBXMPAH, b.EL_LBXMPAH,
                        b.LBXPFUA, b.EL_LBXPFUA
                  from temp as a, source.all as b
                  where a.seqn = b.seqn
                        and a.total_ELs_perf = 12;
            run;
            data Perfl_03a;
                  set work.new;
                  IF LBXPFBS > 0.4  then LOD_LBXPFBS = 1; else LOD_LBXPFBS=0;
                  IF LBXPFDE > 0.3  then LOD_LBXPFDE = 1; else LOD_LBXPFDE=0;
                  IF LBXPFDO > 1.0  then LOD_LBXPFDO = 1; else LOD_LBXPFDO=0;
                  IF LBXPFHP > 0.3  then LOD_LBXPFHP = 1; else LOD_LBXPFHP=0;
                  IF LBXPFHS > 0.3  then LOD_LBXPFHS = 1; else LOD_LBXPFHS=0;
                  IF LBXPFNA > 0.1  then LOD_LBXPFNA = 1; else LOD_LBXPFNA=0;
                  IF LBXPFOA > 0.1  then LOD_LBXPFOA = 1; else LOD_LBXPFOA=0;
                  IF LBXPFOS > 0.4  then LOD_LBXPFOS = 1; else LOD_LBXPFOS=0;
                  IF LBXPFSA > 0.2  then LOD_LBXPFSA = 1; else LOD_LBXPFSA=0;
                  IF LBXEPAH > 0.4  then LOD_LBXEPAH = 1; else LOD_LBXEPAH=0;
                  IF LBXMPAH > 0.6  then LOD_LBXMPAH = 1; else LOD_LBXMPAH=0;
                  IF LBXPFUA > 0.3  then LOD_LBXPFUA = 1; else LOD_LBXPFUA=0;
            run;
```

```
            proc sql;
                  create table source.Perfl_03b as
                  select *,
sum(LOD_LBXPFBS,LOD_LBXPFDE,LOD_LBXPFDO,LOD_LBXPFHP,LOD_LBXPFHS,LOD_LBXPFNA,L
OD_LBXPFOA,LOD_LBXPFOS,LOD_LBXPFSA,LOD_LBXEPAH,LOD_LBXMPAH,LOD_LBXPFUA) as
LODSUM_Perf
                  from Perfl_03a;
            run;
            proc freq data=source.Perfl_03b;
                  table LODSUM_Perf;
            run;
            proc sql;
                  drop table work.temp, temp2, new;
            quit;

/*****************************
Perflourinated Compounds 2005
*****************************/
            proc sql;
                  create table temp as
                  select  seqn,
sum(EL_LBXPFBS,EL_LBXPFDE,EL_LBXPFDO,EL_LBXPFHP,EL_LBXPFHS,EL_LBXPFNA,EL_LBXP
FOA,

      EL_LBXPFOS,EL_LBXPFSA,EL_LBXEPAH,EL_LBXMPAH,EL_LBXPFUA ) as
total_ELs_perf
                  from source.all
                  where SDDSRVYR = 4;  /*2005*/
            run;
            proc freq data = temp;
                  tables total_ELs_perf;
            run;
            proc sql;
                  create table work.new as
                  select a.seqn, a.total_ELs_perf,
                        b.LBXPFBS, b.EL_LBXPFBS,
                        b.LBXPFDE, b.EL_LBXPFDE,
                        b.LBXPFDO, b.EL_LBXPFDO,
                        b.LBXPFHP, b.EL_LBXPFHP,
                        b.LBXPFHS, b.EL_LBXPFHS,
                        b.LBXPFNA, b.EL_LBXPFNA,
                        b.LBXPFOA, b.EL_LBXPFOA,
                        b.LBXPFOS, b.EL_LBXPFOS,
                        b.LBXPFSA, b.EL_LBXPFSA,
                        b.LBXEPAH, b.EL_LBXEPAH,
                        b.LBXMPAH, b.EL_LBXMPAH,
                        b.LBXPFUA, b.EL_LBXPFUA
                  from temp as a, source.all as b
                  where a.seqn = b.seqn
                        and a.total_ELs_perf = 12;
            run;
      data Perfl_05a;
            set work.new;
            IF LBXPFBS > 0.1  then LOD_LBXPFBS = 1; else LOD_LBXPFBS=0;
            IF LBXPFDE > 0.2  then LOD_LBXPFDE = 1; else LOD_LBXPFDE=0;
            IF LBXPFDO > 0.2  then LOD_LBXPFDO = 1; else LOD_LBXPFDO=0;
            IF LBXPFHP > 0.4  then LOD_LBXPFHP = 1; else LOD_LBXPFHP=0;
```

```
            IF LBXPFHS > 0.1  then LOD_LBXPFHS = 1; else LOD_LBXPFHS=0;
            IF LBXPFNA > 0.1  then LOD_LBXPFNA = 1; else LOD_LBXPFNA=0;
            IF LBXPFOA > 0.1  then LOD_LBXPFOA = 1; else LOD_LBXPFOA=0;
            IF LBXPFOS > 0.2  then LOD_LBXPFOS = 1; else LOD_LBXPFOS=0;
            IF LBXPFSA > 0.1  then LOD_LBXPFSA = 1; else LOD_LBXPFSA=0;
            IF LBXEPAH > 0.2  then LOD_LBXEPAH = 1; else LOD_LBXEPAH=0;
            IF LBXMPAH > 0.2  then LOD_LBXMPAH = 1; else LOD_LBXMPAH=0;
            IF LBXPFUA > 0.2  then LOD_LBXPFUA = 1; else LOD_LBXPFUA=0;
      run;
      proc sql;
            create table source.Perfl_05b as
            select *,
sum(LOD_LBXPFBS,LOD_LBXPFDE,LOD_LBXPFDO,LOD_LBXPFHP,LOD_LBXPFHS,LOD_LBXPFNA,L
OD_LBXPFOA,

      LOD_LBXPFOS,LOD_LBXPFSA,LOD_LBXEPAH,LOD_LBXMPAH,LOD_LBXPFUA) as
LODSUM_Perf
            from Perfl_05a;
      run;
      proc freq data=source.Perfl_05b;
            table LODSUM_Perf;
      run;
      proc sql;
            drop table work.temp, temp2, new;
      quit;

/*****************************
Perflourinated Compounds 2007
*****************************/
            proc sql;
                  create table temp as
                  select  seqn,
sum(EL_LBXPFBS,EL_LBXPFDE,EL_LBXPFDO,EL_LBXPFHP,EL_LBXPFHS,EL_LBXPFNA,EL_LBXP
FOA,

      EL_LBXPFOS,EL_LBXPFSA,EL_LBXEPAH,EL_LBXMPAH,EL_LBXPFUA ) as
total_ELs_perf
                  from source.all
                  where SDDSRVYR = 5;  /*2007*/
            run;
            proc freq data = temp;
                  tables total_ELs_perf;
            run;
            proc sql;
                  create table work.new as
                  select a.seqn, a.total_ELs_perf,
                        b.LBXPFBS, b.EL_LBXPFBS,
                        b.LBXPFDE, b.EL_LBXPFDE,
                        b.LBXPFDO, b.EL_LBXPFDO,
                        b.LBXPFHP, b.EL_LBXPFHP,
                        b.LBXPFHS, b.EL_LBXPFHS,
                        b.LBXPFNA, b.EL_LBXPFNA,
                        b.LBXPFOA, b.EL_LBXPFOA,
                        b.LBXPFOS, b.EL_LBXPFOS,
                        b.LBXPFSA, b.EL_LBXPFSA,
                        b.LBXEPAH, b.EL_LBXEPAH,
                        b.LBXMPAH, b.EL_LBXMPAH,
```

```
                        b.LBXPFUA, b.EL_LBXPFUA
                  from temp as a, source.all as b
                  where a.seqn = b.seqn
                        and a.total_ELs_perf = 12;
            run;
            data Perfl_07a;
                  set work.new;
                  IF LBXPFBS > 0.1  then LOD_LBXPFBS = 1; else LOD_LBXPFBS=0;
                  IF LBXPFDE > 0.2  then LOD_LBXPFDE = 1; else LOD_LBXPFDE=0;
                  IF LBXPFDO > 0.2  then LOD_LBXPFDO = 1; else LOD_LBXPFDO=0;
                  IF LBXPFHP > 0.4  then LOD_LBXPFHP = 1; else LOD_LBXPFHP=0;
                  IF LBXPFHS > 0.1  then LOD_LBXPFHS = 1; else LOD_LBXPFHS=0;
                  IF LBXPFNA > 0.1  then LOD_LBXPFNA = 1; else LOD_LBXPFNA=0;
                  IF LBXPFOA > 0.1  then LOD_LBXPFOA = 1; else LOD_LBXPFOA=0;
                  IF LBXPFOS > 0.2  then LOD_LBXPFOS = 1; else LOD_LBXPFOS=0;
                  IF LBXPFSA > 0.1  then LOD_LBXPFSA = 1; else LOD_LBXPFSA=0;
                  IF LBXEPAH > 0.2  then LOD_LBXEPAH = 1; else LOD_LBXEPAH=0;
                  IF LBXMPAH > 0.2  then LOD_LBXMPAH = 1; else LOD_LBXMPAH=0;
                  IF LBXPFUA > 0.2  then LOD_LBXPFUA = 1; else LOD_LBXPFUA=0;
            run;
            proc sql;
                  create table source.Perfl_07b as
                  select *,
sum(LOD_LBXPFBS,LOD_LBXPFDE,LOD_LBXPFDO,LOD_LBXPFHP,LOD_LBXPFHS,LOD_LBXPFNA,L
OD_LBXPFOA,

      LOD_LBXPFOS,LOD_LBXPFSA,LOD_LBXEPAH,LOD_LBXMPAH,LOD_LBXPFUA) as
LODSUM_Perf
                  from Perfl_07a;
            run;
            proc freq data=source.Perfl_07b;
                  table LODSUM_Perf;
            run;
            proc sql;
                  drop table work.temp, temp2, new;
            quit;

/*****************************
Perflourinated Compounds 2009
*****************************/
            proc sql;
                  create table temp as
                  select  seqn,
sum(EL_LBXPFBS,EL_LBXPFDE,EL_LBXPFDO,EL_LBXPFHP,EL_LBXPFHS,EL_LBXPFNA,EL_LBXP
FOA,

      EL_LBXPFOS,EL_LBXPFSA,EL_LBXEPAH,EL_LBXMPAH,EL_LBXPFUA ) as
total_ELs_perf
                  from source.all
                  where SDDSRVYR = 6;  /*2009*/
            run;
            proc freq data = temp;
                  tables total_ELs_perf;
            run;
            proc sql;
                  create table work.new as
                  select a.seqn, a.total_ELs_perf,
```

```
                        b.LBXPFBS, b.EL_LBXPFBS,
                        b.LBXPFDE, b.EL_LBXPFDE,
                        b.LBXPFDO, b.EL_LBXPFDO,
                        b.LBXPFHP, b.EL_LBXPFHP,
                        b.LBXPFHS, b.EL_LBXPFHS,
                        b.LBXPFNA, b.EL_LBXPFNA,
                        b.LBXPFOA, b.EL_LBXPFOA,
                        b.LBXPFOS, b.EL_LBXPFOS,
                        b.LBXPFSA, b.EL_LBXPFSA,
                        b.LBXEPAH, b.EL_LBXEPAH,
                        b.LBXMPAH, b.EL_LBXMPAH,
                        b.LBXPFUA, b.EL_LBXPFUA
                  from temp as a, source.all as b
                  where a.seqn = b.seqn
                        and a.total_ELs_perf = 12;
            run;
            data Perfl_09a;
                  set work.new;
                  IF LBXPFBS > 0.1  then LOD_LBXPFBS = 1; else LOD_LBXPFBS=0;
                  IF LBXPFDE > 0.1  then LOD_LBXPFDE = 1; else LOD_LBXPFDE=0;
                  IF LBXPFDO > 0.1  then LOD_LBXPFDO = 1; else LOD_LBXPFDO=0;
                  IF LBXPFHP > 0.1  then LOD_LBXPFHP = 1; else LOD_LBXPFHP=0;
                  IF LBXPFHS > 0.1  then LOD_LBXPFHS = 1; else LOD_LBXPFHS=0;
                  IF LBXPFNA > 0.1  then LOD_LBXPFNA = 1; else LOD_LBXPFNA=0;
                  IF LBXPFOA > 0.1  then LOD_LBXPFOA = 1; else LOD_LBXPFOA=0;
                  IF LBXPFOS > 0.2  then LOD_LBXPFOS = 1; else LOD_LBXPFOS=0;
                  IF LBXPFSA > 0.1  then LOD_LBXPFSA = 1; else LOD_LBXPFSA=0;
                  IF LBXEPAH > 0.1  then LOD_LBXEPAH = 1; else LOD_LBXEPAH=0;
                  IF LBXMPAH > 0.1  then LOD_LBXMPAH = 1; else LOD_LBXMPAH=0;
                  IF LBXPFUA > 0.1  then LOD_LBXPFUA = 1; else LOD_LBXPFUA=0;
            run;
            proc sql;
                  create table source.Perfl_09b as
                  select *,
sum(LOD_LBXPFBS,LOD_LBXPFDE,LOD_LBXPFDO,LOD_LBXPFHP,LOD_LBXPFHS,LOD_LBXPFNA,L
OD_LBXPFOA,

      LOD_LBXPFOS,LOD_LBXPFSA,LOD_LBXEPAH,LOD_LBXMPAH,LOD_LBXPFUA) as
LODSUM_Perf
                  from Perfl_09a;
            run;
            proc freq data=source.Perfl_09b;
                  table LODSUM_Perf;
            run;
            proc sql;
                  drop table work.temp, temp2, new;
            quit;

/*************************************
*************************************
      Polycyclic Aromatic Hydrocarbons
                  PAHs (9)
*************************************
*************************************/

/**********************
            PAHs 2003
```

```
**********************/
            proc sql;
                  create table temp as
                  select  seqn,
sum(EL_URXP01,EL_URXP02,EL_URXP03,EL_URXP04,EL_URXP05,EL_URXP06,EL_URXP07,
                        EL_URXP10,EL_URXP17) as total_ELs_pah
                  from source.all
                  where SDDSRVYR = 3;  /*2003*/
            run;
            proc freq data = temp;
                  tables total_ELs_pah;
            run;
            proc sql;
                  create table work.new as
                  select a.seqn, a.total_ELs_pah,
                        b.URXP01, b.EL_URXP01,
                        b.URXP02, b.EL_URXP02,
                        b.URXP03, b.EL_URXP03,
                        b.URXP04, b.EL_URXP04,
                        b.URXP05, b.EL_URXP05,
                        b.URXP06, b.EL_URXP06,
                        b.URXP07, b.EL_URXP07,
                        b.URXP10, b.EL_URXP10,
                        b.URXP17, b.EL_URXP17
                        /*b.URXP19, b.EL_URXP19,  Skipped b/c missing 07 and
09 data*/
                  from temp as a, source.all as b
                  where a.seqn = b.seqn
                        and a.total_ELs_pah = 9;
            run;
            data Pah_03a;
                  set work.new;
                  IF URXP01 > 46.7  then LOD_URXP01 = 1; else LOD_URXP01=0;
                  IF URXP02 > 31.1  then LOD_URXP02 = 1; else LOD_URXP02=0;
                  IF URXP03 > 5.0         then LOD_URXP03 = 1; else
LOD_URXP03=0;
                  IF URXP04 > 5.0   then LOD_URXP04 = 1; else LOD_URXP04=0;
                  IF URXP05 > 5.0   then LOD_URXP05 = 1; else LOD_URXP05=0;
                  IF URXP06 > 5.0   then LOD_URXP06 = 1; else LOD_URXP06=0;
                  IF URXP07 > 5.0   then LOD_URXP07 = 1; else LOD_URXP07=0;
                  IF URXP10 > 5.0   then LOD_URXP10 = 1; else LOD_URXP10=0;
                  IF URXP17 > 5.0   then LOD_URXP17 = 1; else LOD_URXP17=0;
            run;
            proc sql;
                  create table source.Pah_03b as
                  select *,
sum(LOD_URXP01,LOD_URXP02,LOD_URXP03,LOD_URXP04,LOD_URXP05,LOD_URXP06,LOD_URX
P07,
                        LOD_URXP10,LOD_URXP17) as LODSUM_Pah
                  from Pah_03a;
            run;
            proc freq data=source.Pah_03b;
                  table LODSUM_Pah;
            run;
            proc sql;
                  drop table work.temp, temp2, new;
            quit;
```

```
/***********************
            PAHs 2005
***********************/
            proc sql;
                  create table temp as
                  select  seqn,
sum(EL_URXP01,EL_URXP02,EL_URXP03,EL_URXP04,EL_URXP05,EL_URXP06,EL_URXP07,
                        EL_URXP10,EL_URXP17) as total_ELs_pah
                  from source.all
                  where SDDSRVYR = 4;  /*2005*/
            run;
            proc freq data = temp;
                  tables total_ELs_pah;
            run;
            proc sql;
                  create table work.new as
                  select a.seqn, a.total_ELs_pah,
                        b.URXP01, b.EL_URXP01,
                        b.URXP02, b.EL_URXP02,
                        b.URXP03, b.EL_URXP03,
                        b.URXP04, b.EL_URXP04,
                        b.URXP05, b.EL_URXP05,
                        b.URXP06, b.EL_URXP06,
                        b.URXP07, b.EL_URXP07,
                        b.URXP10, b.EL_URXP10,
                        b.URXP17, b.EL_URXP17
                        /*b.URXP19, b.EL_URXP19,  Skipped b/c missing 07 and
09 data*/
                  from temp as a, source.all as b
                  where a.seqn = b.seqn
                        and a.total_ELs_pah = 9;
            run;
            data Pah_05a;
                  set work.new;
                  IF URXP01 > 47.9  then LOD_URXP01 = 1; else LOD_URXP01=0;
                  IF URXP02 > 13.2  then LOD_URXP02 = 1; else LOD_URXP02=0;
                  IF URXP03 > 5.0         then LOD_URXP03 = 1; else
LOD_URXP03=0;
                  IF URXP04 > 5.0   then LOD_URXP04 = 1; else LOD_URXP04=0;
                  IF URXP05 > 5.0   then LOD_URXP05 = 1; else LOD_URXP05=0;
                  IF URXP06 > 5.0   then LOD_URXP06 = 1; else LOD_URXP06=0;
                  IF URXP07 > 5.0   then LOD_URXP07 = 1; else LOD_URXP07=0;
                  IF URXP10 > 5.0   then LOD_URXP10 = 1; else LOD_URXP10=0;
                  IF URXP17 > 5.0   then LOD_URXP17 = 1; else LOD_URXP17=0;
            run;
            proc sql;
                  create table source.Pah_05b as
                  select *,
sum(LOD_URXP01,LOD_URXP02,LOD_URXP03,LOD_URXP04,LOD_URXP05,LOD_URXP06,LOD_URX
P07,
                        LOD_URXP10,LOD_URXP17) as LODSUM_Pah
                  from Pah_05a;
            run;
            proc freq data=source.Pah_05b;
                  table LODSUM_Pah;
            run;
```

```
            proc sql;
                  drop table work.temp, temp2, new;
            quit;

/***********************
            PAHs 2007
      (no 2009 data)
***********************/
            proc sql;
                  create table temp as
                  select  seqn,
sum(EL_URXP01,EL_URXP02,EL_URXP03,EL_URXP04,EL_URXP05,EL_URXP06,EL_URXP07,
                        EL_URXP10,EL_URXP17) as total_ELs_pah
                  from source.all
                  where SDDSRVYR = 5;  /*2007*/
            run;
            proc freq data = temp;
                  tables total_ELs_pah;
            run;
            proc sql;
                  create table work.new as
                  select a.seqn, a.total_ELs_pah,
                        b.URXP01, b.EL_URXP01,
                        b.URXP02, b.EL_URXP02,
                        b.URXP03, b.EL_URXP03,
                        b.URXP04, b.EL_URXP04,
                        b.URXP05, b.EL_URXP05,
                        b.URXP06, b.EL_URXP06,
                        b.URXP07, b.EL_URXP07,
                        b.URXP10, b.EL_URXP10,
                        b.URXP17, b.EL_URXP17
                        /*b.URXP19, b.EL_URXP19,  Skipped b/c missing 07 and
09 data*/
                  from temp as a, source.all as b
                  where a.seqn = b.seqn
                        and a.total_ELs_pah = 9;
            run;
            data Pah_07a;
                  set work.new;
                  IF URXP01 > 44.7  then LOD_URXP01 = 1; else LOD_URXP01=0;
                  IF URXP02 > 42.0  then LOD_URXP02 = 1; else LOD_URXP02=0;
                  IF URXP03 > 5.0         then LOD_URXP03 = 1; else
LOD_URXP03=0;
                  IF URXP04 > 5.0   then LOD_URXP04 = 1; else LOD_URXP04=0;
                  IF URXP05 > 5.0   then LOD_URXP05 = 1; else LOD_URXP05=0;
                  IF URXP06 > 5.0   then LOD_URXP06 = 1; else LOD_URXP06=0;
                  IF URXP07 > 5.0   then LOD_URXP07 = 1; else LOD_URXP07=0;
                  IF URXP10 > 5.0   then LOD_URXP10 = 1; else LOD_URXP10=0;
                  IF URXP17 > 5.0   then LOD_URXP17 = 1; else LOD_URXP17=0;
            run;
            proc sql;
                  create table source.Pah_07b as
                  select *,
sum(LOD_URXP01,LOD_URXP02,LOD_URXP03,LOD_URXP04,LOD_URXP05,LOD_URXP06,LOD_URX
P07,
                        LOD_URXP10,LOD_URXP17) as LODSUM_Pah
                  from Pah_07a;
```

```
            run;
            proc freq data=source.Pah_07b;
                  table LODSUM_Pah;
            run;
            proc sql;
                  drop table work.temp, temp2, new;
            quit;

/*************************************
*************************************
                  Cotinine
                      (1)
*************************************
*************************************/

/***********************
      Cotinine 2003
***********************/
            proc sql;
                  create table temp as
                  select  seqn, EL_LBXCOT as total_ELs_cot
                  from source.all
                  where SDDSRVYR = 3;  /*2003*/
            run;
            proc freq data = temp;
                  tables total_ELs_cot;
            run;
            proc sql;
                  create table work.new as
                  select a.seqn, a.total_ELs_cot,
                        b.LBXCOT, b.EL_LBXCOT
                  from temp as a, source.all as b
                  where a.seqn = b.seqn
                        and a.total_ELs_cot =1;
            run;
            data Cot_03a;
                  set work.new;
                  IF LBXCOT > 0.015 then LOD_LBXCOT = 1; else LOD_LBXCOT=0;
            run;
            proc sql;
                  create table source.Cot_03b as
                  select *, LOD_LBXCOT as LODSUM_Cot
                  from Cot_03a;
            run;
            proc freq data=source.Cot_03b;
                  table LODSUM_Cot;
            run;
            proc sql;
                  drop table work.temp, temp2, new;
            quit;

/***********************
      Cotinine 2005
***********************/
            proc sql;
                  create table temp as
                  select  seqn, EL_LBXCOT as total_ELs_cot
```

```
            from source.all
            where SDDSRVYR = 4;  /*2005*/
      run;
      proc freq data = temp;
            tables total_ELs_cot;
      run;
      proc sql;
            create table work.new as
            select a.seqn, a.total_ELs_cot,
                  b.LBXCOT, b.EL_LBXCOT
            from temp as a, source.all as b
            where a.seqn = b.seqn
                  and a.total_ELs_cot =1;
      run;
      data Cot_05a;
            set work.new;
            IF LBXCOT > 0.02  then LOD_LBXCOT = 1; else LOD_LBXCOT=0;
      run;
      proc sql;
            create table source.Cot_05b as
            select *, LOD_LBXCOT as LODSUM_Cot
            from Cot_05a;
      run;
      proc freq data=source.Cot_05b;
            table LODSUM_Cot;
      run;
      proc sql;
            drop table work.temp, temp2, new;
      quit;

/************************
      Cotinine 2007
************************/
      proc sql;
            create table temp as
            select  seqn, EL_LBXCOT as total_ELs_cot
            from source.all
            where SDDSRVYR = 5;  /*2007*/
      run;
      proc freq data = temp;
            tables total_ELs_cot;
      run;
      proc sql;
            create table work.new as
            select a.seqn, a.total_ELs_cot,
                  b.LBXCOT, b.EL_LBXCOT
            from temp as a, source.all as b
            where a.seqn = b.seqn
                  and a.total_ELs_cot =1;
      run;
      data Cot_07a;
            set work.new;
            IF LBXCOT > 0.015 then LOD_LBXCOT = 1; else LOD_LBXCOT=0;
      run;
      proc sql;
            create table source.Cot_07b as
            select *, LOD_LBXCOT as LODSUM_Cot
```

```
            from Cot_07a;
      run;
      proc freq data=source.Cot_07b;
            table LODSUM_Cot;
      run;
      proc sql;
            drop table work.temp, temp2, new;
      quit;

/***********************
      Cotinine 2009
***********************/
      proc sql;
            create table temp as
            select  seqn, EL_LBXCOT as total_ELs_cot
            from source.all
            where SDDSRVYR = 6;  /*2009*/
      run;
      proc freq data = temp;
            tables total_ELs_cot;
      run;
      proc sql;
            create table work.new as
            select a.seqn, a.total_ELs_cot,
                  b.LBXCOT, b.EL_LBXCOT
            from temp as a, source.all as b
            where a.seqn = b.seqn
                  and a.total_ELs_cot =1;
      run;
      data Cot_09a;
            set work.new;
            IF LBXCOT > 0.015 then LOD_LBXCOT = 1; else LOD_LBXCOT=0;
      run;
      proc sql;
            create table source.Cot_09b as
            select *, LOD_LBXCOT as LODSUM_Cot
            from Cot_09a;
      run;
      proc freq data=source.Cot_09b;
            table LODSUM_Cot;
      run;
      proc sql;
            drop table work.temp, temp2, new;
      quit;


/*************************************
*************************************
  Environmental Phenols

*Skipped URX4TO (4-tert-Octylphenol) as the data was
      excluded in 2003/4 due to potential contimination
      during sampling  -- per NHANES
*No 2003 data for URXBUP, URXEPB, URXMPB, URXPPB, so excluded.
*************************************
*************************************/
```

```
/**********************
      Phenols  2003
**********************/
            proc sql;
                  create table temp as
                  select  seqn, sum(EL_URXBPH,EL_URXTRS,EL_URXBP3 ) as
tot_Phenol_ELs
                  from source.all
                  where SDDSRVYR = 3;  /*2003*/
            run;
            proc freq data = temp;
                  tables tot_Phenol_ELs;
            run;
            proc sql;
                  create table work.new as
                  select a.seqn, a.tot_Phenol_ELs,
                        b.URXBPH, b.EL_URXBPH,
                        b.URXTRS, b.EL_URXTRS,
                        b.URXBP3, b.EL_URXBP3
                  from temp as a, source.all as b
                  where a.seqn = b.seqn
                        and a.tot_Phenol_ELs = 3;
            run;
            data Phenol_03a;
                  set work.new;
                  IF URXBPH > 0.4   then LOD_URXBPH = 1; else LOD_URXBPH=0;
                  IF URXTRS > 2.3         then LOD_URXTRS = 1; else
LOD_URXTRS=0;
                  IF URXBP3 > 0.3         then LOD_URXBP3 = 1; else
LOD_URXBP3=0;
            run;
            proc sql;
                  create table source.Phenol_03b as
                  select *, sum(LOD_URXBPH,LOD_URXTRS,LOD_URXBP3) as
LODSUM_Phen
                  from Phenol_03a;
            run;
            proc freq data=source.Phenol_03b;
                  table LODSUM_Phen;
            run;
            proc sql;
                  drop table work.temp, temp2, new;
            quit;

/**********************
      Phenols  2005
**********************/
            proc sql;
                  create table temp as
                  select  seqn, sum(EL_URXBPH,EL_URXTRS,EL_URXBP3 ) as
tot_Phenol_ELs
                  from source.all
                  where SDDSRVYR = 4;  /*2005*/
            run;
            proc freq data = temp;
                  tables tot_Phenol_ELs;
            run;
```

```
            proc sql;
                  create table work.new as
                  select a.seqn, a.tot_Phenol_ELs,
                        b.URXBPH, b.EL_URXBPH,
                        b.URXTRS, b.EL_URXTRS,
                        b.URXBP3, b.EL_URXBP3
                  from temp as a, source.all as b
                  where a.seqn = b.seqn
                        and a.tot_Phenol_ELs = 3;
            run;
            data Phenol_05a;
                  set work.new;
                  IF URXBPH > 0.4   then LOD_URXBPH = 1; else LOD_URXBPH=0;
                  IF URXTRS > 2.3         then LOD_URXTRS = 1; else
LOD_URXTRS=0;
                  IF URXBP3 > 0.4         then LOD_URXBP3 = 1; else
LOD_URXBP3=0;
            run;
            proc sql;
                  create table source.Phenol_05b as
                  select *, sum(LOD_URXBPH,LOD_URXTRS,LOD_URXBP3) as
LODSUM_Phen
                  from Phenol_05a;
            run;
            proc freq data=source.Phenol_05b;
                  table LODSUM_Phen;
            run;
            proc sql;
                  drop table work.temp, temp2, new;
            quit;

/***********************
      Phenols  2007
***********************/
            proc sql;
                  create table temp as
                  select  seqn, sum(EL_URXBPH,EL_URXTRS,EL_URXBP3 ) as
tot_Phenol_ELs
                  from source.all
                  where SDDSRVYR = 5;  /*2007*/
            run;
            proc freq data = temp;
                  tables tot_Phenol_ELs;
            run;
            proc sql;
                  create table work.new as
                  select a.seqn, a.tot_Phenol_ELs,
                        b.URXBPH, b.EL_URXBPH,
                        b.URXTRS, b.EL_URXTRS,
                        b.URXBP3, b.EL_URXBP3
                  from temp as a, source.all as b
                  where a.seqn = b.seqn
                        and a.tot_Phenol_ELs = 3;
            run;
            data Phenol_07a;
                  set work.new;
                  IF URXBPH > 0.4   then LOD_URXBPH = 1; else LOD_URXBPH=0;
```

```
                  IF URXTRS > 2.3         then LOD_URXTRS = 1; else
LOD_URXTRS=0;
                  IF URXBP3 > 0.4         then LOD_URXBP3 = 1; else
LOD_URXBP3=0;
            run;
            proc sql;
                  create table source.Phenol_07b as
                  select *, sum(LOD_URXBPH,LOD_URXTRS,LOD_URXBP3) as
LODSUM_Phen
                  from Phenol_07a;
            run;
            proc freq data=source.Phenol_07b;
                  table LODSUM_Phen;
            run;
            proc sql;
                  drop table work.temp, temp2, new;
            quit;

/**********************
      Phenols  2009
**********************/
            proc sql;
                  create table temp as
                  select  seqn, sum(EL_URXBPH,EL_URXTRS,EL_URXBP3 ) as
tot_Phenol_ELs
                  from source.all
                  where SDDSRVYR = 6;  /*2009*/
            run;
            proc freq data = temp;
                  tables tot_Phenol_ELs;
            run;
            proc sql;
                  create table work.new as
                  select a.seqn, a.tot_Phenol_ELs,
                        b.URXBPH, b.EL_URXBPH,
                        b.URXTRS, b.EL_URXTRS,
                        b.URXBP3, b.EL_URXBP3
                  from temp as a, source.all as b
                  where a.seqn = b.seqn
                        and a.tot_Phenol_ELs = 3;
            run;
            data Phenol_09a;
                  set work.new;
                  IF URXBPH > 0.4   then LOD_URXBPH = 1; else LOD_URXBPH=0;
                  IF URXTRS > 2.3         then LOD_URXTRS = 1; else
LOD_URXTRS=0;
                  IF URXBP3 > 0.4         then LOD_URXBP3 = 1; else
LOD_URXBP3=0;
            run;
            proc sql;
                  create table source.Phenol_09b as
                  select *, sum(LOD_URXBPH,LOD_URXTRS,LOD_URXBP3) as
LODSUM_Phen
                  from Phenol_09a;
            run;
            proc freq data=source.Phenol_09b;
                  table LODSUM_Phen;
```

```
            run;
            proc sql;
                  drop table work.temp, temp2, new;
            quit;

/*************************************
*************************************
 Current Use Environmental Pesticides

      *NO 2009 Data

*Note: No exposures for any women,
      for any cycle, for any chemical.
*************************************
*************************************/

/**********************
 Current Use Pesticides
            2003
**********************/
            proc sql;
                  create table temp as
                  select  seqn,
sum(EL_URXBSM,EL_URXCHS,EL_URXEMM,EL_URXFRM,EL_URXHLS,EL_URXMSM,EL_URXMTM,EL_
URXNOS,

      EL_URXOXS,EL_URXPIM,EL_URXPRO,EL_URXRIM,EL_URXSMM,EL_URXSSF,EL_URXTHF,
                                          EL_URXTRA,EL_URXTRN) as
tot_Curr_ELs
                  from source.all
                  where SDDSRVYR = 3;  /*2003*/
            run;
            proc freq data = temp;
                  tables tot_Curr_ELs;
            run;
            proc sql;
                  create table work.new as
                  select a.seqn, a.tot_Curr_ELs,
                        b.URXBSM, b.EL_URXBSM,
                        b.URXCHS, b.EL_URXCHS,
                        b.URXEMM, b.EL_URXEMM,
                        b.URXFRM, b.EL_URXFRM,
                        b.URXHLS, b.EL_URXHLS,
                        b.URXMSM, b.EL_URXMSM,
                        b.URXMTM, b.EL_URXMTM,
                        b.URXNOS, b.EL_URXNOS,
                        b.URXOXS, b.EL_URXOXS,
                        b.URXPIM, b.EL_URXPIM,
                        b.URXPRO, b.EL_URXPRO,
                        b.URXRIM, b.EL_URXRIM,
                        b.URXSMM, b.EL_URXSMM,
                        b.URXSSF, b.EL_URXSSF,
                        b.URXTHF, b.EL_URXTHF,
                        b.URXTRA, b.EL_URXTRA,
                        b.URXTRN, b.EL_URXTRN
                  from temp as a, source.all as b
                  where a.seqn = b.seqn
```

```
                        and a.tot_Curr_ELs = 17;
            run;
            data Current_03a;
                  set work.new;
                  IF URXBSM > 0.05  then LOD_URXBSM = 1; else LOD_URXBSM=0;
                  IF URXCHS > 0.06  then LOD_URXCHS = 1; else LOD_URXCHS=0;
                  IF URXEMM > 0.1         then LOD_URXEMM = 1; else
LOD_URXEMM=0;
                  IF URXFRM > 0.05  then LOD_URXFRM = 1; else LOD_URXFRM=0;
                  IF URXHLS > 0.1         then LOD_URXHLS = 1; else
LOD_URXHLS=0;
                  IF URXMSM > 0.06  then LOD_URXMSM = 1; else LOD_URXMSM=0;
                  IF URXMTM > 0.05  then LOD_URXMTM = 1; else LOD_URXMTM=0;
                  IF URXNOS > 0.1         then LOD_URXNOS = 1; else
LOD_URXNOS=0;
                  IF URXOXS > 0.06  then LOD_URXOXS = 1; else LOD_URXOXS=0;
                  IF URXPIM > 0.07  then LOD_URXPIM = 1; else LOD_URXPIM=0;
                  IF URXPRO > 0.05  then LOD_URXPRO = 1; else LOD_URXPRO=0;
                  IF URXRIM > 0.05  then LOD_URXRIM = 1; else LOD_URXRIM=0;
                  IF URXSMM > 0.05  then LOD_URXSMM = 1; else LOD_URXSMM=0;
                  IF URXSSF > 0.1         then LOD_URXSSF = 1; else
LOD_URXSSF=0;
                  IF URXTHF > 0.08  then LOD_URXTHF = 1; else LOD_URXTHF=0;
                  IF URXTRA > 0.07  then LOD_URXTRA = 1; else LOD_URXTRA=0;
                  IF URXTRN > 0.05  then LOD_URXTRN = 1; else LOD_URXTRN=0;
            run;
            proc sql;
                  create table source.Current_03b as
                  select *,
sum(LOD_URXBSM,LOD_URXCHS,LOD_URXEMM,LOD_URXFRM,LOD_URXHLS,LOD_URXMSM,LOD_URX
MTM,LOD_URXNOS,

      LOD_URXOXS,LOD_URXPIM,LOD_URXPRO,LOD_URXRIM,LOD_URXSMM,LOD_URXSSF,LOD_U
RXTHF,
                                    LOD_URXTRA,LOD_URXTRN) as LODSUM_Curr
                  from Current_03a;
            run;
            proc freq data=source.Current_03b;
                  table LODSUM_Curr;
            run;
            proc sql;
                  drop table work.temp, temp2, new;
            quit;

/**********************
 Current Use Pesticides
            2005
**********************/
            proc sql;
                  create table temp as
                  select  seqn,
sum(EL_URXBSM,EL_URXCHS,EL_URXEMM,EL_URXFRM,EL_URXHLS,EL_URXMSM,EL_URXMTM,EL_
URXNOS,

      EL_URXOXS,EL_URXPIM,EL_URXPRO,EL_URXRIM,EL_URXSMM,EL_URXSSF,EL_URXTHF,
                                          EL_URXTRA,EL_URXTRN) as
tot_Curr_ELs
```

```
            from source.all
            where SDDSRVYR = 4;  /*2005*/
      run;
      proc freq data = temp;
            tables tot_Curr_ELs;
      run;
      proc sql;
            create table work.new as
            select a.seqn, a.tot_Curr_ELs,
                  b.URXBSM, b.EL_URXBSM,
                  b.URXCHS, b.EL_URXCHS,
                  b.URXEMM, b.EL_URXEMM,
                  b.URXFRM, b.EL_URXFRM,
                  b.URXHLS, b.EL_URXHLS,
                  b.URXMSM, b.EL_URXMSM,
                  b.URXMTM, b.EL_URXMTM,
                  b.URXNOS, b.EL_URXNOS,
                  b.URXOXS, b.EL_URXOXS,
                  b.URXPIM, b.EL_URXPIM,
                  b.URXPRO, b.EL_URXPRO,
                  b.URXRIM, b.EL_URXRIM,
                  b.URXSMM, b.EL_URXSMM,
                  b.URXSSF, b.EL_URXSSF,
                  b.URXTHF, b.EL_URXTHF,
                  b.URXTRA, b.EL_URXTRA,
                  b.URXTRN, b.EL_URXTRN
            from temp as a, source.all as b
            where a.seqn = b.seqn
                  and a.tot_Curr_ELs = 17;
      run;
      data Current_05a;
            set work.new;
            IF URXBSM > 0.05  then LOD_URXBSM = 1; else LOD_URXBSM=0;
            IF URXCHS > 0.06  then LOD_URXCHS = 1; else LOD_URXCHS=0;
            IF URXEMM > 0.1         then LOD_URXEMM = 1; else
LOD_URXEMM=0;
            IF URXFRM > 0.05  then LOD_URXFRM = 1; else LOD_URXFRM=0;
            IF URXHLS > 0.1         then LOD_URXHLS = 1; else
LOD_URXHLS=0;
            IF URXMSM > 0.06  then LOD_URXMSM = 1; else LOD_URXMSM=0;
            IF URXMTM > 0.05  then LOD_URXMTM = 1; else LOD_URXMTM=0;
            IF URXNOS > 0.1         then LOD_URXNOS = 1; else
LOD_URXNOS=0;
            IF URXOXS > 0.06  then LOD_URXOXS = 1; else LOD_URXOXS=0;
            IF URXPIM > 0.07  then LOD_URXPIM = 1; else LOD_URXPIM=0;
            IF URXPRO > 0.05  then LOD_URXPRO = 1; else LOD_URXPRO=0;
            IF URXRIM > 0.05  then LOD_URXRIM = 1; else LOD_URXRIM=0;
            IF URXSMM > 0.05  then LOD_URXSMM = 1; else LOD_URXSMM=0;
            IF URXSSF > 0.1         then LOD_URXSSF = 1; else
LOD_URXSSF=0;
            IF URXTHF > 0.08  then LOD_URXTHF = 1; else LOD_URXTHF=0;
            IF URXTRA > 0.07  then LOD_URXTRA = 1; else LOD_URXTRA=0;
            IF URXTRN > 0.05  then LOD_URXTRN = 1; else LOD_URXTRN=0;
      run;
      proc sql;
            create table source.Current_05b as
```

```
                  select *,
sum(LOD_URXBSM,LOD_URXCHS,LOD_URXEMM,LOD_URXFRM,LOD_URXHLS,LOD_URXMSM,LOD_URX
MTM,LOD_URXNOS,

      LOD_URXOXS,LOD_URXPIM,LOD_URXPRO,LOD_URXRIM,LOD_URXSMM,LOD_URXSSF,LOD_U
RXTHF,
                                    LOD_URXTRA,LOD_URXTRN) as LODSUM_Curr
                  from Current_05a;
            run;
            proc freq data=source.Current_05b;
                  table LODSUM_Curr;
            run;
            proc sql;
                  drop table work.temp, temp2, new;
            quit;

/***********************
 Current Use Pesticides
            2007
***********************/
            proc sql;
                  create table temp as
                  select  seqn,
sum(EL_URXBSM,EL_URXCHS,EL_URXEMM,EL_URXFRM,EL_URXHLS,EL_URXMSM,EL_URXMTM,EL_
URXNOS,

      EL_URXOXS,EL_URXPIM,EL_URXPRO,EL_URXRIM,EL_URXSMM,EL_URXSSF,EL_URXTHF,
                                          EL_URXTRA,EL_URXTRN) as
tot_Curr_ELs
                  from source.all
                  where SDDSRVYR = 5;  /*2007*/
            run;
            proc freq data = temp;
                  tables tot_Curr_ELs;
            run;
            proc sql;
                  create table work.new as
                  select a.seqn, a.tot_Curr_ELs,
                        b.URXBSM, b.EL_URXBSM,
                        b.URXCHS, b.EL_URXCHS,
                        b.URXEMM, b.EL_URXEMM,
                        b.URXFRM, b.EL_URXFRM,
                        b.URXHLS, b.EL_URXHLS,
                        b.URXMSM, b.EL_URXMSM,
                        b.URXMTM, b.EL_URXMTM,
                        b.URXNOS, b.EL_URXNOS,
                        b.URXOXS, b.EL_URXOXS,
                        b.URXPIM, b.EL_URXPIM,
                        b.URXPRO, b.EL_URXPRO,
                        b.URXRIM, b.EL_URXRIM,
                        b.URXSMM, b.EL_URXSMM,
                        b.URXSSF, b.EL_URXSSF,
                        b.URXTHF, b.EL_URXTHF,
                        b.URXTRA, b.EL_URXTRA,
                        b.URXTRN, b.EL_URXTRN
                  from temp as a, source.all as b
                  where a.seqn = b.seqn
```

```
                        and a.tot_Curr_ELs = 17;
            run;
            data Current_07a;
                  set work.new;
                  IF URXBSM > 0.05  then LOD_URXBSM = 1; else LOD_URXBSM=0;
                  IF URXCHS > 0.06  then LOD_URXCHS = 1; else LOD_URXCHS=0;
                  IF URXEMM > 0.1         then LOD_URXEMM = 1; else
LOD_URXEMM=0;
                  IF URXFRM > 0.05  then LOD_URXFRM = 1; else LOD_URXFRM=0;
                  IF URXHLS > 0.1         then LOD_URXHLS = 1; else
LOD_URXHLS=0;
                  IF URXMSM > 0.06  then LOD_URXMSM = 1; else LOD_URXMSM=0;
                  IF URXMTM > 0.05  then LOD_URXMTM = 1; else LOD_URXMTM=0;
                  IF URXNOS > 0.1         then LOD_URXNOS = 1; else
LOD_URXNOS=0;
                  IF URXOXS > 0.06  then LOD_URXOXS = 1; else LOD_URXOXS=0;
                  IF URXPIM > 0.07  then LOD_URXPIM = 1; else LOD_URXPIM=0;
                  IF URXPRO > 0.05  then LOD_URXPRO = 1; else LOD_URXPRO=0;
                  IF URXRIM > 0.05  then LOD_URXRIM = 1; else LOD_URXRIM=0;
                  IF URXSMM > 0.05  then LOD_URXSMM = 1; else LOD_URXSMM=0;
                  IF URXSSF > 0.1         then LOD_URXSSF = 1; else
LOD_URXSSF=0;
                  IF URXTHF > 0.08  then LOD_URXTHF = 1; else LOD_URXTHF=0;
                  IF URXTRA > 0.07  then LOD_URXTRA = 1; else LOD_URXTRA=0;
                  IF URXTRN > 0.05  then LOD_URXTRN = 1; else LOD_URXTRN=0;
            run;
            proc sql;
                  create table source.Current_07b as
                  select *,
sum(LOD_URXBSM,LOD_URXCHS,LOD_URXEMM,LOD_URXFRM,LOD_URXHLS,LOD_URXMSM,LOD_URX
MTM,LOD_URXNOS,

      LOD_URXOXS,LOD_URXPIM,LOD_URXPRO,LOD_URXRIM,LOD_URXSMM,LOD_URXSSF,LOD_U
RXTHF,
                                    LOD_URXTRA,LOD_URXTRN) as LODSUM_Curr
                  from Current_07a;
            run;
            proc freq data=source.Current_07b;
                  table LODSUM_Curr;
            run;
            proc sql;
                  drop table work.temp, temp2, new;
            quit;

/*************************************
*************************************
                  Parabens

*No 2003 data for any chemical -
      so excluded entire cycle for parabens.

*************************************
*************************************/
/**********************
      Parabens  2005
**********************/
            proc sql;
```

```
                  create table temp as
                  select  seqn, sum(EL_URXBUP,EL_URXEPB,EL_URXMPB,EL_URXPPB)
as tot_Paraben_ELs
                  from source.all
                  where SDDSRVYR = 4;  /*2005*/
            run;
            proc freq data = temp;
                  tables tot_Paraben_ELs;
            run;
            proc sql;
                  create table work.new as
                  select a.seqn, a.tot_Paraben_ELs,
                        b.URXBUP, b.EL_URXBUP,
                        b.URXEPB, b.EL_URXEPB,
                        b.URXMPB, b.EL_URXMPB,
                        b.URXPPB, b.EL_URXPPB
                  from temp as a, source.all as b
                  where a.seqn = b.seqn
                        and a.tot_Paraben_ELs = 4;
            run;
            data Paraben_05a;
                  set work.new;
                  IF URXBUP > 0.2   then LOD_URXBUP = 1; else LOD_URXBUP=0;
                  IF URXEPB > 1           then LOD_URXEPB = 1; else
LOD_URXEPB=0;
                  IF URXMPB > 1           then LOD_URXMPB = 1; else
LOD_URXMPB=0;
                  IF URXPPB > 0.2         then LOD_URXPPB = 1; else
LOD_URXPPB=0;
            run;
            proc sql;
                  create table source.Paraben_05b as
                  select *, sum(LOD_URXBUP,LOD_URXEPB,LOD_URXMPB,LOD_URXPPB)
as LODSUM_Para
                  from Paraben_05a;
            run;
            proc freq data=source.Paraben_05b;
                  table LODSUM_Para;
            run;
            proc sql;
                  drop table work.temp, temp2, new;
            quit;

/***********************
      Parabens  2007
***********************/
            proc sql;
                  create table temp as
                  select  seqn, sum(EL_URXBUP,EL_URXEPB,EL_URXMPB,EL_URXPPB)
as tot_Paraben_ELs
                  from source.all
                  where SDDSRVYR = 5;  /*2007*/
            run;
            proc freq data = temp;
                  tables tot_Paraben_ELs;
            run;
            proc sql;
```

```
                  create table work.new as
                  select a.seqn, a.tot_Paraben_ELs,
                        b.URXBUP, b.EL_URXBUP,
                        b.URXEPB, b.EL_URXEPB,
                        b.URXMPB, b.EL_URXMPB,
                        b.URXPPB, b.EL_URXPPB
                  from temp as a, source.all as b
                  where a.seqn = b.seqn
                        and a.tot_Paraben_ELs = 4;
            run;
            data Paraben_07a;
                  set work.new;
                  IF URXBUP > 0.2   then LOD_URXBUP = 1; else LOD_URXBUP=0;
                  IF URXEPB > 1           then LOD_URXEPB = 1; else
LOD_URXEPB=0;
                  IF URXMPB > 1           then LOD_URXMPB = 1; else
LOD_URXMPB=0;
                  IF URXPPB > 0.2         then LOD_URXPPB = 1; else
LOD_URXPPB=0;
            run;
            proc sql;
                  create table source.Paraben_07b as
                  select *, sum(LOD_URXBUP,LOD_URXEPB,LOD_URXMPB,LOD_URXPPB)
as LODSUM_Para
                  from Paraben_07a;
            run;
            proc freq data=source.Paraben_07b;
                  table LODSUM_Para;
            run;
            proc sql;
                  drop table work.temp, temp2, new;
            quit;

/***********************
      Parabens  2009
***********************/
            proc sql;
                  create table temp as
                  select  seqn, sum(EL_URXBUP,EL_URXEPB,EL_URXMPB,EL_URXPPB)
as tot_Paraben_ELs
                  from source.all
                  where SDDSRVYR = 6;  /*2009*/
            run;
            proc freq data = temp;
                  tables tot_Paraben_ELs;
            run;
            proc sql;
                  create table work.new as
                  select a.seqn, a.tot_Paraben_ELs,
                        b.URXBUP, b.EL_URXBUP,
                        b.URXEPB, b.EL_URXEPB,
                        b.URXMPB, b.EL_URXMPB,
                        b.URXPPB, b.EL_URXPPB
                  from temp as a, source.all as b
                  where a.seqn = b.seqn
                        and a.tot_Paraben_ELs = 4;
            run;
```

```
            data Paraben_09a;
                  set work.new;
                  IF URXBUP > 0.2   then LOD_URXBUP = 1; else LOD_URXBUP=0;
                  IF URXEPB > 1           then LOD_URXEPB = 1; else
LOD_URXEPB=0;
                  IF URXMPB > 1           then LOD_URXMPB = 1; else
LOD_URXMPB=0;
                  IF URXPPB > 0.2         then LOD_URXPPB = 1; else
LOD_URXPPB=0;
            run;
            proc sql;
                  create table source.Paraben_09b as
                  select *, sum(LOD_URXBUP,LOD_URXEPB,LOD_URXMPB,LOD_URXPPB)
as LODSUM_Para
                  from Paraben_09a;
            run;
            proc freq data=source.Paraben_09b;
                  table LODSUM_Para;
            run;
            proc sql;
                  drop table work.temp, temp2, new;
            quit;

/*************************************
*************************************
                  Percholate
      *URXUP8 changed from subsample C
            to 2003 to ALL 2005 & 2007.
      *No 2003, 2009 data for
            URXNO3, URXSCN
      *No 2009 data for this category.
*************************************
*************************************/

/**********************
      Percholate  2003
      *Only 1 (URXUP8)
**********************/
            proc sql;
                  create table temp as
                  select  seqn, EL_URXUP8 as tot_Perch_ELs
                  from source.all
                  where SDDSRVYR = 3;  /*2003*/
            run;
            proc freq data = temp;
                  tables tot_Perch_ELs;
            run;
            proc sql;
                  create table work.new as
                  select a.seqn, a.tot_Perch_ELs,
                        b.URXUP8, b.EL_URXUP8
                  from temp as a, source.all as b
                  where a.seqn = b.seqn
                        and a.tot_Perch_ELs = 1;
            run;
            data Perch_03a;
                  set work.new;
```

```
                  IF URXUP8 > 0.05  then LOD_URXUP8 = 1; else LOD_URXUP8=0;
            run;
            proc sql;
                  create table source.Perch_03b as
                  select *, LOD_URXUP8 as LODSUM_Perch
                  from Perch_03a;
            run;
            proc freq data=source.Perch_03b;
                  table LODSUM_Perch;
            run;
            proc sql;
                  drop table work.temp, temp2, new;
            quit;

/*************************************************************
                              SECTION SEVEN
Purpose: Goal is output like Woodruff's Figure 3:
            Analysis of total # of individual pregnant woman detects
            for the groups in a single cycle/subsample.
***DATA IS UNWEIGHTED***
*************************************************************/

/*****************************
            2003 Subsample A
1.  Urinary Metals (13)
2.  Arsenics (8)
3.  Perflourinated Compounds (12)
4.  Cotinine (1)
5.  Blood Metals (4)
TOTAL = 38
*****************************/
            proc sql;
                  create table  first as
                  select a.*, b.*
                  from source.Metals_03b as a, source.Arsenics_03b as b
                  where a.seqn = b.seqn;

                  create table second as
                  select a.*, b.*
                  from first as a, source.Perfl_03b as b
                  where a.seqn = b.seqn;

                  create table third as
                  select a.*, b.*
                  from second as a, source.Cot_03b as b
                  where a.seqn = b.seqn;

                  create table fourth as
                  select a.*, b.*
                  from third as a, source.BloodMetal_03b as b
                  where a.seqn = b.seqn;

                  create table fifth as
                  select seqn, sum(total_ELs_metal, total_ELs_ars,
total_ELs_perf, total_ELs_cot, total_ELs_BL )
                        as A_2003_ELs, sum(LODSUM_metals, LODSUM_arsenic,
LODSUM_Perf, LODSUM_Cot, LODSUM_BLMetal) as Detects
```

```
                  from fourth;

                  create table source.SubA_2003 as
                  select a.seqn, a.total_ELs_metal, a.total_ELs_ars,
a.total_ELs_perf, a.total_ELs_cot, a.total_ELs_BL,
                        b.A_2003_ELs, a.LODSUM_metals, a.LODSUM_arsenic,
a.LODSUM_Perf, a.LODSUM_Cot, a.LODSUM_BLMetal, b.Detects
                  from fourth as a, fifth as b
                  where a.seqn= b.seqn;

                  drop table first, second, third, fourth, fifth;
            quit;

      /*Output for Excel Graphing*/
            proc print data = source.SubA_2003;
                  var seqn LODSUM_metals LODSUM_arsenic LODSUM_Perf
LODSUM_Cot LODSUM_BLMetal;
                  where A_2003_ELs = 38;   /*Double-ensuring only those
eligible & measured for all chemicals*/
            run;

/*****************************
            2003 Subsample B
1.  Phytoestrogens (6)
2.  Phthalates (13)
3.  PAHs (9)
4.  Cotinine (1)
5.  Blood Metals (4)
TOTAL = 33
*****************************/
            proc sql;
                  create table  first as
                  select a.*, b.*
                  from source.Phyto_03b as a, source.Phthalates_03b as b
                  where a.seqn = b.seqn;

                  create table second as
                  select a.*, b.*
                  from first as a,source.Pah_03b as b
                  where a.seqn = b.seqn;

                  create table third as
                  select a.*, b.*
                  from second as a, source.Cot_03b as b
                  where a.seqn = b.seqn;

                  create table fourth as
                  select a.*, b.*
                  from third as a, source.BloodMetal_03b as b
                  where a.seqn = b.seqn;

                  create table fifth as
                  select seqn, sum(total_ELs_phyto, total_ELs_phth,
total_ELs_pah, total_ELs_cot, total_ELs_BL)
                        as B_2003_ELs, sum(LODSUM_phyto, LODSUM_phthal,
LODSUM_Pah, LODSUM_Cot, LODSUM_BLMetal) as Detects
                  from fourth;
```

```
                  create table source.SubB_2003 as
                  select a.seqn, a.total_ELs_phyto, a.total_ELs_phth,
a.total_ELs_pah, a.total_ELs_cot, a.total_ELs_BL,
                        b.B_2003_ELs, a.LODSUM_phyto, a.LODSUM_phthal,
a.LODSUM_Pah, a.LODSUM_Cot, a.LODSUM_BLMetal, b.Detects
                  from fourth as a, fifth as b
                  where a.seqn= b.seqn;

                  drop table first, second, third, fourth, fifth;
            quit;

      /*Output for Excel Graphing*/
            proc print data = source.SubB_2003;
                  var seqn LODSUM_phyto LODSUM_phthal LODSUM_Pah LODSUM_Cot
LODSUM_BLMetal;
                  where B_2003_ELs = 33;
            run;

/*****************************
            2003 Subsample C
1.  Phenols (3)
            No parabens in 2003
2.  Environmental Pesticides (5)
3.  Current Use Pesticides (17)
4.  Cotinine (1)
5.  Blood Metals (4)
TOTAL = 30
*****************************
*****************************/
      proc sql;
            create table  first as
            select a.*, b.*
            from source.Phenol_03b as a, source.Pesticides_03b as b
            where a.seqn = b.seqn;

            create table second as
            select a.*, b.*
            from first as a,source.Current_03b as b
            where a.seqn = b.seqn;

            create table third as
            select a.*, b.*
            from second as a, source.Cot_03b as b
            where a.seqn = b.seqn;

            create table fourth as
            select a.*, b.*
            from third as a, source.BloodMetal_03b as b
            where a.seqn = b.seqn;

            create table fifth as
            select seqn, sum(tot_Phenol_ELs, total_ELs_pest, tot_Curr_ELs,
total_ELs_cot, total_ELs_BL) as C_2003_ELs,
                              sum(LODSUM_Phen, LODSUM_Pests, LODSUM_Curr,
LODSUM_Cot, LODSUM_BLMetal) as Detects
            from fourth;
```

```
            create table source.SubC_2003 as
            select a.seqn, a.tot_Phenol_ELs, a.total_ELs_pest,
a.tot_Curr_ELs, a.total_ELs_cot, a.total_ELs_BL,
                        b.C_2003_ELs, a.LODSUM_Phen, a.LODSUM_Pests,
a.LODSUM_Curr, a.LODSUM_Cot, a.LODSUM_BLMetal, b.Detects
            from fourth as a, fifth as b
            where a.seqn= b.seqn;

            drop table first, second, third, fourth, fifth;
      quit;

      /*Output for Excel Graphing*/
            proc print data = source.SubC_2003;
                  var seqn LODSUM_Phen LODSUM_Pests LODSUM_Curr LODSUM_Cot
LODSUM_BLMetal;
                  where C_2003_ELs = 30;
            run;

/*******************************************
                              2005
*******************************************/
/***************************
            2005 Subsample A
1.  Urinary Heavy Metals (13)
2.  Arsenics (8)
3.  Perflourinated Compounds (12)
4.  Cotinine (1)
5.  Blood Metals (4)
TOTAL = 38
***************************/
      proc sql;
            create table  first as
            select a.*, b.*
            from source.Metals_05b as a, source.Arsenics_05b as b
            where a.seqn = b.seqn;

            create table second as
            select a.*, b.*
            from first as a, source.Perfl_05b as b
            where a.seqn = b.seqn;

            create table third as
            select a.*, b.*
            from second as a, source.Cot_05b as b
            where a.seqn = b.seqn;

            create table fourth as
            select a.*, b.*
            from third as a, source.BloodMetal_05b as b
            where a.seqn = b.seqn;

            create table fifth as
            select seqn, sum(total_ELs_metal, total_ELs_ars, total_ELs_perf,
total_ELs_cot, total_ELs_BL )
                  as A_2005_ELs, sum(LODSUM_metals, LODSUM_arsenic,
LODSUM_Perf, LODSUM_Cot, LODSUM_BLMetal) as Detects
```

```
            from fourth;

            create table source.SubA_2005 as
            select a.seqn, a.total_ELs_metal, a.total_ELs_ars,
a.total_ELs_perf, a.total_ELs_cot, a.total_ELs_BL,
                  b.A_2005_ELs, a.LODSUM_metals, a.LODSUM_arsenic,
a.LODSUM_Perf, a.LODSUM_Cot, a.LODSUM_BLMetal, b.Detects
            from fourth as a, fifth as b
            where a.seqn= b.seqn;

            drop table first, second, third, fourth, fifth;
      quit;

      /*Output for Excel Graphing*/
            proc print data = source.SubA_2005;
                  var seqn LODSUM_metals LODSUM_arsenic LODSUM_Perf
LODSUM_Cot LODSUM_BLMetal;
                  where A_2005_ELs = 38;
            run;

/*****************************
            2005 Subsample B
1.  Phenols (3)  *Skipped parabens as not any consistently measured
chemicals.
2.  Environmental Pesticides (5)
3.  Phytoestrogens (6)
4.  Phthalates (13)
5.    PAHs (9)
4.  Cotinine (1)
5.  Blood Metals (4)
TOTAL = 41
*****************************/
proc sql;
      create table  first as
      select a.*, b.*
      from source.Phenol_05b as a, source.Pesticides_05b as b
      where a.seqn = b.seqn;

      create table second as
      select a.*, b.*
      from first as a, source.Phyto_05b as b
      where a.seqn = b.seqn;

      create table third as
      select a.*, b.*
      from second as a, source.Phthalates_05b as b
      where a.seqn = b.seqn;

      create table fourth as
      select a.*, b.*
      from third as a, source.Pah_05b as b
      where a.seqn = b.seqn;

      create table fifth as
      select a.*, b.*
      from fourth as a, source.Cot_05b as b
      where a.seqn = b.seqn;
```

```
      create table sixth as
      select a.*, b.*
      from fifth as a, source.BloodMetal_05b as b
      where a.seqn = b.seqn;

      create table seventh as
      select seqn, sum(tot_Phenol_ELs, total_ELs_pest, total_ELs_phyto,
total_ELs_phth, total_ELs_pah, total_ELs_cot,
            total_ELs_BL) as B_2005_ELs, sum(LODSUM_Phen, LODSUM_Pests,
LODSUM_phyto, LODSUM_phthal, LODSUM_Pah,
            LODSUM_Cot, LODSUM_BLMetal) as Detects
      from sixth;

      create table source.SubB_2005 as
      select a.seqn, a.tot_Phenol_ELs,a.total_ELs_pest, a.total_ELs_phyto,
a.total_ELs_phth, a.total_ELs_pah,
            a.total_ELs_cot, a.total_ELs_BL, b.B_2005_ELs, a.LODSUM_Phen,
a.LODSUM_Pests, a.LODSUM_phyto,
            a.LODSUM_phthal, a.LODSUM_Pah, a.LODSUM_Cot, a.LODSUM_BLMetal,
b.Detects
      from sixth as a, seventh as b
      where a.seqn= b.seqn;

      drop table first, second, third, fourth, fifth, sixth, seventh;
quit;

      /*Output for Excel Graphing*/
            proc print data = source.SubB_2005;
                  var seqn LODSUM_Phen LODSUM_Pests LODSUM_phyto
LODSUM_phthal LODSUM_Pah LODSUM_Cot LODSUM_BLMetal;
                  where B_2005_ELs = 41;
            run;

/*****************************
            2005 Subsample C
1.  Current Use Pesticides (17)
2.  Cotinine (1)
3.  Blood Metals (4)
TOTAL = 22
*****************************/
            proc sql;
                  create table  first as
                  select a.*, b.*
                  from source.Current_05b as a, source.Cot_05b as b
                  where a.seqn = b.seqn;

                  create table second as
                  select a.*, b.*
                  from first as a, source.BloodMetal_05b as b
                  where a.seqn = b.seqn;

                  create table third as
                  select seqn, sum(tot_Curr_ELs, total_ELs_cot, total_ELs_BL)
as C_2005_ELs,
                                    sum(LODSUM_Curr, LODSUM_Cot,
LODSUM_BLMetal) as Detects
```

```
                  from second;

                  create table source.SubC_2005 as
                  select a.seqn, a.tot_Curr_ELs, a.total_ELs_cot,
a.total_ELs_BL, b.C_2005_ELs,
                                    a.LODSUM_Curr, LODSUM_Cot,
a.LODSUM_BLMetal, b.Detects
                  from second as a, third as b
                  where a.seqn= b.seqn;

                  drop table first, second, third;
            quit;

      /*Output for Excel Graphing*/
            proc print data = source.SubC_2005;
                  var seqn LODSUM_Curr LODSUM_Cot LODSUM_BLMetal;
                  where C_2005_ELs = 22;
            run;


/*******************************************
                              2007
*******************************************/
/****************************
****************************
            2007 Subsample A
1.  Urinary Heavy Metals (13)
2.  Arsenics (8)
4.  Cotinine (1)
5.  Blood Metals (4)
TOTAL = 26
****************************/
      proc sql;
            create table  first as
            select a.*, b.*
            from source.Metals_07b as a, source.Arsenics_07b as b
            where a.seqn = b.seqn;

            create table second as
            select a.*, b.*
            from first as a, source.Cot_07b as b
            where a.seqn = b.seqn;

            create table third as
            select a.*, b.*
            from second as a, source.BloodMetal_07b as b
            where a.seqn = b.seqn;

            create table fourth as
            select seqn, sum(total_ELs_metal, total_ELs_ars, total_ELs_cot,
total_ELs_BL) as A_2007_ELs,
                              sum(LODSUM_metals, LODSUM_arsenic, LODSUM_Cot,
LODSUM_BLMetal) as Detects
            from third;

            create table source.SubA_2007 as
```

```
            select a.seqn, a.total_ELs_metal, a.total_ELs_ars,
a.total_ELs_cot, a.total_ELs_BL, b.A_2007_ELs,
                                    a.LODSUM_metals, a.LODSUM_arsenic,
a.LODSUM_Cot, a.LODSUM_BLMetal, b.Detects
            from third as a, fourth as b
            where a.seqn= b.seqn;

            drop table first, second, third, fourth, fifth;
      quit;

      /*Output for Excel Graphing*/
            proc print data = source.SubA_2007;
                  var seqn LODSUM_metals LODSUM_arsenic LODSUM_Cot
LODSUM_BLMetal;
                  where A_2007_ELs = 26;
            run;

/*****************************
            2007 Subsample B
1.  Phenols (3)
2.  Environmental Pesticides (5)
3.  Phytoestrogens (6)
4.  Phthalates (13)
5.    PAHs (9)
4.  Cotinine (1)
5.  Blood Metals (4)
TOTAL = 41
*****************************/
            proc sql;
                  create table  first as
                  select a.*, b.*
                  from source.Phenol_07b as a, source.Pesticides_07b as b
                  where a.seqn = b.seqn;

                  create table second as
                  select a.*, b.*
                  from first as a, source.Phyto_07b as b
                  where a.seqn = b.seqn;

                  create table third as
                  select a.*, b.*
                  from second as a, source.Phthalates_07b as b
                  where a.seqn = b.seqn;

                  create table fourth as
                  select a.*, b.*
                  from third as a, source.Pah_07b as b
                  where a.seqn = b.seqn;

                  create table fifth as
                  select a.*, b.*
                  from fourth as a, source.Cot_07b as b
                  where a.seqn = b.seqn;

                  create table sixth as
                  select a.*, b.*
                  from fifth as a, source.BloodMetal_07b as b
```

```
                  where a.seqn = b.seqn;

                  create table seventh as
                  select seqn, sum(tot_Phenol_ELs, total_ELs_pest,
total_ELs_phyto, total_ELs_phth, total_ELs_pah,
                        total_ELs_cot, total_ELs_BL) as B_2007_ELs,
sum(LODSUM_Phen, LODSUM_Pests,  LODSUM_phyto,
                        LODSUM_phthal, LODSUM_Pah, LODSUM_Cot,
LODSUM_BLMetal) as Detects
                  from sixth;

                  create table source.SubB_2007 as
                  select a.seqn, a.tot_Phenol_ELs,a.total_ELs_pest,
a.total_ELs_phyto, a.total_ELs_phth, a.total_ELs_pah,
                        a.total_ELs_cot, a.total_ELs_BL, b.B_2007_ELs,
a.LODSUM_Phen, a.LODSUM_Pests, a.LODSUM_phyto,
                        a.LODSUM_phthal, a.LODSUM_Pah, a.LODSUM_Cot,
a.LODSUM_BLMetal, b.Detects
                  from sixth as a, seventh as b
                  where a.seqn= b.seqn;

                  drop table first, second, third, fourth, fifth, sixth,
seventh;
            quit;

      /*Output for Excel Graphing*/
            proc print data = source.SubB_2007;
                  var seqn LODSUM_Phen LODSUM_Pests LODSUM_phyto
LODSUM_phthal LODSUM_Pah LODSUM_Cot LODSUM_BLMetal;
                  where B_2007_ELs = 41;
            run;

/*****************************
            2007 Subsample C
1.  Current Use Pesticides (17)
2.  Perflourinated Compounds (12)
2.  Cotinine (1)
3.  Blood Metals (4)
TOTAL = 34
*****************************/
            proc sql;
                  create table  first as
                  select a.*, b.*
                  from source.Current_07b as a, source.Perfl_07b as b
                  where a.seqn = b.seqn;

                  create table second as
                  select a.*, b.*
                  from first as a, source.Cot_07b as b
                  where a.seqn = b.seqn;

                  create table third as
                  select a.*, b.*
                  from second as a, source.BloodMetal_07b as b
                  where a.seqn = b.seqn;

                  create table fourth as
```

```
                  select seqn, sum(tot_Curr_ELs, total_ELs_perf,
total_ELs_cot, total_ELs_BL) as C_2007_ELs,
                                    sum(LODSUM_Curr, LODSUM_Perf, LODSUM_Cot,
LODSUM_BLMetal) as Detects
                  from third;

                  create table source.SubC_2007 as
                  select a.seqn, a.tot_Curr_ELs, a.total_ELs_perf,
a.total_ELs_cot, a.total_ELs_BL, b.C_2007_ELs,
                                    a.LODSUM_Curr, LODSUM_Perf, LODSUM_Cot,
a.LODSUM_BLMetal, b.Detects
                  from third as a, fourth as b
                  where a.seqn= b.seqn;

                  drop table first, second, third, fourth;
            quit;

      /*Output for Excel Graphing*/
            proc print data = source.SubC_2007;
                  var seqn LODSUM_Curr LODSUM_Perf LODSUM_Cot LODSUM_BLMetal;
                  where C_2007_ELs = 34;
            run;

/*****************************************
                              2009
*****************************************/
/****************************
            2009 Subsample A
1.  Phytoestrogens (6)
2.  Urinary Heavy Metals (13)
3.  Arsenics (8)
4.  Cotinine (1)
5.  Blood Metals (4)
TOTAL = 32
****************************/
      proc sql;
            create table  first as
            select a.*, b.*
            from source.Metals_09b as a, source.Arsenics_09b as b
            where a.seqn = b.seqn;

            create table second as
            select a.*, b.*
            from first as a, source.Phyto_09b as b
            where a.seqn = b.seqn;

            create table third as
            select a.*, b.*
            from second as a, source.Cot_09b as b
            where a.seqn = b.seqn;

            create table fourth as
            select a.*, b.*
            from third as a, source.BloodMetal_09b as b
            where a.seqn = b.seqn;

            create table fifth as
```

```
            select seqn, sum(total_ELs_metal, total_ELs_ars, total_ELs_phyto,
total_ELs_cot, total_ELs_BL)
                  as A_2009_ELs, sum(LODSUM_metals, LODSUM_arsenic,
LODSUM_phyto, LODSUM_Cot, LODSUM_BLMetal) as Detects
            from fourth;

            create table source.SubA_2009 as
            select a.seqn, a.total_ELs_metal, a.total_ELs_ars,
a.total_ELs_phyto, a.total_ELs_cot, a.total_ELs_BL,
                  b.A_2009_ELs, a.LODSUM_metals, a.LODSUM_arsenic,
a.LODSUM_phyto, a.LODSUM_Cot, a.LODSUM_BLMetal, b.Detects
            from fourth as a, fifth as b
            where a.seqn= b.seqn;

            drop table first, second, third, fourth, fifth;
      quit;

      /*Output for Excel Graphing*/
            proc print data = source.SubA_2009;
                  var seqn LODSUM_metals LODSUM_arsenic LODSUM_phyto
LODSUM_Cot LODSUM_BLMetal;
                  where A_2009_ELs = 32;
            run;

/*****************************
            2009 Subsample B
1.  Phenols (3)
2.  Environmental Pesticides (5)
3.  Phthalates (13)
      *PAHs are in this cat, but
            no data yet for 2009.
4.  Cotinine (1)
5.  Blood Metals (4)
TOTAL = 26
*****************************/
proc sql;
      create table  first as
      select a.*, b.*
      from source.Phenol_09b as a, source.Pesticides_09b as b
      where a.seqn = b.seqn;

      create table second as
      select a.*, b.*
      from first as a, source.Phthalates_09b as b
      where a.seqn = b.seqn;

      create table third as
      select a.*, b.*
      from second as a, source.Cot_09b as b
      where a.seqn = b.seqn;

      create table fourth as
      select a.*, b.*
      from third as a, source.BloodMetal_09b as b
      where a.seqn = b.seqn;

      create table fifth as
```

```
      select seqn, sum(tot_Phenol_ELs, total_ELs_pest, total_ELs_phth,
total_ELs_cot, total_ELs_BL) as B_2009_ELs,
                        sum(LODSUM_Phen, LODSUM_Pests, LODSUM_phthal,
LODSUM_Cot, LODSUM_BLMetal) as Detects
      from fourth;

      create table source.SubB_2009 as
      select a.seqn, a.tot_Phenol_ELs,a.total_ELs_pest, a.total_ELs_phth,
a.total_ELs_cot, a.total_ELs_BL, b.B_2009_ELs,
                        a.LODSUM_Phen, a.LODSUM_Pests, a.LODSUM_phthal,
a.LODSUM_Cot, a.LODSUM_BLMetal, b.Detects
      from fourth as a, fifth as b
      where a.seqn= b.seqn;

      drop table first, second, third, fourth, fifth;
quit;

      /*Output for Excel Graphing*/
            proc print data = source.SubB_2009;
                  var seqn LODSUM_Phen LODSUM_Pests LODSUM_phthal LODSUM_Cot
LODSUM_BLMetal;
                  where B_2009_ELs = 26;
            run;

/*****************************
            2009 Subsample C
1.  Perflourinated Compounds (12)
            *Current Use Pesticides
            Data is not avail for 09.
2.  Cotinine (1)
3.  Blood Metals (4)
TOTAL = 17
*****************************/
      proc sql;
            create table  first as
            select a.*, b.*
            from source.Perfl_09b as a, source.Cot_09b as b
            where a.seqn = b.seqn;

            create table second as
            select a.*, b.*
            from first as a, source.BloodMetal_09b as b
            where a.seqn = b.seqn;

            create table third as
            select seqn, sum(total_ELs_perf, total_ELs_cot, total_ELs_BL) as
C_2009_ELs,
                              sum(LODSUM_Perf, LODSUM_Cot, LODSUM_BLMetal) as
Detects
            from second;

            create table source.SubC_2009 as
            select a.seqn, a.total_ELs_perf, a.total_ELs_cot, a.total_ELs_BL,
b.C_2009_ELs,
                              LODSUM_Perf, LODSUM_Cot, a.LODSUM_BLMetal,
b.Detects
            from second as a, third as b
```

```
            where a.seqn= b.seqn;

            drop table first, second, third;
      quit;

      /*Output for Excel Graphing*/
            proc print data = source.SubC_2009;
                  var seqn LODSUM_Perf LODSUM_Cot LODSUM_BLMetal;
                  where C_2009_ELs = 17;
            run;


/*************************************************************
                              SECTION EIGHT
Purpose: Fisher's Exact Test on Frequency Data from
            Steps 6 & 7, above.
            Determine if the distribution of total detects for a
            chemical group are different between 2003 and 2009
            ***DATA IS UNWEIGHTED***
Fisher's Exact Test was used rather than Wald Chi-Square.
      --Standard chi-square assumption of an expected value > 5 for
      each cell was violated, so an exact test was used instead.
The following chemical groups were excluded due to a lack of
      data:
      --Current Use Pesticides (no 2009)
      --PAHs (no 2009)
      --Parabens (no 2003)
*************************************************************/
/*****************************************
1.  Create Data File:  Data files are a combination of
files such as source.Phthalates_03b.
      --A) Add a new field to indicated the chemical group
      & Cycle from which the data was sourced.
      --B) Combine files from 03 and 09
      --C) Append to main file (source.chis)
*****************************************/
      /*********************************
        Urinary Environmental Pesticides
      *********************************/
      data source.Pesticides_03b (rename = (LODSUM_Pests = LODSUM));
            set source.Pesticides_03b;
            group = 'Urinary Environmental Pesticides';
            cycle = '2003-2004';
      run;
      data source.Pesticides_09b (rename = (LODSUM_Pests = LODSUM));
            set source.Pesticides_09b;
            group = 'Urinary Environmental Pesticides';
            cycle = '2009-2010';
      run;
      data source.Chis;
            set source.Pesticides_03b (keep = cycle group LODSUM)
                  source.Pesticides_09b (keep = cycle group LODSUM);
      run;

      /**********************
            Phthalates
      **********************/
```

```
data source.Phthalates_03b (rename = (LODSUM_phthal = LODSUM));
      set source.Phthalates_03b;
      group = 'Phthalates';
      cycle = '2003-2004';
run;
data source.Phthalates_09b (rename = (LODSUM_phthal = LODSUM));
      set source.Phthalates_09b;
      group = 'Phthalates';
      cycle = '2009-2010';
run;
data source.Chis;
      set source.Chis
            source.Phthalates_03b (keep = cycle group LODSUM)
            source.Phthalates_09b (keep = cycle group LODSUM);
run;

/**********************
  Urine Heavy Metals
**********************/
data source.Metals_03b (rename = (LODSUM_metals = LODSUM));
      set source.Metals_03b;
      group = 'Urinary Heavy Metals';
      cycle = '2003-2004';
run;
data source.Metals_09b (rename = (LODSUM_metals = LODSUM));
      set source.Metals_09b;
      group = 'Urinary Heavy Metals';
      cycle = '2009-2010';
run;
data source.Chis;
      set source.Chis
            source.Metals_03b (keep = cycle group LODSUM)
            source.Metals_09b (keep = cycle group LODSUM);
run;

/**********************
     Phytoestrogens
**********************/
data source.Phyto_03b (rename = (LODSUM_phyto = LODSUM));
      set source.Phyto_03b;
      group = 'Phytoestrogens';
      cycle = '2003-2004';
run;
data source.Phyto_09b (rename = (LODSUM_phyto = LODSUM));
      set source.Phyto_09b;
      group = 'Phytoestrogens';
      cycle = '2009-2010';
run;
data source.Chis;
      set source.Chis
            source.Phyto_03b (keep = cycle group LODSUM)
            source.Phyto_09b (keep = cycle group LODSUM);
run;

/**********************
      Arsenics
**********************/
```

```
data source.Arsenics_03b (rename = (LODSUM_arsenic = LODSUM));
      set source.Arsenics_03b;
      group = 'Arsenics';
      cycle = '2003-2004';
run;
data source.Arsenics_09b (rename = (LODSUM_arsenic = LODSUM));
      set source.Arsenics_09b;
      group = 'Arsenics';
      cycle = '2009-2010';
run;
data source.Chis;
      set source.Chis
            source.Arsenics_03b (keep = cycle group LODSUM)
            source.Arsenics_09b (keep = cycle group LODSUM);
run;

/**********************
        Blood Metals
**********************/
data source.BloodMetal_03b (rename = (LODSUM_BLMetal = LODSUM));
      set source.BloodMetal_03b;
      group = 'Blood Metals';
      cycle = '2003-2004';
run;
data source.BloodMetal_09b (rename = (LODSUM_BLMetal = LODSUM));
      set source.BloodMetal_09b;
      group = 'Blood Metals';
      cycle = '2009-2010';
run;
data source.Chis;
      set source.Chis
            source.BloodMetal_03b (keep = cycle group LODSUM)
            source.BloodMetal_09b (keep = cycle group LODSUM);
run;

/******************************
      Perflourinated Compounds
******************************/
data source.Perfl_03b (rename = (LODSUM_Perf = LODSUM));
      set source.Perfl_03b;
      group = 'Perflourinated Compounds';
      cycle = '2003-2004';
run;
data source.Perfl_09b (rename = (LODSUM_Perf = LODSUM));
      set source.Perfl_09b;
      group = 'Perflourinated Compounds';
      cycle = '2009-2010';
run;
data source.Chis;
      set source.Chis
            source.Perfl_03b (keep = cycle group LODSUM)
            source.Perfl_09b (keep = cycle group LODSUM);
run;

/**********************
  Environmental Phenols
**********************/
```

```
      data source.Phenol_03b (rename = (LODSUM_Phen = LODSUM));
            set source.Phenol_03b;
            group = 'Environmental Phenols';
            cycle = '2003-2004';
      run;
      data source.Phenol_09b (rename = (LODSUM_Phen = LODSUM));
            set source.Phenol_09b;
            group = 'Environmental Phenols';
            cycle = '2009-2010';
      run;
      data source.Chis;
            set source.Chis
                  source.Phenol_03b (keep = cycle group LODSUM)
                  source.Phenol_09b (keep = cycle group LODSUM);
      run;

/*******************************************
2.  Fisher's Exact Test
*******************************************/
            proc sort data=source.chis;
                  by group cycle;
            run;

      /*A SAS View of the Data*/
            title 'Distribution of Chemical Groups 2003-2004 vs 2009-2010';
            ods graphics off;
                  proc univariate data= source.Chis noprint;
                        by group;
                     class cycle;
                     histogram LODSUM / nrows = 3;
                  run;
            title;
            ods graphics on;

      /*Fisher's*/
            proc freq data= source.chis;
                  by group;
                  tables cycle*LODSUM;
                  exact fisher;
            run;
```

Vita

Teri Leurise Cabana was born on August 25, 1976 in Norristown, Pennsylvania and is an American citizen. She graduated with honors from North Penn Senior High School, Lansdale, Pennsylvania in 1994. In 1998 she received her Bachelor of Science in Psychology with a minor in Applied Statistics from James Madison University, graduating summa cum laude. She subsequently worked in various industries, first in inventory forecasting and modeling at the headquarters for Circuit City Stores, Inc. and then in consumer electronic sales with Sony. She began work for the United Network for Organ Sharing (UNOS) in 2005 as a SAS programmer. During her time at VCU, she was employed as a statistical consultant for student services under the Department of Technology Services.