HOUSEHOLD FOOD INSECURITY AND BMI OUTCOMES AMONG PRE-SCHOOL AND SCHOOL AGED CHILDREN IN AN INNER-CITY SETTING

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by
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ABSTRACT

Title: Household food insecurity and BMI outcomes among pre-school and school-aged children in an inner-city setting
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Degree: Doctor of Philosophy
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Introduction: While the paradoxical association between overweight and household food insecurity (HFI) is well established amongst low-income women, findings remain inconclusive amongst children. The purpose of this study was to determine the relationship between household food insecurity (HFI) and child overweight outcomes in an inner-city, pre-school and school aged population. **Methods:** This study used a cross-sectional study design augmented by validated Early Pregnancy Study (EPS) data collected during a pregnancy 6 years prior. A random subset of mothers of child-bearing age (23-44 years) and the child resulting from that pregnancy (between 4-7 years of age at time of re-enrollment) were tracked and re-enrolled in this follow-up study. The primary exposure, HFI, was captured using an adaptation of the standardized US Food Security Scale -- embedded within a larger self-report questionnaire addressing selected maternal and child influences (such as health, exercise, and dietary risk factors) on child weight patterns. Maternal and the child BMI outcome was determined through in-home clinical assessment of height and weight and using standard CDC based cutoffs to classify weight status. Self-report and biologically confirmed prenatal EPS data were also obtained to establish useful baseline data and to enhance study results. Exploratory hypotheses examined: (1) Interrelatedness between select maternal and child health, social-environmental, and socio-demographic exposures and (2) Household food insecurity (HFI), prenatal and current maternal and child exposures were explored for their relationship with child BMI. **Results:** Thirty-six mother-child dyads participated in this follow-up study. Twenty-eight percent of mothers reported HFI; 83% of mothers were classified as overweight or obese and 58% of children were categorized as at-risk for overweight or overweight. Most bi-variate analyses yielded non-significant results, though in-utero drug use was significantly correlated, and mothers who tested positive for tobacco use during pregnancy were also likely to test positive for marijuana use, as determined through biological confirmation ($p<0.05$). Additionally, current maternal BMI as well as current maternal hip-to-waist ratio were each significantly associated with current child BMI ($p<0.05$). One unexpected finding included a significant association between current maternal BMI and presence of a co-morbidity in the child ($p<0.05$). No significant relationships were found between HFI or additional exploratory multivariate models looking at independent effects of prenatal and current maternal-child exposures in predicting child overweight, though current maternal BMI was predictive of child overweight in most analyses. Access to electronic medical record information was highly predictive of participation in this follow-up study ($p<0.001$). **Discussion:** This study provided an opportunity to better characterize an attrition-prone population, and, while it is possible to track and identify these women through electronic medical record databases, recruitment efforts were labor-intensive and attrition rates particularly high (~22% of mothers re-enrolled). Overall, the influence of household food insecurity on child overweight remains unclear. However, study findings also demonstrated that maternal weight alone was highly predictive of child overweight as early as pre-school, mirroring empirical evidence in this area. Ultimately, childhood obesity is more effectively prevented when treated as a familial concern. Future studies should continue to explore cumulative influences catalyzing obesity in young children in order to better inform understanding of early obesity onset.

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CHAPTER 1

INTRODUCTION

I.A. Statement of Problem

Trends in U.S. childhood obesity mirror a similar dramatic increase over the same 20-year time period in adults in the U.S. and abroad. Since the 1970's, obesity has nearly tripled among young children aged 2–5 years as well as among school-aged children and adolescents (6–19 years of age) (Centers for Disease Control and Prevention [CDC], 2009; Ogden, Carroll & Flegal, 2008). Data from the National Health and Nutrition Survey (NHANES) I (1971–1974) to the most recent NHANES conducted between 2003–2006, shows that, among U.S. preschool-aged children (2-5 years), prevalence of obesity has increased from 5.0% to about 14%, 4% to nearly 19% among school-aged children (6-11 years), and among school-aged adolescents (12-19 years), the prevalence of obesity has increased from 6% to about 17% (Centers for Disease Control and Prevention [CDC], 2009; Ogden, et al, 2008). Disparate trends among racial/ethnic groups are well documented, and, U.S. born, African-American women (20 or older) and teen girls (12-19 years) are two of the sub groups demonstrating highest prevalence of obesity patterns (Ogden, 2009).

For U.S. adults, overweight is generally defined as having a body mass index (BMI) of 25 to 29.9 kg/m^2, adult obesity defined as having a BMI of 30 kg/m^2 and above and extreme adult obesity as having a BMI of 40 kg/m^2 and above (Ogden, Carroll, Curtin, Mcdowell, Tabak, et al, 2006). BMI is the commonly accepted anthropometric body measurement used to assess growth and development over time and is an examination of an individual's weight to height ratio; it indirectly measures body fat. For U.S. children and adolescents aged 2 to 19 years, BMI is gender and age specific, because children's body fatness changes over the years as they grow, and girls and boys differ in their body fatness as they mature. Therefore, BMI-for-age charts from the CDC are used to categorize high BMI weight status amongst children and adolescents, using 2 well established percentile cutoff points: a BMI-for-age at or above the 85^{th} percentile to < 95^{th} percentile (or overweight), and a BMI-for-age ≥ the 95^{th} percentile (or obese) (Ogden, et al, 2008; Barlow & The Expert Committee, 2007). Anecdotally, healthy (or normal) weight is categorized by the 5^{th} to the < 85^{th} percentile in children and adolescents. These percentile cutoff points are intended to identify children with varying degrees of health risk and to pinpoint subsequent necessity for additional screening or intervention (Barlow et al, 2007; Hedley, Ogden, Johnson, Carroll, Curtin, et al, 2004). In addition to the 2 well known percentile cutoff points in children and adolescents, an emerging literature reports on the importance of a 3^{rd} percentile cutoff point to further delineate high BMI weight status among children and adolescents, or, a BMI-for-age at or above the 97^{th} percentile (Ogden et al, 2008; Barlow et al, 2007). According to 2005-2006 NHANES data, 10.9% of children and adolescents were at or above the 97^{th} percentile of the 2000 BMI-for age growth charts (Ogden et al, 2008). With the understanding that these percentile cutoff points are meant to identify children with varying degrees of health risk, this 3^{rd} percentile cutoff point was suggested by an expert panel to further delineate extreme obesity in this population and appropriately tailor health risk evaluation and treatment (Barlow et al, 2007).

Standardized cutoff criteria within this age range (2-19 years of age) in the U.S. are based on 2000 CDC BMI sex and age specific growth charts (Ogden et al, 2008). Results from the National Health and Nutrition Examination Survey (NHANES), conducted from 1999–2002 provide the primary source of BMI measurement and related health and nutrition data for the civilian, non-institutionalized U.S. population (Ogden et al, 2008).

This chapter focuses on definitions, trends, health disparities and long-term health, social and economic consequences of childhood obesity. The current understanding of HFI and the relationship between food insecurity and child overweight is also explored. In addition, key terms are defined, including maternal and child BMI, as well as the primary exposure of interest, household food insecurity (HFI). The study purpose and aims are then detailed. This chapter concludes by highlighting how results from the current study contribute to the literature on maternal and social-environmental influences on childhood overweight in a particularly underserved population.

I.A.1 Disparate Obesity Trends by Race/Ethnicity, Age and Sex in Childhood Overweight

As reported above, overweight prevalence has dramatically increased across all age, gender, education, and racial/ethnic groups in the U.S. over the last 25 years, though more recent trends (between 1999-2006) demonstrate minimal fluctuations in obesity among women and children (Ogden, 2009; Ogden et al, 2008). Despite leveling obesity trends amongst certain groups, prevalence of obesity varies according to racial groups, and, among African-American women in the U.S., obesity is higher than it is in most other subgroups. In 2005–2006, 52.9% of non-Hispanic black women aged 20 and older were obese compared with 37.2% of non-Hispanic black men and 32.9% of non-Hispanic white women. Similar to adults, the prevalence of obesity in children varies by racial/ethnic and gender subgroups, with African-American and Hispanic-American children and adolescents having disproportionately higher overweight prevalence than non-Hispanic whites in the same age categories (Ogden et al, 2008). According to 2003-2006 NHANES data, 27.7% of African-American adolescents (12-19 years of age) were obese compared with almost 15% of non-Hispanic white teen girls (Ogden, 2009; Ogden et al, 2008).

Along these lines, Ogden, Flegal, Carroll and Johnson surveyed more than 4700 U.S. children from 0-19 years of age and obtained weight and height measurements from the 1999-2000 NHANES. The authors reported that, about 10% of non-Hispanic whites birth through 23 months were at or above the 95th percentile, while 18.5% non-Hispanic blacks in the same age category were already overweight. Black, non-Hispanic children aged 6-11 years showed the second highest (36%) prevalence of overweight or at-risk for overweight, and White, non-Hispanic children the lowest prevalence (26%) (Ogden, Flegal, Caroll, & Johnson, 2002). Among the most notable findings from Ogden's investigation includes that based on adult definitions of obesity, 11.2% of adolescents had a BMI of 30 or higher, with 20% of non-Hispanic black females and about 10% of non-Hispanic white females exceeding the adult definition of obesity; this difference was statistically significant ($p = .003$).

1.A.2 Childhood Overweight--Health, Social and Economic Consequences

Thirty-three percent of preschool children and 50% of school-aged children will likely become overweight adults (Berkey, Rockett, Field, Gillman, Frazier, et al, 2000; Serdula, Ivery, Coates, Freedman, Williamson et al, 1993). Overweight during childhood and adolescence is in turn related to increased morbidity during childhood and in adulthood from a host of chronic medical conditions, such as cardiovascular disease, asthma, type 2-diabetes, and hypertension (Olshansky, Passaro, Hershow, Layden, Carnes, et al, 2005; Berkey et al, 2000). Many of these chronic conditions have become more frequent among children and adolescents and the dramatic increase, in overweight prevalence may be a probable factor for the more frequent onset of such conditions. The incidence of type 2-diabetes has increased over the past two decades, with 2 different studies noting that type 2-diabetes accounted for 33% and 46% of all diabetes cases in children aged 10-19 years (Ludwig & Ebbeling, 2001). Results from examination of NHANES III (1988-1994) data found metabolic syndrome (which, poses a risk for type-2 diabetes and premature coronary heart disease in adults) in 4% of all U.S. children aged 12 to 19, with almost 30% of overweight adolescents having the syndrome (Cook, Weitzman, Avinger, Nguyen & Dietz, 2003). Another study of children with asthma found that obese children used more medicine, wheezed more, and made more visits to emergency rooms than their non-obese counterparts (Belamarich, Luder, Kattan, Mitchell, Islam, et al, 2000). Finally, according to the Bogalusa heart study, which followed black and white children for nearly 30 years and identified a series of biologic and behavioral markers of cardiovascular disease, among overweight 5-10 year olds, 61% had at least one risk factor for heart disease (Freedman, Dietz, Srinivasin, & Berenson, 1999).

Overweight also impacts a child's immediate and long-term psychosocial development and wellbeing. In a study involving 2,127 middle school-aged children, the degree of overweight was associated with depressed mood, low self-esteem, and greater victimization (Storch, Milsom, DeBraganza, Lewin, Geffken, et al, 2006). Similarly, the same authors, using a clinic based sample, conducted a study of 100 at risk for overweight and overweight US children between the ages of 8-18 and found that peer victimization was associated with child-reported depression, anxiety, and loneliness (Storch et al, 2006). In addition, the researchers found that peer victimization was negatively related to physical activity among this group of at risk for and overweight children. A 2002 cross-sectional study of 106 children and adolescents (aged 5-18) found that severely overweight children also miss four times as much school as normal-weight children (Schwimmer, Burwinkle, & Varni, 2003). This same study concluded that severely obese children and adolescents have lower health-related quality of life (QOL) than children and adolescents who are healthy and similar QOL as children and adolescents diagnosed with cancer. Finally, children who become overweight adults face many problems due to their weight, or, “anti-fat” attitudes about their weight, such as decreased productivity and greater social stigmatization and employment discrimination than their normal weight counterparts (Puhl & Brownell, 2001).

Economic consequences attributable to obesity are staggering. Overweight and obesity-attributable expenditures accounted for 9.1% of overall annual US expenditures in 1998, and were as high as $78.5 billion (Finkelstein, Febelkorn, & Wang, 2003). Obese adults incur annual medical costs that are 36% higher than normal weight adults (Sturm, 2002). Furthermore, obesity-associated annual hospital costs for US children tripled from $35 million during 1979-1981 to $127 million between 1997-1999 (Wang & Dietz, 2002).

1.A.3 Household Food Insecurity (HFI)—Prevalence & Relationship to Child Overweight

The U.S. Department of Agriculture (USDA) monitors household food insecurity (HFI) by conducting an annual nationally representative survey. Food security for a household means that all household members have access at all times throughout the year to enough and well-nourishing food for a productive, healthy life – 89% of all US households were food secure throughout 2007 (Nord, Andrews & Carlson, 2008). The remaining 11.1% of households were intermittently food insecure throughout 2007 (Nord et al, 2008) and, at a basic level, one or more adults in the household lived with a constrained ability "to acquire or consume an adequate quality or sufficient quantity of food in socially acceptable ways, or an uncertainty about being able to do so," because of insufficient monetary and other food resources (Nord, 2008; Anderson, 1990). Among 11.1% of food insecure households in 2007, 7% were classified as having low food security, meaning, these households used a range of coping strategies (i.e, participation in Federal food assistance programs, eating less varied diets, or getting emergency food from community food pantries) to avoid considerable disruptions in eating patterns and reduced food intake. The remaining 4.1% of food insecure households experienced very low food insecurity, meaning, normal eating patterns of one or more household members was noticeably disrupted and food intake substantially reduced at times during 2007, as a result of insufficient money or other resources for food (Nord, 2008).

Similar to overweight, where prevalence is higher in certain subgroups, food insecurity varies considerably by household type and rates of food insecurity are much higher than the national 11.1% average according to particular demographic characteristics (Nord, 2008). According to Nord and colleagues' 2007 report, the prevalence of food insecurity was highest in households with children, headed by a single female (30.2%), Black, non-Hispanic households (22.2%), and households with incomes below the official poverty line (about $21,000 for a family of 4 in 2007), (37.7%) (Nord, 2008).

One well-established hypothesis about the paradoxical relationship between obesity (considered to result from excess food intake) and food insecurity, (resulting from actual reduced food intake and disordered eating patterns), suggests that "food choices or physiologic adaptations in response to episodic food shortages could cause increased body fat" (Dietz, 1995). In other words, one could over-consume poor quality, energy dense foods (regularly), in anticipation of intermittent restricted food intake, which, could in turn fuel metabolic changes to permit more efficient use of energy (Casey, Goolsby, Berkowitz, Frank, Cook J, et al, 2004). Although findings and measures used to identify food insecurity are variable (Lyons, Park, & Nelson, 2008; Keenan, Olson, Hershey & Palmer, 2001) a generally established positive association exists between food insecurity and overweight among low-income women (Adams, Grummer-Strawn & Chavez, 2003; Townsend, Peerson, Love, Achterberg & Murphy, 2001). However, clear patterns have yet to emerge about the relationship between household food insecurity and weight status in US children. One study found a positive association between household food insecurity and likelihood of child overweight (Casey, Simpson, Gossett, Bogle, Champagne et al, 2006), while another study found differences among certain subgroups (Alaimo, Olson, & Frongillo, 2001), while a different study found no association between household food insecurity and child overweight (Rose & Bodor, 2006). Some suggest that contradictory findings on household food insecurity and child weight outcomes may be attributed to limited sample size, use of cross-sectional data and study design, definitions and measurements of food insecurity and BMI, as well as choice of confounding variables (Feinberg, Kavanagh, Young, & Prudent, 2008; Lyons, Park, & Nelson, 2008). Determinants of childhood obesity include complex interactions between genetic, physiological, environmental, familial, social and public policy contexts that collectively influence eating and physical activity patterns. This study was designed to explore how household food insecurity, as well as common and less explored pre-natal and current maternal and child exposures influence weight trajectories in young children.

I.B. Study Purpose

The purpose of this study was to determine the relationship between household food insecurity (HFI), a range of prenatal and current maternal and child co-factors, and child overweight outcomes in an inner-city, pre-school and school aged, primarily African-American population. This study used a cross-sectional design augmented by biologically confirmed and self-report data from a previous prospective cohort study, or the Early Pregnancy Study (EPS) (Nelson, Grisso, Joffe, Brensinger, Ness, et al, 2003). A random selection of women who participated in the EPS cohort were enrolled during pregnancy, from 1999-2001, and were re-enrolled 6 years later in this follow-up study.

I.B.1 Definition of Key Terms

I.B.1.a. Household Food Insecurity (HFI) Defined. Classification of household food insecurity status focuses on adult responses to a series of questions about conditions mitigating food insecurity, specifically, 3 or more affirmative responses to behaviors and experiences associated with difficulty in meeting food needs (Nord, 2008). The US Household Food Security Module, an 18-item survey administered every other year, assesses adult household food insecurity as well as experience of reduced food intake and experience of hunger amongst children in the household (Nord, 2008). Questions cover a range of severity levels. By USDA measurement standards, food security status of a household lies somewhere along a continuum ranging from high food security to very low food security, divided into four categories (high food security, marginal food security, low food security, and very low food security), and further collapsed into two categories for most reporting purposes (Nord, 2008). Thus, high/marginal food security represents households that are food secure and low/very low food security represents households that are food insecure. This study captured HFI using an 11-item adaptation (Appendix A) of the 18-item standardized US Food Security Scale (Appendix B). Household food security status was subsequently computed and classified in accord with USDA measurement standards (ie, food secure vs. food insecure households).

I.B.1.b. Maternal exposures. Obesity-related maternal influences on child weight outcomes increasingly focus on the mother's collective risk factors in their prenatal and current environments. For purposes of this study, exposures pertaining to the prenatal environment were defined by selected socio-demographic, stress, and violence risk factors, as well as whether or not their child was breastfed – all of which were previously collected using validated self-report measures (Nelson et al, 2003). In addition, drug use in-utero (including cigarette, marijuana, cocaine and alcohol exposure) was determined through biological confirmation in the prior study and re-explored for this follow-up study. Current maternal exposures of interest in this study focused on self-reported socio-demographic, stress, and cigarette smoking characteristics.

I.B.1.c. Child exposures. Obesity-related child influences on child weight outcomes are important to explore in young age groups and often center around adult perception of the child's health, as well as the child's home and school dietary, exercise and sedentary behaviors and patterns. For purposes of this study, self-report responses (from enrolled mothers) to a series of single item questions addressing child weight at birth, presence of co-morbidities, dietary, exercise, sedentary sources (frequency and amount(s) of each were described).

I.B.1.d. Overweight & Obesity Defined. As earlier reported, classifying weight status is based on assessing individual weight and height, and calculating BMI according to CDC based standards. For this study, maternal and child height and weight were assessed by a trained technician during the in-home visit (blood pressure and hip/waist measurements were also collected). Maternal BMI was subsequently calculated and then used to classify the mothers' weight into one of four categories: 1) underweight (BMI<18.5), 2) normal weight (18.5-24.9),

3) overweight (25.0-29.9), and 4) obese (30 or greater). For analytic reasons, maternal BMI was further classified into two categories in this study; underweight/normal weight represented normal weight while overweight/obese was denoted by obese.

While the established cutoff percentile points for classifying weight status in children remain unchanged from CDC and the Institute of Medicine's guidelines (therefore prevalence estimates remain unchanged), in 2007, an expert committee developed clinically justifiable recommendations around use of overweight terminology with children. According to committee findings,

> …when BMI is 95th percentile, the term "obesity" should replace "overweight" and, when BMI is 85th to 94th percentile, "overweight" should replace "at risk of overweight." … The term obesity denotes excess body fat more accurately and reflects the associated serious health risks more clearly than does the term overweight, which is not recognized as a clinical term for high adiposity. Overweight denotes high weight from high lean body mass as well as from high body fat levels and so is appropriate for the 85th to 94th percentile category, which includes children with excess body fat as well as children with high lean body mass and minimal health risks. These terms provide continuity with adult definitions and avoid the vagueness of "at risk of overweight," which has been confusing to patients and health care providers (Barlow et al, 2007).

For this study, child weight status was also based on BMI calculations, and classified in accord with 2000 CDC BMI for age percentile charts. Thus, child weight status categories included: 1) underweight ($<5^{th}$ percentile), 2) normal weight (5^{th}-85^{th} percentile), 3) at risk for overweight (85^{th}-95^{th} percentile), and overweight ($>95^{th}$ percentile). These categories were further collapsed for reporting purposes; underweight/normal weight was denoted by normal weight and at risk for overweight/overweight represented overweight.

I.C. Specific Aims

The aims of this study were as follows:

Aim 1: To describe factors predicting retention and re-enrollment in a follow-up study among inner-city women of childbearing age.

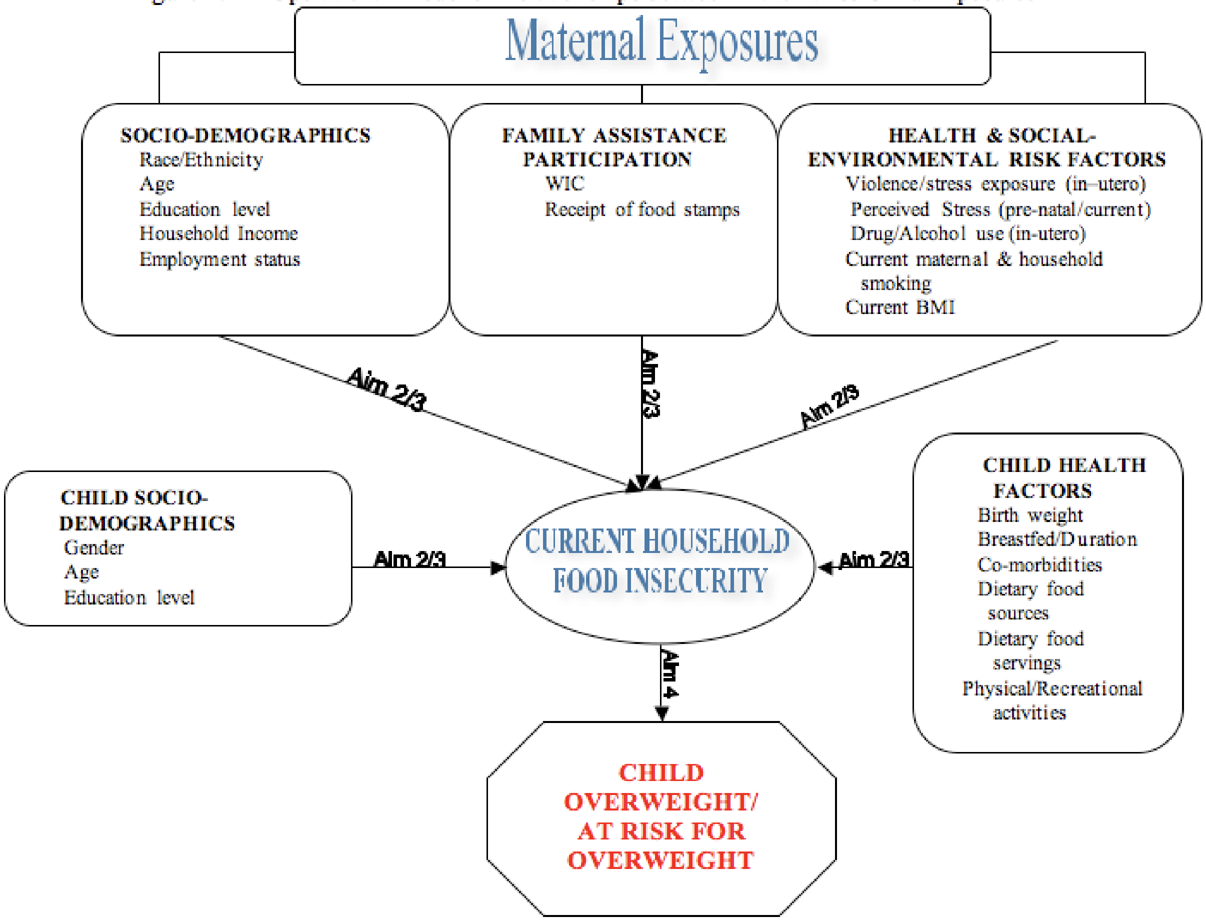
Aim 2: To describe the percentage households in the fully food secure, food insecure with and without hunger, and food insecure with marginal hunger among children categories by select socio-demographic characteristics.

Aim 3: To assess the relationship between selected prenatal exposures, current maternal and child exposures, and current household food insecurity (HFI).

Aim 4: To explore the independent relationship between current household food insecurity (HFI) and relevant maternal/child co-variances in predicting overweight among children after adjusting for known confounders. A correlation matrix was developed to better estimate possible relationships between prior and current maternal/child exposures, and these results were subsequently used to develop a series of exploratory models examining the independent role of household food insecurity and select prenatal and current maternal and child exposures in predicting child overweight.

Relationship(s) between above study variables and Aims are visually diagrammed in Figure 1.

Figure 1: An Operational Model of Relationships between Maternal & Child Exposures



I.D. Summary

The rates of childhood overweight and obesity are reaching epidemic proportions in the US, with disparities in health and health outcomes apparent in individuals and whole communities. Evolving literature notes the importance of exploring the built and food environments together, with the understanding that since pharmacological, educational and behavioral interventions focused on prevention and treatment of obesity have been met with limited success, and that, novel and longer-term approaches should seek to fully understand and investigate the environments that promote high energy intake and sedentary (Lake & Townshend, 2006). In accord with Lake and Townshend's defense of considering obesity related factors together, this study provided a unique opportunity to examine how complex social-environmental phenomena interact over two distinct periods in a child's development to influence weight outcomes. To date, few studies have looked at how such exposures relate to one another and in turn, how such factors subsequently modify current household food insecurity and current child weight status.

This study specifically elucidated: 1) information about factors that predict study participation in a particularly transient population (inner city population of child-bearing age); 2) information on the characteristics of household food insecurity among an inner city primarily African American population of child-bearing age; 3) an examination of both prior and recent factors significantly related to household food insecurity and 4) an exploration of the independent relationship between food insecurity and additional maternal/child factors predicting overweight, among young children in an urban environment.

CHAPTER 2

BACKGROUND AND SIGNIFICANCE

II.A. Introduction

Food insecurity is a global and national public health concern for many reasons. Among the most important include its association with reduced or deficient micronutrient intake, malnutrition (over and under-nutrition), and overweight in vulnerable populations (Laraia, Siega-Rize, Gunderson, & Dole, 2006; Townsend, Peerson, Love, Achterberg, & Murphy, 2001). At a basic level, food insecurity precludes consistent access to nutritionally adequate and safe foods or an inability to acquire such foods in socially acceptable ways. Conversely, food security is the absence of food want, or a situation in which individuals, households, or nations live without hunger and/or without fear of starvation (Nord, 2008; Anderson, 1990). While food insecurity in the US is less severe than in some developing countries, ironically, in a country seen as having food in plenty, a significant portion of US households experience food insecurity of varying intensity and struggle with fears that their food will run out before they have money to buy more.

Chapter II presents a review of existing literature pertinent to this study, focusing on the primary exposure of interest, food insecurity. It begins with a broad overview of the evolution of hunger and food insecurity, discussing historical and conceptual definitions of the terms. This is followed by a discussion of operational and instrument development of past and current food insecurity measurements. Next, major contributions to food security measurement are highlighted within this chapter, including, the single item indicator food sufficiency status question, the Community Childhood Hunger Identification Project (CCHIP) instrument; the Radimer/Cornell instrument; and the U.S. Household Food Security Scale (FSS).

This chapter then reviews trends in food insecurity, describes overall prevalence of household food insecurity in the US and by select "group" or household characteristics. Known confounders and less explored factors that potentially modify the relationship between food insecurity and child overweight are then individually examined in greater detail.

II.B. Household Food Insecurity--History, Definition, Measurements

II.B.1 Brief History of Hunger

Hunger essentially refers to the physiological, uneasy or painful sensation caused by a lack of food; to the consequence of food deprivation, and next, to recurrent and involuntary lack of access to food (Anderson, 1990, p. 1598). According to the President's Task force on Food Assistance, hunger became a public issue in the US following the release of the CBS television documentary in the late 1960's, "Hunger in America," sanctioned by the Senate Subcommittee on Employment, Manpower and Poverty. At that point in time, definitions of hunger varied widely amongst expert researchers, measures of hunger were generally indirect, both definitions and measures lacked congruence, and hunger, given it's dual physiological and socioeconomic components, meant "rather different things to different people" (U.S. President, Task Force on Food Assistance, 1984, p. 34). For example, some researchers measured problems of hunger using medical and dietary intake data, and often used the term hunger interchangeably with the term malnutrition. Others who used traditional measures for assessing prevalence of hunger relied on indirect indicators, such as percentage of the overall population living in poverty, or the percentage of the population receiving food stamps. Overall, definitions and assessments of hunger were ill conceived and highly variable, although hunger itself was steadily increasing in the US. Following the television documentary, government agencies, researchers, community-based organizations and advocacy groups attempted to develop a consensus definition and measure of hunger as experienced within the American context.

The 1984 report of the President's Task Force on Food Assistance clearly delineated between medically defined hunger versus commonly defined hunger, and, according to this Task Force, the commonly defined, *alternative* definition of hunger pointed to a direct social, communal phenomenon that addressed inadequate access to food.

> "In this sense of the term, hunger can be said to be present even when there are no clinical symptoms of deprivation, a situation in which someone cannot obtain an adequate amount of food, even if the shortage is not prolonged enough to cause health problems, the experience of being unsatisfied, of not getting enough to eat. It is easy to think of examples of this kind of hunger: children who sometimes are sent to bed hungry because their parents find it impossible to provide for them; parents, especially mothers, who sometimes forego food so that their families may eat" (Carlson, Andrews & Bickel, 1999).

Thus, the 1984 Report identified US specific poverty related hunger and recognized the importance of consistent and safe food access, beyond just deprivation from hunger. Although the terms *food sufficiency,* or *food insecurity* were not used in the Report, the concept now recognized as food security (assured access at all times to enough food for a healthy life) stems from the 1984 Report findings. The constructs of food insecurity and food insufficiency were subsequently investigated as a proxy for the more difficult to quantify construct of hunger.

II.B.2. Food Insecurity Definition Overview

The concept of food insecurity has evolved considerably over time. There are approximately 200 definitions and 450 indicators of the term (Hoddinott, 1999). At a basic level, food insecurity precludes consistent access to nutritionally adequate and safe foods or an inability to acquire such foods in socially acceptable ways (Nord, 2008; Carlson et al, 1999). The concept is more comprehensive than food depletion or deprivation, because it also examines eating behaviors and anxieties associated with imminent food shortages and inadequate food procurement. For example, food insecure households include those that procure food through "socially unacceptable" means, such as emergency food banks, food stamps, on credit, or by stealing (Nord, 2008). Moreover, the members of food insecure households may strictly purchase poor-quality (ie, long shelf life or high caloric intake products) or have unbalanced diets, generally lack proper meals on a consistent basis, and so forth, due to constrained economic resources. In other words, the concept of food insecurity takes into account, how relevant undesirable modifications of food purchases and behavioral eating patterns occur as a result of limited economic resources.

Food insecurity is important because, as a result of food insecurity, many adults with children will forgo eating, reduce food intake or skip an occasional meal to specifically ensure that their children eat, often at the detriment of the adults health. In some instances, one or more children in a sufficiently food insecure household may also be hungry on one or more days during the year because the household lacked enough money for food (Nord, 2008). Accordingly, it has been shown that food insecurity is linked to poor physical, social, and mental well being and to a decreased quality of life in a variety of U.S. sub-populations, including adolescents and young children (Rose et al, 2006; Tarasuk 2001; Frongillo, 1999). Eleven-percent of households were food insecure in 2007 (Nord, 2008).

Food insufficiency is a narrower concept than food insecurity, though the consequences of each are related (Keenan et al, 2001). Similar to food insecurity, food insufficiency includes lack of access to needed types of foods. However, separate from food insecurity, food insufficiency includes an actual or experienced reduction in the quantity and/or quality of foods. It is a more severe form of food insecurity, though it, may or may not imply hunger because one could lack access to nutritional or desired foods and still not experience hunger, or, conversely, may experience food insecurity with intermittent hunger.

Overall, although distinct concepts, food insecurity and food insufficiency are closely related issues: food insufficiency is classified as being equivalent to severe food insecurity or food insecurity with episodes of hunger (Dixon, Winkleby, & Radimer, 2001). *Hunger,* an individual construct, is defined as the uneasy or painful sensation caused by a lack of food, which, is a possible consequence of food insecurity (Nord, 2008). Based on definitions of household food insecurity prior to 2006, food insecurity with hunger includes skipping meals, cutting meal portions, not eating, or losing weight because of restricted or depleted household food stores (Nord, 2008; Carlson et al, 1999) and is thus fairly similar to food insufficiency and in this context, an extreme consequence of food insecurity.

The converse, food security describes the absence of food want, or a situation in which individuals, households, or nations live without hunger and/or without fear of starvation. Eighty-nine percent of American households were food secure throughout the entire 2007 year (Nord, 2008). According to the Food and Agriculture Organization (FAO), food security exists when "all people at all times, have physical and economic access to sufficient, safe and nutritious foods to meet their dietary needs and food preferences for an active and healthy life." Similarly, the United States Department of Agriculture (USDA) states that food security includes at a minimum of: (1) the ready availability of nutritionally adequate and safe foods, and (2) assured ability to acquire acceptable foods in socially acceptable ways (i.e., without resorting to emergency supplies, scavenging or stealing) (Nord, 2008). One of the original studies defining food insecurity is detailed below followed by operational definitions of various levels of food insecurity.

II.B.3. Development of Food Insecurity—Prior Qualitative Research

For advanced industrial countries, the measurement of food insecurity is fairly recent, with the generally accepted operational definitions having been developed by nutritional experts in the late 1980s and early 1990s (Carlson et al, 1999; Anderson 1990; Radimer, Olson & Campbell, 1990). These definitions cover appropriate dimensions of food security. The core definition includes food quantity (having enough food), food quality (having safe and nutritious food), and food acquisition (getting food in socially acceptable ways).

One of the most influential frameworks guiding the current, conceptual and operational definition(s) of food security is based on the work of Radimer and colleagues conducted in the 1980's. As part of Radimer's research, 193 low-income women in upstate New York were asked "if they had ever gone hungry or close to going hungry," and then asked to describe this experience (Tarasuk, 2001). From these data, the resulting four dimensions of food insecurity, including quantitative, qualitative, psychological and social components, were derived at both the individual and household levels.

Table 1. Dimensions of food insecurity from qualitative research by Radimer (1990)

	Individual Level	Household Level
Quantitative	Insufficient intake	Food Depletion
Qualitative	Nutritional inadequacy	Unsuitable Food
Psychological	Lack of choice, feelings of deprivation	Food anxiety
Social	Disrupted eating patterns	Food acquisition in socially unacceptable ways

In addition to Radimer and colleagues' work, the broader conceptualization of food insecurity is also supported by a number of previous investigations, largely qualitative in nature and mainly focused on low-income families. The work includes, (but is not limited to), that of Hamelin, Habicht and Beaudry (1999) and Hamilton, Cook, Thompson, Buron, Frongillo, Olson, and Wehler (1997). Similar to Radimer's research, much of the food insecurity research concluded that food insecurity is experienced when there is:

- Uncertainty about future food availability and access
- A need to use socially unacceptable ways to acquire food
- Insufficiency in the amount and kind of food required for a healthy lifestyle

This research also showed that although lack of economic resources accounted for much of the experience of food insecurity, food insecurity could also be experienced for other reasons, including psychological, social and physical (as experienced by elderly, or those with disabilities, for example). Research also concluded that related consequences of food insecurity include worry and anxiety about food, feelings of alienation, distress, and hunger and malnutrition.

II.B.4. Measurement Development-Brief History

In order to refine the definitions mentioned above, household food security measurement continued with the US government and researchers in the private sector developing a national benchmarks of food insecurity in the US. A series of research endeavors were undertaken to measure hunger and food insecurity during the 1980's and 1990's. Four important contributions are highlighted below.

The first contribution to measuring food insecurity included the single item indicator food sufficiency status question, "which of the following statements best describes the food eaten in your household". Respondents choose between one of four options: 1. Enough of the kinds of food we want to eat, 2. Enough but not always the kinds of food we want to eat, 3. Sometimes not enough to eat, or 4. Often not enough to eat. This question has appeared on every USDA food survey since 1977 (Keenan et al, 2001).

The next major contributions include 3 broad scales developed to measure the severity of food security and hunger at the individual and household levels, including, the Community Childhood Hunger Identification Project (CCHIP) instrument; the Radimer/Cornell instrument; and the 18-item US Food Security Scale. Each are administered to the head of household or person most responsible for food and food provision in the household, and provide insight into the household food insecurity situation as well as the child food insecurity situation in households with children. These four contributions to household food insecurity measurement along with corresponding use, reliability and validation are outlined in Table 2 below.

Table 2. Partial Listing of Scales Measuring Food Insecurity at Household Level

Scales Measuring Food Insecurity at Household level	Use	Reliability (Cronbach's alpha)	Validation
CCHIP 8 items; additive scale, an affirmative score of 5+ indicates a food shortage for everyone in the household, including children	One of 1st scales developed to measure hunger in families with at least one child; Provides information on the frequency and episodes of food insecurity and hunger.	.80-.89	Strongly associated with economic and sociodemographic variables, reliance on coping strategies, and health problems with children
Radimer/Cornell 13-items subscales: household (5);women (4); children (4); household food supply; quality (1)	Three subscales correspond loosely to a single overall scale for the severity of food insecurity and hunger within the household.	.84-.86	Correlated with risk factors for hunger, consequences of hunger, and hunger indicators from other surveys; correlated with total amount of food in household and weekly fruit and vegetable consumption
US HFSSM 18 items	Most comprehensive instrument measuring US household food security in hunger to date; proven consistent over time and across population sub-groups.	.74-.93	Significant relationship to poverty income ratio, weekly food expenditures, the food sufficiency question, and nutrient intake (energy, protein, vitamin A, calcium, iron and minerals) in women visiting food banks

(Keenan et al, 2001).

As shown, while early national surveys measured food insufficiency with a single question that assessed the quantity of food available at the household level, the most current survey (the US Food Security measurement—US HFSSM), is more comprehensive, and measures the quality, uncertainty, and certain psychological components of food access at the individual and household levels. Moving forward, leading experts at the US Department of Agriculture (USDA) and Department of Health and Human Services (DHHS) were brought together to best select available and relevant questionnaire items, and to account for all levels of food insecurity severity and hunger observed in the US and suggested in previous literature. Some of the findings from this 1994 working conference, which, mirrored the work of Radimer and others, included:

1. Limiting the measure to clearly defined poverty-linked or resource-constrained food insecurity and hunger without measuring hunger resulting from reasons outside of such resource constraints;
2. Limiting operational definitions and measurement approaches to aspects of food insecurity that can be captured in household level surveys;
3. Focusing on behavioral and experiential dimensions of food insecurity and hunger (essential for policy makers).

Next, the USDA collaborated with the Census Bureau to develop, test analyze, and iteratively refine a food security questionnaire to be added as a supplement to the 1995 Current Population Survey (Hamilton et al, 1997). Since 1995, and prior to 2006, increasing levels of severity of household food insecurity and individual experience of hunger were measured with the intent to elicit information regarding experience of meeting basic food needs due to a lack of economic or financial resources to obtain food. Bickel, Nord, Price, Hamilton & Cook developed a Guide to Measuring Household Food Insecurity, and define the four key classifications in their Revised 2000 report (see Table 3).

Table 3. Four categories and corresponding definitions re: household food security/insecurity

Household Food Security Status	**Definition**
Food Secure	Households show no or minimal evidence of food insecurity.
Food Insecure without hunger	Food insecurity is evident in household members' concerns about adequacy of the household food supply and in adjustments to household food management, including reduced quality of food and increased unusual coping patterns. Little or no reduction in members' food intake is reported.
Food Insecure with hunger-Less severe	Food intake for adults in the household has been reduced to an extent that implies that adults have repeatedly experienced the physical sensation of hunger. In most (but not all) food-insecure households with children, such reductions are not observed at this stage for children.
Food Insecure with hunger-Severe	At this level, all households with children have reduced the children's food intake to an extent indicating that the children have experienced hunger. For some other households with children, this already has occurred at an earlier stage of severity. Adults in households with and without children have repeatedly experienced more extensive reductions in food intake.

Source: Bickel et al, 2000

II.B.5. Operational Definition of Household Food Insecurity

The measures of food security are obtained by evaluating the household's response to an 18-item array of questions (see Appendix A for the full 18-item scale). These questions attempt to determine if the household did not have enough to eat because there was "not enough money for food," "could not afford to eat balanced meals," and was "hungry but did not eat" because they could not afford to buy food. The 18-item Food Security Scale, or a modification of it, has been incorporated nationally, regionally as well as in local surveys; within the CPS, the

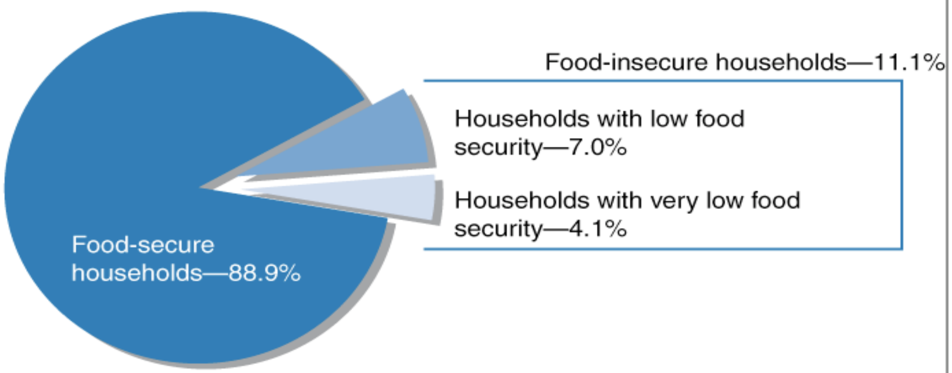
Childhood Longitudinal Study, and the NHANES, to name a few. It is administered to heads of household with or without children in the US, and is widely validated and used today.

II.C. Trends in Household Food Insecurity

Use of the term hunger as part of the food insecurity construct was omitted as part of 2006 USDA recommendations (see Appendix A), since, food insecurity is intended to measure reductions in food intake, etc., at the household level, whereas hunger, though a related concept, is an individual construct (Nord, 2008). New labels describe ranges of severity of food insecurity, including food security, low food insecurity (reduced food quality, reductions in food intake not substantial), and very low food insecurity (multiple indicators of disrupted food intake in one or more adults in household and perhaps children). However, household food insecurity prevalence estimates have not changed since 2003, and the questions used to identify household food insecurity are generally unchanged; for study purposes, the original labeling used to measure household food insecurity is discussed throughout. Overall, as shown in Figure 2 below, 11.1% of all US households were food insecure throughout 2007 (Nord, 2008).

Figure 2.

U.S. households by food security status, 2007

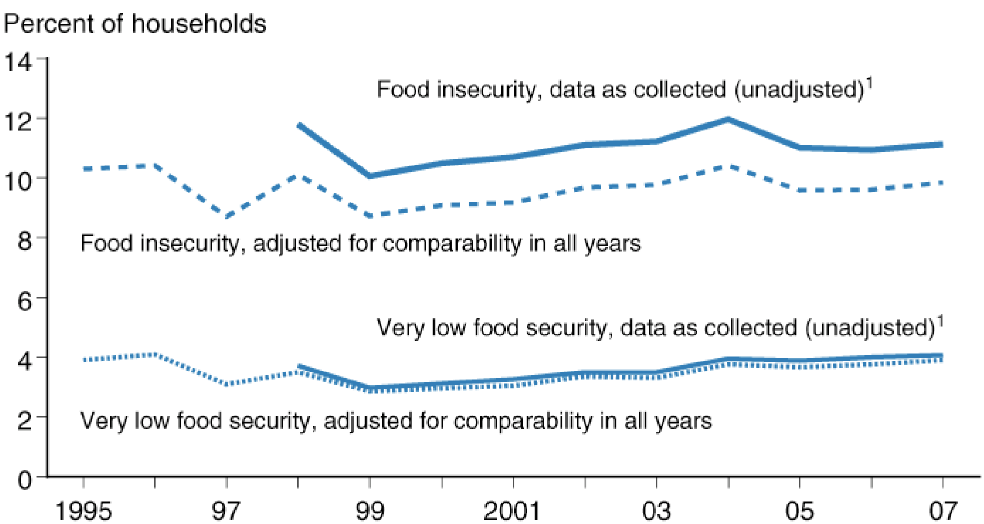


Source: Calculated by ERS using data from December 2007 Current Population Survey Food Security Supplement.

Household insecurity, and food insecurity with hunger fluctuated minimally between 1995-2007. Trends in the prevalence of food insecurity in US households between 1995-2007 are shown in Figure 3.

Figure 3.

Trends in the prevalence of food insecurity in U.S. households, 1995-2007



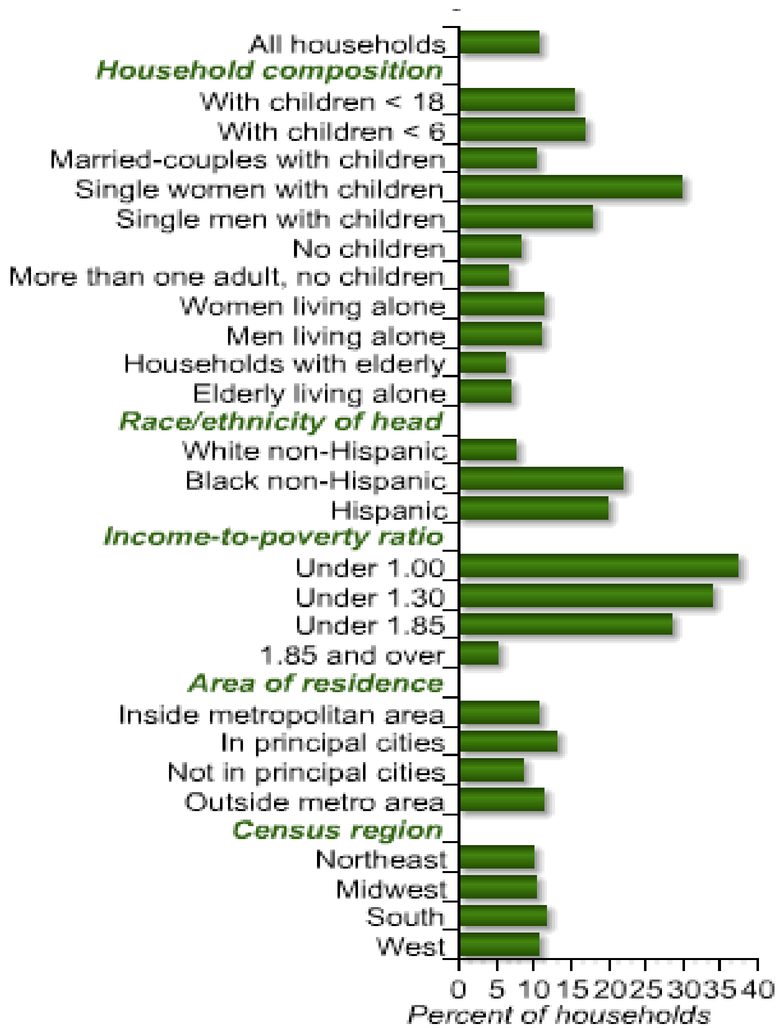
[1]Data as collected in 1995-97 are not directly comparable with data collected in 1998-2007.
Source: Calculated by ERS based on Current Population Survey Food Security Supplement data.

II.C.1.Prevalence of Household Food Insecurity with and without hunger by Select sub-groups

Food security status has also generally remained unchanged between 1995-2007 along select household categories (Nord, 2008). For example, the number of children living in food secure, food insecure, and food insecure with hunger households has varied minimally. In 1998, 80.3% of children lived in food secure households, while 1.0% lived in food insecure household with hunger among children. In 2003, 81.8% of children lived in food secure households, and 0.6% lived in food insecure households with hunger among children. This number has slightly increased, and in the comparable *very low* food insecurity category, 691,000 children, or 0.9% of all US children lived in households with very low food security among the children (Nord, 2008).

Along these lines, the prevalence of food insecurity is highest in households with in households below the official poverty line (37.7%), households with children, headed by a single female (30.2%), Black, households (22.2%), and Hispanic households (20.1%) (Nord, 2008). The Figure below outlines food insecurity prevalence estimates by household type in 2007.

Figure 4. Prevalence of food insecurity by household type in 2007



Source: Calculated by ERS using data from the December 2007 Current Population Survey Food Security Supplement.

II.D. Determinants of Household Food Insecurity

II.D.1. Adult socio-demographic factors/role of family assistance participation

Economic and socio-demographic factors predisposing a household to food insecurity or hunger are widely documented, (Laraia et al, 2006; Townsend et al, 2001, Daponte, 2000; Corcoran, Heflin & Siefert, 1999; Rose, Gunderson & Oliveira, 1998), with low-income and poverty primarily precipitating US household food insecurity. Other known socio-demographic predictors of household food insecurity include, age, race, ethnicity (Black or Latino), education, female-headed household, and presence of children living in household (Laraia et al, 2006; Townsend et al, 2001). Poor single mother families with children, particularly Blacks and Latinas, are disproportionately represented among food insecure households. Carlson, Andrews and Bickel (1999) found that households below the poverty line had a hunger prevalence rate of 13.5%, compared with 3.6% of all households; Black and Hispanic households had hunger rates of 8.2% and 6.7%, respectively. In analyzing data from the Third National Health and Nutrition Examination Survey (NHANES III), another researcher found that 31.5% of food-insufficient individuals lived in single-woman-headed families with children, compared with 9.0% of food sufficient individuals with the same socio-demographic characteristics (Siefert, 2001).

US government measures poverty using a narrow income standard that does not capture other aspects of economic status, including material hardship and other costs involved in supporting a family, such as childcare, housing, food, etc, (Cauthen & Fass, 2008). According to 2009 Federal guidelines, the poverty level for a family of 4 was $22,050 and $18,310 for a family of 3 (US Department of Health & Human Services, 2009). This dollar amount is important because, poverty level thresholds are used to determine eligibility for governmental assistance (US Department of Agriculture, 2009). In 2007, households with incomes below the official poverty line ($21,027 for a family of four) had rates of food insecurity (37.7%) much higher than the national average (11.1%), (Nord, 2008). However, while families living below the poverty level are more than 3 times more likely to be food insecure than other families, even low-income families who earn above the poverty level still struggle to make ends meet and are not immune to hunger or food insecurity. For example, families that participate in family assistance programs are still only marginally equipped to meet basic budget needs. The level of assistance provided by the Temporary Assistance for Needy Families (TANF) income assistance program for example, is not sufficient to raise a family above poverty level and out of risk for food insecurity (Wilson, 2005). The food security status of participants in the Food Stamp Program (Gunderson & Oliveira, 2001), and welfare programs (Capps, Ku & Fix, 2002; Borjas, 2001) has also been investigated. A recent report by Wilde (2007) notes that the prevalence of food insecurity with hunger (12.3% of all households in 2004) is much higher among food stamp participant households than among low-income non-participant households (18.6% vs. 10.1%), though perhaps due to self-selection effects, since, households facing more severe hardship are more inclined to join the program (Wilde, 2007). Overall, while such programs partially serve as "protective factors," offsetting financial resource constraints in targeted populations, they do not fully succeed in meeting the insufficient family budget.

Overall, inadequate wages and benefits precipitate poverty and in turn limit the ability of low-income families to consistently give their children basic necessities such as food, housing, and even medical care. Low-income families are particularly faced with recurrent bouts of monthly or weekly food shortages because constrained budgets cannot consistently support fluctuations in heating expenses, rental payments, medical or other unforeseen events.

Furthermore, prioritization and management of other household expenses reduce the amount of income available to procure and purchase food, and, when such fluctuations occur, it creates for economic crises that potentially lead to food insecurity or hunger. Consistent with these findings, Alaimo's 2005 article, "Food Insecurity in the United States—An Overview," provided a broad summary of a range of risk factors that contribute to food insecurity and noted that, the severity or accumulation of certain household risk factors, including, financial, socio-demographic (educational attainment, race/ethnicity, family composition), time, employment skills, housing status, and health and health insurance status all contribute to food insecurity. Alaimo also noted more expansive risk factors, including, health status, food skills/capabilities, health insurance status, social support, past and present economic hardship, abuse, and the immediate food environment (availability of affordable nutritious food), which all collectively contribute to food insecurity (Alaimo, 2005). The next section describes empirical research that has explored relationships between the broader social-environment and food insecurity.

II.D.2.Social Environmental Factors

II.D.2.a. Homelessness. The determinants of food insecurity are complex and in many ways mirror determinants of childhood overweight (i.e., low-income, African-American/Hispanic descent, poverty), so examining factors beyond usual socio-demographic variables (such as homelessness or exposure to violence) that might confound the relationship between the two is important. Even when examined, research methodologies are highly variable. For example, Dachner & Tarasuk, using an ethnographic research approach, examined the day-to-day experiences of 6 street youth at a local center that provides daytime shelter for homeless or socially isolated individuals in Toronto, Canada (Dachner & Tarasuk, 2002). The researchers determined that participants appeared to be "enmeshed in a web of insecurity characterized by precarious food acquisition, shelter, income, and health" and that their food access was undermined by their extreme poverty and homelessness." Also, primary sources for procuring food (i.e, food assistance or purchasing food) were inconsistent given the obvious link between food acquisition and daily conditions associated with street life. Gunderson, Weinreb, Wehler & Hosmer (2003), using 7 of the 18-items found in the Food Security Scale, analyzed the relationship between homelessness and food insecurity using a sample of low-income housed and homeless women with children in Worcester, Massachusetts, and found that, families with a higher propensity to be homeless are only at marginal increased risk of food insecurity ($p=0.147$). To the contrary, in an article by Furness, Simon, Wold and Anderson published in 2004, the authors used the 6-item short form of the US Department of Agriculture's Household Food Security Scale to examine prevalence and predictors of food insecurity among low-income households in Los Angeles county and found that, in addition to income, presence of children in the household, and past homelessness all independently predicted household food insecurity (Furness, Simon, Wold & Anderson, 2004). In this same study, households with a history of homelessness in the past 5 years were 5.6 times (95% CI: 3.4-9.4 OR) more likely to be food insecure than those who had not experienced homelessness.

II.D.1.b. Violence exposure. Not surprisingly, homelessness has been linked to domestic violence in studies, since female victims of domestic violence often have to manage and make decisions between staying with an abusive partner and foregoing sufficient shelter and food (Metraux & Culhane, 1999; Browne & Bassuk, 1997). Less attention is given to the possible relationship between domestic violence and food insecurity. Domestic violence can precipitate not only housing, but economic instability that in turn brings about food shortages. Also, the traumatic health and mental health effects of domestic violence may cause some women to inadequately provide for their own nutrition or that of their families.

Evidence that women who experience domestic abuse are also at greater risk of food insecurity is sparse (Alaimo, 2005). Tolman and Rosen used data from the Women's Employment Study (which collects detailed information about domestic violence, mental health status, physical wellbeing, employment and welfare status), and conducted in person interviews, using a random sample of 753 single-mother welfare recipients in an urban Michigan county. The researchers set out to investigate the relationship between mental health, substance dependence, and economic wellbeing. Among their noteworthy findings includes that both past and recent victims of domestic violence were significantly more likely to have been homeless and to have experienced food insufficiency than those who had never experienced domestic violence (Tolman & Rosen, 2001).

II.D.1.c. Maternal Stress and Depression. Maternal depression and decreased mental health status are associated with food insecurity and in turn associated with increased likelihood of developmental, behavioral and emotional problems in their children (Casey, Goolsby, Berkowitz, Frank, Cook et al, 2004). For example, "Maternal depression, changing public assistance, food security and child health status," describes a study conducted between 1998 and 2001 focusing on adult caregivers and accompanying children 0-3 years of age, in multiple emergency department settings across the U.S (Casey et al, 2004). Even after controlling for confounding variables, the authors found that mothers who scored positive on the maternal depression screen were considerably more likely to report household food insecurity (AOR: 2.69; $p = 0.0001$). Using the standardized USDA 18-item Food Security Scale to assess the prevalence of food insecurity among pregnant women with incomes, Laraia and colleagues similarly found high reported rates of food insecurity after adjusting for select socio-economic, demographic and psychosocial variables, (like perceived stress, trait anxiety, depressive symptoms, and locus of control) among pregnant women with incomes ≤400% of poverty (2006). Finally, Whitaker, Phillips and Orzol conducted a study to in part, examine food insecurity and the risks of depression and anxiety in mothers, using a cross sectional survey (including the 10 adult items of the US Food Security Scale) of mothers of 3-year-old children between 2001–2003 in 18 large US cities (2006). After adjustment for 8 socio-demographic factors (i.e., race/ethnicity, income, maternal employment) plus additional social-environmental and health co-variates (i.e., maternal physical health, alcohol use), the percentage of mothers with either major depressive episode or generalized anxiety disorder increased with increasing food insecurity: 16.9%, 21.0%, and 30.3% respectively (Whitaker, Phillips, & Orzol, 2006). While Table 4 does not include an exhaustive examination of factors influencing household food insecurity, several covariates relevant to this study are illustrated.

Table 4. Factors influencing risk of household food insecurity (in adults)

Predictor(s)	OR (Odds ratio)	P-value	Reference
*Ethnicity (African-American)	2.3	<0.0001	Townsend et al, 2001
*Education (≤ 11th grade)	data not shown	<0.001	
*Age (35-≥60)	1.6	<0.001	
*Income (< 100% below Family Poverty Line)	3.0	<0.001	Furness et al, 2004
*Past Homelessness	5.6	<0.001	Furness et al, 2004
*Recent domestic violence	1.72-4.21	<0.001	Tolman and Rosen, 2001
*Past domestic violence	1.15-2.29	<0.01	Tolman and Rosen, 2001
*Maternal stress	1.84	<0.001	Laraia et al, 2006
*Prenatal smoking	data not shown	≤0.001	Whitaker et al, 2006
*Preterm birth	data not shown	0.02	Weinreb et al, 2002

II.E. Household Food Insecurity and Weight Status in Women

Because child overweight is in part, predicted by parental weight status (Evers, Arnold, & Hamilton, 2007; Whitaker, Wright, Seidel & Dietz, 1997), the relationship between food insecurity and adult weight status is noteworthy. Generally, food-insecure women are more likely to be overweight or obese (though this is not true for men). In 1993, Olson and colleagues,' focused on 193 women of childbearing age from a rural county in Upstate New York, and their findings revealed that mean body mass index (BMI) was significantly higher for women in food-insecure households compared to women in food-secure households (28.2% vs. 25.6%; $p < .05$), even after controlling for relevant socio-demographic factors, (such as woman's height, income level, educational level, single parent status, and employment status), food insecurity was still positively related to BMI, ($p=.06$) (Olson, 1999). Townsend and colleagues (2001) replicated this finding in women, using nationally representative data from the 1994-1996 Continuing Survey of Food Intake of Individuals (CSFII). They found that the prevalence of overweight (BMI > 27.3) increased as food insecurity became more severe, from 34% for those who were food secure, to 41% for those who were mildly food insecure, and 52% for those who were moderately food insecure (95% CI: 1.08, 1.52). Even after adjusting for potentially confounding demographic and lifestyle factors food insecurity significantly predicted overweight, with African-American race emerged as the single greatest single predictor of overweight (OR 2.3, $p<0.0001$) (Townsend et al, 2001).

Adams, Grummer-Strawn and Chavez used data from the 1998 and 1999 California Women's Health Survey (N= 8169) to investigate the relationship between food insecurity and obesity in an adult, multiethnic sample of women. Multiple logistic regression analyses demonstrated that, controlling for socio-demographic factors (income, race/ethnicity, education, country birth origin), general health status, and walking, food insecurity with hunger was associated with increased risk of obesity for Asians, Blacks, and Hispanics (OR = 2.81) but not for non-Hispanic white women (OR = 0.82) (Adams, Grummer-Strawn, & Chavez, 2003). However, a longitudinal study examining whether changes in mothers' food security status were associated with weight changes by Whitaker and Sarin dissimilarly concluded that a causal association did not exist between food insecurity and obesity in a population of urban women with preschool aged children (Whitaker & Sarin, 2007). The next section addresses health outcomes in children related to food insecurity in greater detail.

II.F. Health Outcomes in Children

II.F.1.Physical Activity, TV viewing & childhood obesity

Because overweight occurs when energy intake substantially exceeds energy expenditure (Morrill & Chinn, 2004) and dramatically decreased exercise and increased sedentary patterns in US children over the past 40 years has run parallel to climbing childhood obesity statistics, (Warner, Harley, Bradman, Vargas & Eskenazi, 2006), it was important to look at how such health risk factors influence the child overweight outcome. Disparities in inactivity are apparent according to select demographics, such as gender and race/ethnicity (Zoeller, 2009; Eaton, Kann, Kinchen, Shanklin; Ross et al, 2008). In terms of disparate trends in physical activity levels, girls are less active than boys at all ages and according to data from the Third National Health and Nutrition Survey (NHANES III, 2003-2004), physical activity levels for adolescents were highest for non-Hispanic whites (88% for boys, 77% for girls) and lowest for non-Hispanic blacks (77.6% for boys, 69.4% for girls) (Zoeller, 2009).

Based on a systematic literature review of 850 articles about the effects of physical activity on health and behavior outcomes, Strong, Malina, Blimke, Daniels, Dishman et al noted 1) the benefits of regular physical activity on school aged children in reducing the incidence and severity of chronic diseases and 2) that physical activity should be promoted and physical inactivity limited beginning with preschool aged children due to the increased risk of overweight and sedentary behavior among 2-5 year old U.S. born children (2005). Strong and colleagues also noted that school-aged children should participate in 60 minutes or more of moderate to vigorous physical activity (MVPA) (Strong et al, 2005). Despite recommendations from the 2008 Physical Activity Guidelines for Americans issued by the US Department of Health and Human Services that validate Strong and colleagues' as well as other empirical findings, it is not completely clear how many children and adolescents meet above described guidelines (Zoeller, 2009). Youth Risk Behavior Surveillance Data from 2007 indicated that 24.9% of students nationwide (9^{th}-12^{th} grade) did not participate in 60 more minutes of physical activity on any day that increased their heart rate or made them breathe hard (Eaton et al, 2008). In addition, an inverse relationship exists between age and physical activity; as children move through adolescence, they become less physically active (Eaton et al, 2008; Nader, Bradley, Houts, McRitchie, & O'Brien, 2008). According to a longitudinal analysis of 9 to 15 year old US children, almost all children at age 9 were above the recommended 60 minutes of MVPA 7 days a week, while only 31% of 15 year olds in the same cohort met recommended guidelines on weekdays, and even less (15%) on weekends (Nader et al, 2008).

Understanding of other correlates of behavior in predicting child overweight (ie, increased sedentary behaviors) is important though less clear. According to the 2007 YRBS, prevalence of 3 or more TV viewing hours per day among high school aged students ranged from 18.2% to

47.4% across US state surveys (Eaton et al, 2007); this was disproportionately higher among black students (62.7%) than white students (27.2%) (Eaton et al, 2007). A 2003 study likewise concluded that US children aged 8 to 18 watch an average of 3 hours of TV a day in their home; addition of DVD's or video increased this viewing time to 4 hours and addition of computers and video games raised overall exposure to media in the home to 6 or more hours (Roberts, Foehr, & Rideout, 2005). Empirical studies generally show that overweight and obese youth watch more television than healthy-weight youth (Janz, Levy, Burns, Torner, Willing et al, 2002; Crespo, Smit, Troiano, Bartlett, Macera et al, 2001), though a study conducted using over 2,500 NHANES 2003-2004 participants and where objectively monitored physical activity using an accelerometer found no association between total sedentary time and weight status (Whitt-Glover, Taylor, Floyd, Yore, Yancey & Matthews, 2009). Overall, considering health over the course of a child's lifetime, immediate health and psychological consequences associated with childhood obesity and the large proportion of inactive U.S. children, known and less known correlates of child weight status should be explored together.

II.F.2. Household Food Insecurity health, developmental and nutritional correlates in children

Children are highly susceptible to both short and long-term nutritional deprivation as a result of their rapid growth, fluctuating weight and immature immune systems. Poor nutrition can stunt growth and learning and in turn weaken the body's ability to fight infections and increase vulnerability to poorer health and frequent hospitalizations.

Researchers have documented a variety of adverse developmental, school readiness, health and quality of life consequences regarding food insecurity in children (Feinberg, Kavanagh, Young, & Prudent, 2008; Rose-Jacobs, Black, Casey, Cook, Cutts et al, 2008; Bronte-Tinkew, Zaslow, Capps, Horowitz, & Mcnamara, 2007; Kendall, Olson, & Frongillo, 1996).

For example, a cross sectional study that used household survey and surveillance data of 9721 children <36 months of age conducted between 2001-2006 by Cook, Frank Casey, Rose-Jacobs, Black and colleagues found a positive association between household energy insecurity, odds of household and child food insecurity and reported frequency of "fair/poor" health, hospitalizations and developmental risks (2008). In other words, as household energy insecurity increased, odds of household and child food insecurity increased as well as reported poor health, hospitalizations and developmental risks amongst infants and toddlers (Cook et al, 2008). Jyoti, Frongillo and Jones used longitudinal data from the Early Childhood Longitudinal Study-Kindergarten cohort of approximately 21,000 nationally representative children to investigate how food insecurity over time related to changes in reading, test performance in math and social skills in children (2005) and found that food insecurity significantly effected school children's academic performance and social skills. Winicki and Jemison (2003) similarly found that food-insecure children have lower math scores. Dunifon and Kowaleski-Jones (2003) found that children living in food-insecure households experienced greater health problems and increased behavior problems than do children in food-secure households. Weinreb, Wehler, Perloff, Hosmer, Sagor et al, examined relevant socio-demographic, environmental, maternal and child markers in a homeless and low-income housed sample in Worcester, Massachusetts, enrolling mothers and children from 1995-1997. Using items from the Community Childhood Identification Project measure (CCHIP) as part of their intake survey the researchers food significant associations between hunger and low birth weight; 25% of preschool-aged children were underweight at birth, compared with 5% of children from food sufficient homes (p=0.02) (Weinreb et al, 2002).

II.G. Household Food Insecurity and Child Weight Status

Beyond adults, food insecurity may place a child at risk for being overweight or obese for a variety of reasons. In order to prevent hunger, some food insecure families often sacrifice the quality of the food they eat. Also, low nutrient foods with high calories and fat content are inexpensive and although such foods will prevent a child from experiencing painful hunger sensations, these foods do not guard against nutrient deficiencies that can put the child at risk for being overweight. Dietz suggested that, "food choices or physiologic adaptations in response to episodic food shortages could cause increased body fat" (Dietz, 1995). In other words, one could over-consume poor quality, energy dense foods (regularly), in anticipation of intermittent restricted food intake, which, could in turn fuel metabolic changes to permit more efficient use of energy (Casey, Goolsby, Berkowitz, Frank, Cook J, et al, 2004). Empirical evidence on the relationship between household food insecurity and overweight status in children has not been conclusive, different from generally established literature on US female adults.

In a study of preschool aged Canadian children (N=2103), using data from the Longitudinal Study of Child Development in Quebec (1998–2002), Dubois, Farmer, Girard & Porchiere found an association between food insufficiency and overweight even once controlling for relevant correlates of BMI such as child's birth weight, parental BMI, maternal education, and family income sufficiency (2006). Dubois et al additionally found that low-birthweight children living in a household that experienced food insufficiency during preschool years were at higher risk of overweight at 4.5 years (Dubois, Farmer, Girard & Porchiere, 2006). This finding suggests a strong need for targeted interventions that support low-income and food insufficient families—the authors recommended such interventions particularly for pregnant women in order to prevent overweight and obesity among their children (Dubois et al, 2006). Casey and colleagues (2006), using data from the NHANES 1999-2002 Survey, found that child food insecurity was significantly associated with child at risk for overweight status for children aged 3 to 5 years ($p \leq .01$). This same study found that independent of relevant demographic factors, (ethnicity, gender, age, and family poverty index level), childhood food insecurity was still associated with a child being at risk for overweight status (AOR: 1.32; 95% CI (1.03–1.69); $p=0.03$) but not overweight status (Casey et al, 2006). Using data from the NHANES III (1988-1994), Alaimo, Olson and Frongillo found an association between food insufficiency and overweight in non-Hispanic white girls 8-16 years of age, who were 3.5 times more likely to be overweight than were food sufficient girls (2001).

However, to the contrary, inverse associations between food insecurity and child overweight have been found in some instances. According to data obtained from the Early Childhood Longitudinal Study, a nationally representative sample consisting of a cohort of children who entered kindergarten in the fall of 1998, children from food-insecure households were 20% less likely to be overweight than their food-secure counterparts (Rose et al, 2006). Kaiser and Townsend provided an overview of articles relating food insecurity to overall health outcomes in children and concluded that food insufficiency and food insecurity were not associated with risk of being overweight in childhood, but that "deprivation during childhood may be related to adult obesity" (Kaiser & Townsend, p. 313, 2005). Gunderson, Lohman, Eisenmann, Garasky and Stewart (2006), specifically examining the relationship between child-specific food insecurity and overweight across three US cities in 10-15 year olds (N=1031) found no association between the two, though nearly 25% of all food insecure children were overweight (Gunderson et al, 2008). According to Lyons, Park and Nelson, "it is clear from the discrepancies…in measurements of food insecurity and food insufficiency, definitions of overweight and obesity, and choices of confounding variables result in both confusion and complexity in terms of delineating the relationship between food insecurity and BMI" (Lyons, Park & Nelson, p. 751, 2008).

II.H. Theoretical Framework

The select literature review described above underscores the importance of examining combined social and environmental correlates and influences on overweight in children. Food insecurity and obesity are both health problems, disproportionately impacting certain subgroups in the US. While food insecurity is generally associated with overweight outcomes in women (Laraia et al, 2006; Townsend et al, 2001), results have been inconsistent in terms of how food insecurity impacts overweight patterns in children. Given inconclusive evidence, more prospective studies need to be conducted regarding household food insecurity and child overweight in order to better characterize their relationship among US children, adjusting for known as well as less explored variables.

Urie Bronfenbrenner's ecological model provides a useful starting point for conceptualizing how nutrition, socio-demographic and environmental circumstances collectively influence eating and exercise patterns and behaviors in children and in turn child overweight. In the 1970's, developmental psychologist Urie Bronfenbrenner formulated a framework whereby at a basic level, the ecological environment exists along several concentric circles of influence (micro, meso, exo and macrosystems), nested within one another. These concentric circles all *reciprocally* affect one another, which is otherwise known as the ecology of human development. The model emphasizes the interconnectedness between the evolving individual and the *micro and macro* level environment within which s/he is situated. For Bronfenbrenner,

> "The ecology of human development involves the scientific study of the progressive, mutual accommodation between an active, growing human being and the changing properties of the immediate settings in which the developing person lives, as this process is affected by relations between these settings, and by the larger contexts in which the settings are embedded" (Bronfenbrenner, p. 22, 1979).

Brofenbrenner's model is represented in pediatric illness literature as well (Barakat & Boyer, p. 372, 2007). Power, DuPaul Shapiro and Kazak developed a model along 3 concentric circles, the micro, meso, and ecosystems, which represent the social ecology of pediatric illness. The innermost circle emphasizes how the child herself and how her own behaviors, coping mechanisms, attitudes, etc, impact how the child relates within her own immediate surroundings. Recognizing the child at the center, the child's illness, parents, family and siblings, all factors that most proximally impact the child, are contained within the microsystem. The microsystem dually recognizes the complex dynamic between the child, and the child's immediate environment--the child's morbidity(ies), the child's family (the most frequently addressed microsystem), as well as subsystems within the immediate family (siblings, marital relationships, parent-child interactions) (See Appendix C for Brofenbrenners Ecological Model describing the set of nested environmental influences on the child). In turn, *mesosystems* are comprised of two or more overlapping microsystems. In considering the mesosystem, distal relationships (ie, peers, schools, neighborhoods, hospital, staff) to the child come into play. Next, the *exosystem* acknowledges aspects of the social-ecological system that may not have direct effects on the child, but that may have significant indirect effects (ie, school boards, mass media, parent work environment). Finally, the outermost sphere, or macrosystem, includes "the impact of subculture, culture, and general belief patterns throughout the ecology" (ie, culture, laws, social conditions, history) (Kazak, p. 161).

Variations of Bronfenbrenner's conceptual model are also represented in a public health framework. The Center for Disease Control (CDC) utilizes a social-ecological model as a framework for understanding childhood obesity and chronic disease (CDC, 2007). With this model, addressing obesity begins with the individual, and expands along 4 additional concentric circles out into society.

Figure 5. Centers for Disease Control & Prevention Social-Ecological Model, 2007

Using an ecological model to develop their qualitative study measures, Bauer, Patel, Prokop and Austin conducted focus groups with faculty and staff in five low-income middle schools in order to better understand the impact that urban school environments might have on implementation, efficacy and sustainability of initiatives designed to improve nutrition and physical activity (Bauer et al, 2006). The authors used an ecological framework to guide their exploration since the model emphasizes that "individual health behaviors are influenced by the environment on many levels, with influences including interpersonal relationship and organizational and institutional factors" (Bauer et al, p. 3, 2006). Study participants' reported that many students were ineligible to receive federal assistance to receive subsidized meal plans and still could not afford school lunch. The authors duly note that low-income families are particularly susceptible to food insufficiency, the need for improved access to healthy meals provided during school hours (especially for children living in food-insufficient homes), and the overall importance of considering relevant barriers and facilitators within the school environment that impact physical activity initiatives (Bauer et al, 2006). Eisenmann, Gentile Welk, Callahan Strickland and colleagues similarly used an adaptation of Brofenbrenner's social ecological rationale to design and implement "SWITCH"; a school and family based intervention aimed at modifying (or SWITCHing key behaviors, such as physical activity, media screen time, and nutrition among 3^{rd}-5^{th} graders in two mid-western cities (Eisenmann et al, 2008). "In designing the SWITCH intervention strategy, the authors sought to influence youth behaviors and cognitions through three different levels (Community, School and Family) … [we theorized that] by providing integrated programming at each of these ecological levels…that we would have a greater impact than a focused emphasis at only one level" (Eisenmann et al, 2008). While study results are not presented in Eisenmann's article, the authors carefully analyze how behaviors and interactions at different levels of a child's ecologic environment impact weight outcomes and recommend that public health professionals and professions seeking to develop similar intervention programs do so collaboratively, using inter-disciplinary efforts, and at multiple levels (Eisenmann et al, 2008).

In Townsend and colleagues' 2001 article, the authors applied Bronfenbrenner's ecology of human development model, because of its "emphasis on all factors affecting one another in a childs life" (Townsend et al, p. 1739, 2001) to their study of overweight and food insecurity among the general and low-income US population as well as among food stamp recipients. The researchers found an unexpected paradoxical association between the two; that is, prevalence of overweight was higher among the food insecure. The authors' conceptual model included two demographic (age and ethnicity), three socioeconomic (education, income and occupation), two-government assistance (welfare status and food stamps), three environmental (household size, urbanization, and region of country) and five lifestyle (vigorous exercise, television time, percentage of dietary energy as fat, percentage of dietary energy as saturated fat and total energy intake) variables. "According to this model, food insecurity influenced weight both directly and indirectly through lifestyle factors" (Townsend et al, p. 1739, 2001).

This follow up study only focused on the innermost circle (the child his/herself), and, selected proximal influences within a child's microsystem or interpersonal circle, (ie, pre-natal influences, maternal-child dynamics, school, neighborhood). While evaluation of macro-systemic influences (ie, the food industry, nutrition policies, etc.,) is beyond the scope of this study, ultimately, given the complexities associated with childhood obesity, acknowledging macro-systemic influences (ie, the food industry, nutrition policies, etc,) precipitating childhood obesity is equally important for prevention, as well as program and policy planning purposes. For this study, both pre-natal and current maternal socio-demographic, BMI, and relevant social-environmental risk factors (such as perceived stress, self-report smoking) and including household food insecurity, were all hypothesized to predict overweight in children. Additionally, the child's behaviors around physical activity, television viewing and food intake and consumption were also explored. The dependent variable in this study was child overweight.

The primary independent variable was household food insecurity. Other variables assessed to minimize confounding relationships in this study included, past and current *socio-demographic variables* (family income, maternal/child race, gender, age, education level), past and current *use of family assistance*, (participation in WIC, receipt of food stamps), prior *child nutritional risk factors* (birth-weight, breast-feeding duration), prior social-environmental risks (prenatal maternal stress, exposure to violence, drug use), and current *familial factors* (maternal weight status, current perceived stress, smoking within household, maternal smoking). These factors were chosen in the model because it was hypothesized that the selected maternal factors (i.e., prenatal drug use, weight, violence exposure, etc), and household food insecurity, were all important factors in the child's proximal, family environment, directly and indirectly influencing weight outcomes in young children.

II.I. Conclusion

This investigation utilized an enhanced cross-sectional design to inform a piece of Bronfenbrenner's or the CDC's ecological model since, it was augmented by data validated 6 years prior, and accounted for, relevant socio-demographic factors (such as participation in WIC), and also, less explored biologically confirmed maternal exposures (such as violence and drug use while pregnant), as well as exposures critical to child development, (such as breast feeding, diet resources and behaviors) which all influence child weight status. This is particularly relevant given the population of study interest, where, specific cultural, socio-demographic and other individual and systemic conditions of poverty may also be operating over-time to mediate child behavior and health outcomes. Given the six-year time lapse between re-contacting participants in the original Early Pregnancy Study (EPS) and this study, describing socio-demographic characteristics potentially predictive of long-term follow-up was also worth exploring.

The well-known benefit of surveying participants at different points in time is that it ameliorates direction-of-effect problems. In addition, longitudinal research produces more reliable evidence concerning causality since data can be gathered directly from the same respondents over time. However, the process of conducting longitudinal research is also labor-intensive, costly, and prone to high attrition rates (Chretien, Chu, Smith, Smith, Ryan & Millennium Cohort Study Team; 2007, Shavers, Lynch, & Bumeister, 2002). While literature examining both micro and meso-system level ecological contexts at two different points in time and how such circles influence development and weight outcomes in children is sparse, beyond obvious feasibility limitations in tracking a transient population, potential problems associated with subject attrition are likely to arise that tend to reduce or inflate study results and which in turn may affect study validity and generalizability (Chretien et al, 2007; Shavers et al, 2002) This study used previously validated data from the Early Pregnancy Study (EPS) enhanced by recent data collected by first examining multiple hospital IRB approved electronic medical record databases (and published phone and address records when needed) to identify, track, and contact eligible participants; by administering an in-person 77-item questionnaire to enrolled mother's, and through conducting health assessments on both the mother and child. The next chapter focuses on overall study design and proposed analyses.

CHAPTER 3

METHODS

III.A. Study Design

This study used a cross-sectional design augmented by validated prospective data collected from a previous cohort study entitled the Early Pregnancy Study (EPS) (Nelson et al, 2003). Women who participated in the EPS were enrolled during pregnancy from 1999-2001; a random 20% (N=220) of the women and the child from that index pregnancy (4-7 years of age at time of re-enrollment) were selected and followed up nearly 6 years later to determine the relationship between current household food insecurity (HFI) and child overweight status, adjusting for a variety of prenatal, maternal and child factors. This study design was chosen to meet timelines and demands in the scope of a dissertation.

In order to track and successfully re-enroll participants for this follow-up study, basic contact, demographic, and health encounter data was collected under the auspices of the University of Pennsylvania Health System and using multiple IRB approved electronic medical record databases (EMR). Once re-contacted, each woman who consented to follow-up study participation was administered an in-person follow-up questionnaire and health assessments were conducted on the mother and child.

The primary exposure, HFI, was captured using an 11-item adaptation of the 18-item standardized US Food Security Scale (internal reliability discussed later in this chapter; both 18-item and 11-item adaptation included are in Appendix A & B), assessed as part of the in-home interview. The child overweight outcome as well as the maternal weight assessment were determined by collecting height and weight measurements and using standard gender and age specific BMI cutoff percentiles to categorize weight status in children and respective classifications for adults. Blood pressure and hip/waist measurements were also assessed on the mother and child (see Appendix D for Recruitment procedures and measurement techniques). This chapter describes the research design and methods, including the study sample, study variables and procedures, study instrument(s), data collection procedures, and the data analytic plan.

III.B. Subjects

III.B.1. Sample Population

Subjects for this follow-up study included a random subset of maternal/child dyads, or, women who participated in the original Early Pregnancy Study (EPS) and the child from that pregnancy. The majority of study participants were African-American, inner-city women and their child, and the eligible child for this follow-up study was between 4 to 7 years of age at time of re-enrollment. A random subset of participants from the EPS cohort (20%) were first identified and electronic medical record (EMR) information was subsequently extracted on this subset in order to document most recent phone numbers and mailing addresses. Letters were subsequently sent to all eligible mothers to introduce the follow-up study (research procedures are discussed in detail later in this Chapter). Multiple phone calls were then made to complete recruitment procedures. A brief introductory telephone script was read (see Appendix E) for those potential participants successfully tracked. Study participation ultimately took place in the participants' home, upon obtaining appropriate verbal consent. Recruitment procedures are discussed in depth later in this chapter (also see Appendix D for recruitment procedures and Appendix F for timeline of data recruitment/collection).

III.B.2. Inclusion & Exclusion Criteria

Inclusion and exclusion criteria for study re-enrollment in this follow-up study consisted of the following:

- A random 20% sample of women enrolled in the original Early Pregnancy Study (EPS) who reported a live born, singleton birth.
- Eligible participants were also English speaking, able to provide consent, and contactable by phone.
- Individuals who participated in the Early Pregnancy Study who no longer had custody of their child, who could not recall participating in the EPS study, or who were lost to follow-up were excluded from this study.

III.B.3. Ethics

Institutional Review Board (IRB) approval at Temple University and at the University of Pennsylvania was obtained prior to beginning this study. IRB approval was obtained in order to access patient databases, re-contact potential study participants, to obtain verbal consent for study participation, to complete in-home interviews and to conduct dissertation research. All IRB related documents are included in Appendices G-K. Before enrolling participants, the research team also successfully completed human subjects' research training (Appendix H).

III.C. Data Collection Methods

III.C.1. Recruitment Site.

Participants for this study were not recruited to or from a central physical study site. While a study space was available to conduct assessments and administers surveys to participating mothers at points during this follow-up study at Temple University, it was not treated as a primary study site for important reasons. Research personnel involved in this follow-up study were located at different institutions at the time of follow-up (close to 6 years later). In addition, while participants for this follow-up study had also participated in the EPS study, different from EPS participants, recruited from an emergency room clinic, in-home interviews took place in order to make study participation convenient for women (ie, mothers with a young child or children who might regularly utilize public transportation) and as part of recruitment efforts to optimize enrollment. One abstractor identified eligible participants from original EPS study, since, she is a licensed Social Worker, was employed at HUP (and thus able to use IRB databases under these auspices), and was also member of Dr. Nelson's EPS study team that involved tracking and retaining a cohort of attrition-prone participants. Regular meetings were held with study team members at Temple University to discuss recruitment related issues and progress. Also, a point person was assigned a study related mobile phone to contact potential participants and/or study personnel.

III.C.2. Electronic Medical Record (EMR) Abstraction.

As mentioned above, a licensed Social Worker served as the abstractor for this follow-up study (as well as one of the research coordinators), she obtained updated locator information from several IRB approved HUP databases, (each described below). Before identifying eligible women through one of the IRB approved hospital databases, a random selection of 20% (N=220) of eligible controls was performed to identify study ID numbers from the Early Pregnancy Study (EPS), using a computer generated algorithm. After the 220 study ID numbers were generated, the abstractor created a spreadsheet, identified the group of eligible women, and recorded relevant contact information by using 3 electronic medical record (EMR) systems: MedView, Emtrac, and Canopy to update contact information. The abstractor first searched for study participants in MedView by medical record, name and date of birth. If a participant was found, the last encounter with the health system (inpatient, ED, outpatient) was recorded and the most recent address and phone number(s) updated. If an upcoming appointment was scheduled, this information was also documented in order to accurately track data and to maximize recruitment efforts. Demographic contact information for study participants was collected through MedView. Because providers often chart additional contact information in their notes, and MedView may not reflect "real time" up-to-date information, the abstractor also utilized Emtrac and Canopy to acquire additional contact information (such as more recent address and home/work numbers).

III.C.2.a. MedView is a web-based program used to gather and analyze clinical data within the UPHS system. The program serves as an umbrella portal to access clinical data from past and current encounters, as well as discharge summaries, scheduled appointments, and demographic information.

III.C.2.b. Emtrac is utilized by the Emergency Department to document patient encounters. Emtrac also contains demographic information.

III.C.2.c. Canopy is a Care Management program utilized by the Social Work and Clinical Resource Management Department (at HUP) to document and plan for patient discharges.

III.C.3. Study Recruitment Procedures

Due to the 6-year duration between EPS contact and this follow-up study, strategies successful in combating attrition in the past were also employed in this study (i.e, use of IRB approved hospital medical record databases, mass mailings, and follow-up telephone calls). Once a working number and/or most recent addresses were identified, eligible women were then notified through a general mailing, using a letter that introduced the follow-up study, and that also included a self-addressed stamped envelope and consent and HIPAA forms for willing individuals to sign and mail back. In addition, a number was included in the letter, which the eligible woman could use if she did not want to be contacted any further for this study (Appendix L).

After a period of 10 days, if the information was not mailed back or the women had not called, the research coordinator (or another designated study team member) called the subject at all numbers documented in the recruitment spreadsheet. For potential participants for whom a good contact number was not identified, the abstractor searched for new contacts within the health system each month. New demographic contact information was added to the tracking spreadsheet and was utilized to identify, recruit and schedule interviews. This process was conducted on an ongoing basis, until close of enrollment (see Appendix F for study timeline).

Where potential participants were successfully reached via phone, the to introduce herself, using a standard telephone script to describe the new study (see Appendix E—to view the telephone script used to introduce this study). She explained the nature of participation, which involved a 30-45 minute home visit to assess the mother and child's height, weight, blood pressure, hip and waist measurements and the completion of an intake interview. If the mother agreed to participate, a date and time where both the mother and child were available to complete the interview and health assessment was scheduled. If the subject declined study participation, she was thanked for her time and given a follow-up phone number in case study related questions arose.

III.C.4. Additional Study Procedures

III.C.4.1. Pilot Testing Study Instrument

The 77-item follow-up questionnaire administered during the in-person interview assessed household food insecurity as well as many of the areas from the previous Early Pregnancy Study (EPS). The original EPS questions were pilot tested with 5 women presenting at the Hospital of the University of Pennsylvania's (HUP) emergency department and modifications subsequently made. Similarly, prior to re-contacting potential participants for the follow-up study, the research coordinator pilot-tested the 77-item follow-up questionnaire on 3 individuals to assess timing, readability, and understandability of questions. Only minor modifications (formatting) were made as a result of pilot testing the survey. In addition, the primary research coordinator also trained the second interviewer (Diana Harris) on appropriate interviewing techniques, using 2 practice sessions to familiarize her with the survey and to standardize instrument administration (and reduce interviewer bias). The final 77-item follow-up questionnaire took between 15-20 minutes to administer to the mother (See Appendix K for complete follow-up questionnaire).

III.C.4.2. Researcher Training with Pediatrician

The research coordinator and a second interviewer completed training with an experienced clinician in the Department of Pediatrics at Temple University (and dissertation committee member) to standardize conducting the health assessments on the mother and child. This included training on use of the tape measurer to evaluate waist and hip circumference as well as height, how to evaluate weight (using a digital scale and assuring that it was appropriately calibrated each time), and training on blood pressure measure techniques in adults and children. The research team also received training on calculating Body Mass Index (BMI) percentiles in children and calculating BMI for adults. BMI and blood pressure norms for children and adults were also reviewed during this training. Details about how the research devices were used with participants are included under Appendix D.

III.C.4.3. Conducting Health Assessment and Administering Follow-Up Questionnaire

Consent and assent (if the child was 7 years of age) to review personally identifiable health records and information, to obtain the biologic markers (height, weight, hip/waist measurements and blood pressure) and to administer the 77-item follow-up questionnaire to participating mothers were obtained in person, in writing, at the woman's home, before beginning each interview. The HIPAA waiver for UPENN and Temple were also obtained before starting each interview and completing any health assessments. Once in-person consent was obtained, when two study team members were present, a one administered the questionnaire to the mother, while a second trained researcher conducted the health assessment on the child. Survey administration with the mother took approximately 20 minutes. Data collection in the woman's home lasted between 30-45 minutes. Adult participants were compensated with a $50 American Express (AMEX) gift card for their time.

III.C.4.4. Process Notes

Observations about the interview, the surrounding area and household environment were documented when possible, such as, observations about family composition and household dynamics, presence of TV, snack foods and smell of smoke, as well as notes on general area (i.e, presence of parks, street lights, etc) (see Appendices Q-R). Process notes are discussed in Chapter 5.

III.C.5. Recruitment Procedures/Data Collection Summary

Overall, study techniques were standardized as much as possible to successfully track participants, minimize interviewer bias and to enhance internal validity. In addition, many of the instruments used in this study were previously validated within the population of interest, and several also have demonstrated high reliability.

III.D. Measures

III.D.1. Primary Exposure—Household Food Insecurity (HFI)

Household food insecurity (embedded within the 77-item follow-up questionnaire administered to participating mothers in their homes) was captured using an 11-item adaptation of the 18-item standardized US Food Security Scale. The 18-item scale is detailed below, followed by the 11-item scale used for purposes of this follow-up study. Rationale for omission of certain items for purposes of this study and internal reliability are also discussed.

III.D.1.a. The 18-item USDA household food security module is designed to specifically capture economic resource constraints and experiences associated with inadequate quality and quantity of the household food supply over the preceding 12 months, along a continuum of increasing food insecurity status (see revised 18-item household food insecurity module in Appendix A). This module has been administered to a representative sample of households in the US since 1995 (Nord, 2008). Research shows that the 18-item Household Food Security Scale is highly stable over time with a good reliability coefficient of 0.81 for households with children and 0.74 for all households (Keenan et al, 2001). Households with children are asked all 18 items in the module – which assesses household food insecurity status amongst all adults in a residence and also addresses dramatically reduced food intake amongst children in the household (that might result in experience of hunger).

Prior to a 2006 USDA report, households were classified into 1 of 4 categories in accord with number of affirmative respondent items about the household food situation: (1) *Food secure* (All households: affirmative responses to less than 3 items;) (2) *Food insecure* without hunger: Adult affirmative responses to 3-7 items); (3) *Food insecure with hunger:* affirmative responses to more than 7 items). Finally, households with children are further categorized as (4) *Food insecure with hunger among children* (affirmative responses to 5 of 8 items that specifically ask about children in the household). An example of one of the items included in the module is: “In the last 12 months, since (current month) of last year, did you ever cut the size of (your child’s any of the children’s) meals because there wasn’t enough money for food.” Specific child items asked of the head of the household are designed to pinpoint actual substantial reductions in food intake among children in the household which could result in them experiencing intermittent hunger (Bickel et al, 2000).

Table 5 describes households by food security status, providing categories of each as developed prior to USDA expert committee recommendations in 2006.

Table 5. 18-item scale Operationalized definitions of Household Food Insecurity

Household Food Security Status	Definition	# of Affirmative Responses (as described by 18-item module)
Food Secure	Households show no or minimal evidence of food insecurity.	<3 items
Food Insecure without hunger	Food insecurity is evident in household members' concerns about adequacy of the household food supply and in adjustments to household food management, including reduced quality of food and increased unusual coping patterns. Little or no reduction in members' food intake is reported.	3-7 items
Food Insecure with hunger-Less severe	Food intake for adults in the household has been reduced to an extent that implies that adults have repeatedly experienced the physical sensation of hunger. In most (but not all) food-insecure households with children, such reductions are not observed at this stage for children.	> 7 items
Food Insecure with hunger-(severe) among children	At this level, households with children have reduced the children's food intake to an extent indicating that the children have experienced hunger. For some other households with children, this already has occurred at an earlier stage of severity. Adults in households with and without children have repeatedly experienced more extensive reductions in food intake.	In addition to above category, > 5-8 items that specifically address children

Source: Bickel et al, 2000

As discussed in Chapter 2, constructs of food insecurity with and without hunger have evolved and debated over time (Nord, 2008). Similarly, variability exists in which instruments and/or questions researchers use to assess household food insecurity (Lyons et al, 2008; Feinberg et al, 2008; Keenan et al, 2001). In 2006, as part of a series of USDA committee recommendations to improve and strengthen the food security measure, it was determined that while *hunger* was a useful construct to measure, (since it is a potential consequence of food insecurity), that using the language of hunger should be omitted from discussion about food insecurity because it is an individual construct -- and not a household construct as food insecurity intends to measure. The USDA report also mentioned that developing a feasible concept and definition of hunger would be a useful starting point for identifying appropriate measurements for the term (Nord, 2008). Thus, new labels describe ranges of severity of food insecurity.

Table 6. Revised Labels Describing Severity of Household Food Insecurity

General categories (old and new labels are the same)	Detailed categories		
	Old label	**New label**	**Description of conditions in the household**
Food security	Food security	**High food security**	No reported indications of food-access problems or limitations
		Marginal food security	One or two reported indications—typically of anxiety over food sufficiency or shortage of food in the house. Little or no indication of changes in diets or food intake
Food insecurity	Food insecurity without hunger	**Low food security**	Reports of reduced quality, variety, or desirability of diet. Little or no indication of reduced food intake
	Food insecurity with hunger	**Very low food security**	Reports of multiple indications of disrupted eating patterns and reduced food intake

From USDA Briefing Room, 2008.

The introduction of new labeling has not changed the methods used to assess households' food security status. In addition, national prevalence estimates since 2005 are directly comparable with those for earlier years in similar categories (Nord, 2008). Therefore, this study used a subset of questions from the standard 18-item module as well as comparable labeling and scoring procedures.

III.D.1.b. For this study, household food insecurity was measured using an adaptation of the USDA's Household Food Security Survey Module. Because only mothers with a child between 4-7 years of age were eligible to participate in this study, all questions explicitly addressing child food insecurity were included, using the same response format as the standardized 18-item module. Table 7 outlines the household food security module as adapted for purposes of this study.

Table 7. 11-item Module Operationalized Definitions of Household Food Insecurity

Household Food Security Status	**Definition**	**# of Affirmative Responses (as described by 18-item module)**
Fully Food Secure	Households little to no evidence of food insecurity.	0 –1 items
Food Insecure - with or without hunger	Food insecurity is not only evident in adult household members' perceptions or worry about adequacy of the household food supply and in adjustments to household food management, but in addition, quality and quantity of food has been reduced to the extent that one or more adults have experienced some physical sensation of hunger. Reductions are not observed at this stage for children.	2- 4 items
Food Insecure with marginal hunger among children	Adults in households with children have repeatedly experienced more extensive reductions in food intake and physical sensations of hunger. Also, children's food intake has been reduced to a point where the child may have experienced variable physical hunger sensations.	greater than 4 items* *at least one affirmative response to specific questions that address actions taken to reduce child food intake.

The 11 questions asked of participating mothers for this follow-up study and corresponding response format are included in Tables 8 and 9 next.

Table 8. Follow-up study Household Food Insecurity Assessment (Adult level)	
The food that (I/we) bought just didn't last, and (I/we) didn't have money to get more.	☐0 Often true ☐1 Sometimes true ☐2 Never true ☐9 Refused/Don't know
(I/we) couldn't afford to eat balanced meals.	☐0 Often true ☐1 Sometimes true ☐2 Never true ☐9 Refused/Don't know
In the last 12 months (date 12 months ago) did (you/you or other adults in your household) ever cut the size of your meals or skip meals because there wasn't enough money for food?	☐2 Yes ☐1 No (skip pattern) ☐9 Refused / Don't know (skip pattern)
How often did this happen—almost every month, some months but not every month, or in only 1 or 2 months?	☐0 Almost every month ☐1 Some months but not every month ☐2 Only 1 or 2 months ☐9 Refused/Don't know
In the last 12 months, did you ever eat less than you felt you should because there wasn't enough money to buy food?	☐2 Yes ☐1 No ☐9 Refused / Don't know
In the last 12 months, were you ever hungry but didn't eat because you couldn't afford enough food?	☐2 Yes ☐1 No ☐9 Refused / Don't know

Table 9. Follow up Study Questions addressing Household Food Insecurity with Marginal Hunger Among Children

In the last 12 months, did you ever cut the size of [CHILD'S NAME] meals because there wasn't enough money for food?	☐2 Yes ☐1 No (skip pattern) ☐9 Refused / Don't know (skip pattern)
In the last 12 months, did [CHILD'S NAME] ever skip meals because there wasn't enough money for food?	☐2 Yes ☐1 No ☐9 Refused / Don't know (skip pattern)
How often did this happen—almost every month, some months but not every month, or in only 1 or 2 months?	☐0 Almost every month ☐1 Some months but not every month ☐2 Only 1 or 2 months ☐9 Refused/Don't know
In the last 12 months, was [CHILD'S NAME] ever hungry but you just couldn't afford more food?	☐2 Yes ☐1 No ☐9 Refused / Don't know
In the last 12 months, did [CHILD'S NAME] ever not eat for a whole day because there wasn't enough money for food?	☐2 Yes ☐1 No ☐9 Refused / Don't know

III.D.2. Study Reliability

The above-described 11 household food insecurity questionnaire used in this study was chosen to reduce respondent burden. Also, because the exposures of interest in this study included both prenatal and distal maternal and child influences on the outcome of interest, child overweight, questions capturing more severe levels of household food insecurity amongst adults were omitted (see Appendix A and B for comparison of items). Along these lines, because of the ambiguities surrounding hunger as a concept (Nord, 2008), categories as detailed above and the number of affirmative response categories used to describe household food insecurity status were also adapted for this study in order to capture even marginal reduction in food intake of children in the household. Because of the variability in study design, research questions, and study techniques in measuring household food insecurity across studies, a Cronbach's α was performed based on a 7 item subset of the 11item household food insecurity module used for this follow-up study.

Four questions were omitted from this reliability check because of skip patterns, one set of questions addressed the food circumstances for adults in the household, while the set addressed the food circumstances of the child. For example, in responding to items about household food insecurity, the mother was asked to respond to the question, "In the last 12 months (date 12 months ago) did (you/you or other adults in your household) ever cut the size of your childs meals or skip meals because there wasn't enough money for food," and, if a "no" response was endorsed, then the follow-up question related to frequency of occurrence, "how often did this happen" was automatically omitted.   High internal reliability was demonstrated in this study, with a Cronbach α of 0.76, similar to the measures and corresponding reliability results listed below.

Table 10. Partial Listing of Scales Measuring Household Food Insecurity with corresponding α

Scales Measuring Food Insecurity at Household level	Use	Reliability (Cronbach's alpha)
CCHIP 8 items; additive scale, an affirmative score of 5+ indicates a food shortage for everyone in the household, including children	One of 1st scales developed to measure hunger in families with at least one child; Provides information on the frequency and episodes of food insecurity and hunger.	0.80-.89
Radimer/Cornell 13-items subscales: household (5);women (4); children (4); household food supply; quality (1)	Three subscales correspond loosely to a single overall scale for the severity of food insecurity and hunger within the household.	0.84-.86
US HFSSM 18 items	Most comprehensive instrument measuring US household food security in hunger to date; proven consistent over time and across population sub-groups.	0.74-.93

Keenan et al, 2001

III.D.3. Outcome-Child Overweight

BMI as a surrogate marker for adiposity has repeatedly been validated as a good indicator of overweight and at-risk for overweight in children (Katzmarzyk, Janssen & Ardem, 2003), using the Center for Disease Control and Prevention's (CDC) web based child and teen BMI calculator (http://www.cdc.gov/nccdphp/dnpa/bmi/), gender and age-specific child BMI percentiles were calculated from child height and weight collected during the in-home visit. In accord with CDC standards, at or above the 95th percentile was considered overweight and at risk for overweight was classified between the 85th-95th percentiles for enrolled children. Height and weight were collected using a calibrated digital scale to document weight and a standard tape measure to collect height. The scale was re-calibrated each time it was used.

Secondary anthropometric data were collected to better account for markers of child overweight status, including, assessing blood pressure using an Omron IntelliSense Professional Digital Blood Pressure Monitor. This blood pressure monitor was previously validated for accuracy, and includes automatic cuff inflation/deflation, thereby eliminating the need to predetermine the inflation level setting. It also includes 4 different cuff sizes of arm circumference (small, medium, large, extra large), and also different choices in modes for measuring blood pressure (including taking the average of 3 blood pressures), which allowed for more accurate measurement. Waist and hip circumference were also measured using the same tape measure when 2 interviewers were present (technique described in Appendix D). Heights, weights, waist and hip assessments were measured twice on the child to minimize measurement error and to improve accuracy of study results.

Table 11. Outcome Markers of Child Overweight

Outcome	Emphasis
BMI $\geq$ 95th percentile (dichotomous) Overweight	Primary
BMI 85% - 95% (dichotomous) at-risk for overweight	
Blood pressure adjusted for gender, age and height percentile (continuous)	Secondary

III.D.4. Maternal Biologic Markers

Because overweight in at least one parent is highly predictive of child overweight, maternal BMI was determined through measurement assessment collected at time of re-enrollment and adjusted for in the analysis. Maternal height was measured (using a tape measurer) and maternal weight was determined using the calibrated digital scale (when possible—scale limited to 300 pounds; some women refused to have weight assessment conducted; See Appendix D for explanation of measurement techniques). Maternal BMI was calculated using the Center for Disease Control and Prevention's (CDC) web-based adult BMI calculator (http://www.cdc.gov/nccdphp/dnpa/bmi/). In accord with CDC standards, adult overweight was defined as having a Body Mass Index (BMI) of 25 to 29.9 kg/m^2 and adult obesity defined as having a BMI of 30 kg/m^2 and above. The mother's blood pressure was obtained using the Omron IntelliSense Professional Digital Blood Pressure Monitor earlier described and hip and waist measurements were taken on the mother using the standard tape measurer. Table 12 represents maternal anthropometric data collected during the follow-up interview.

Table 12. Study Related Health Assessment Data (Collected during follow-up)
Maternal height and weight* measurements (BMI subsequently calculated)
Maternal waist and hip measurements
Maternal blood pressure measurements

III.D.5. Prenatal & Current Maternal & Child Exposures

Relevant demographic and other exploratory data was collected using the 77-item follow-up questionnaire as well as data from the Early Pregnancy Study (EPS) (Appendix M and N). Accounting for demographic, maternal social-environmental and/or child nutritional factors and other potential confounders was essential to validating the study findings and was therefore conducted during the analysis phase to reduce the possibility of spurious associations between current household food insecurity and weight status of enrolled children. Potential confounders of the relationship between current household food insecurity and childhood overweight included past and current *socio-demographics*, (family income, adult race, and maternal/child gender, age, education level), past and current *family assistance participation*, (WIC, receipt of food stamps), past maternal risk behaviors (pre-natal cocaine, smoking and/or alcohol use, self-reported stress and violence exposure during pregnancy), *child nutritional risk factors* (birth weight and breast-feeding), most recent *child health, nutrition and behavior risks*, (eating/drinking patterns and resources, exercise risk factors, co-morbidities), current *genetic risks* (maternal height), and self-reported maternal and household smoking at time enrollment in follow-up study (see Appendix J).

III.D.5.1. Early Pregnancy Study Data. Because of research underscoring the importance of examining fetal origins of child overweight trajectories (Whitaker, 2004), select socio-demographic, behavioral, social-environmental, reproductive, and other medical history data for each woman collected during the pregnancy as a part of the EPS study and was extracted for participants in this follow-up study to assess Aims 1 and 2 and to enhance the results of Aims 3 and 4 (described in detail later in this chapter). The data items listed below were collected as part of the EPS survey and used in this follow-up study (full EPS questionnaire is included in Appendix E).

Table 13. Maternal Study-related Data (Collected at enrollment Early Pregnancy Study)

Demographic information
Medical history
Obstetrics and gynecologic history
Pregnancy information
Exposure to violence (in-utero, intimate, neighborhood)
Family characteristics (including homelessness)
Drug and alcohol use (biological assessment)
Stress, depression, and life events
Self reported height and weight prior to pregnancy
Sedentary habits (standing up, TV, lifting)

As part of the original Early Pregnancy Study, pregnant women less than 22 weeks gestation were enrolled to examine the relationship between violence and the risk for spontaneous abortion (SAB). Eligible participants from this original cohort were pregnant females between 14 to 40 years of age presenting to the Emergency Department at the Hospital of the University of Pennsylvania and residing within West or Southwest Philadelphia between 1999 and 2001. Of the 1,532 women with positive pregnancy tests, 283 were deemed ineligible due to ectopic, molar, or twin pregnancies, non-English speaking status, acute mental illness, or birth of a child, therapeutic abortion, or complete SAB 4 to 14 days before the ED visit (Nelson et al, 2003). Of the remaining 1,249 eligible study participants, 96% (1,199) agreed to participate in the EPS study. Seventy-five percent of study participants were under 30, 92% African-American and nearly 30% had not completed high school.

Violence was broadly identified in the EPS study, using questions like "during any argument or fight, did you get pushed, slapped, or hurt in any way?" Biologic samples (hair and urine) were used to examine recent exposure to tobacco, alcohol and cocaine. A battery of validated psycho-social stress scales, all with high reliability among African-American inner-city women, were used in the EPS study to capture both external stress as well as self-perceived stress, including the Perceived Stress Scale (PSS), the Prenatal Social Environment Index (PSEI), and the Index of Spousal Abuse (ISA) (Nelson et al, 2003). A brief description of each of these scales, including their validity and reliability in African-American female populations, are described below.

Table 14. Validated Stress Measures Assessed as part of EPS

Study Measure	**Description**
Perceived stress scale (PSS)	Designed to measure the degree to which certain situations in a person's life are perceived as stressful. Using a 5-point Likert scale, women respond to 4 items with respect to the past month. A total score between 0-16 is possible, with a higher score indicating more distressing situations experienced in the past month. The four-item instrument has been validated in low income, African-American women and found to have high reliability. One study reported a mean/SD score of 5.1 ± 3.4 among African-American inner city women.
Prenatal Social Environment Index (PSEI)	This 41-item instrument is specifically designed to assess chronic stressful life conditions for pregnant women. The total scores range from 0-41, with the sum values being grouped into tertiles, with values 0-6 representing low stress, 7-11 indicating moderate stress, and values 12 or greater indicating high stress. The PSEI has high reliability among pregnant African-American women, with a Spearman rank-order correlation coefficient of 0.73 ($p= 0.001$). Reported mean/SD score among African American pregnant women seeking care in inner-city prenatal clinics was 9.0 ± 4.0 in one study.
Index of Spousal Abuse (ISA)	Original instrument contains 30 items designed to measure the severity of physical and nonphysical abuse inflicted on a woman by her most recent intimate partner. The ISA has been found to have high reliability and validity among African-American women. The ISA was modified for purposes of the EPS, to include eight statements focused on the nonphysical, or controlling behavior a woman has experienced from that partner. Women were asked to indicate frequency of particular behaviors using a 5-item Likert scale (1=never; 5=very frequently). Possible scores range from 0 to 40, with a higher score representing increasing severity of nonphysical abuse.

Findings from the Early Pregnancy Study have been published and among the most notable include that after adjusting for relevant confounding factors (i.e, maternal age, social support, education, cigarette or cocaine use, neighborhood violence), violence was not significantly associated with SAB (see Nelson articles in Appendix N).

III.D.5.1.b. Current Survey Data (77-item follow-up questionnaire). Current confounding data was obtained through administering a 77-item questionnaire during the in-home interview. This questionnaire contained information on the child's socio-demographics (including gender, age and education level), past and recent medical history, recent recreational activity/inactivity (including physical education, participation and TV/video game use), and recent eating/drinking patterns. Maternal socio-demographic and other behavioral data (i.e., current smoking within household, stress perception, self-reported maternal smoking) were also collected (See Appendix K, 77-item questionnaire). Frequency distributions were calculated on single items where appropriate.

For this follow-up study, 22 of the 41 PSEI items were used to assess current maternal perception of stress. Questions specifically addressing perceived stress during pregnancy were omitted for this follow-up study as well as other perceived environmental stressors to reduce respondent burden (see Appendix J and K for full questionnaires and to compare items). Positive ("yes") responses to this 22-item subscale were counted to create summary scores and the frequency distribution of the study sample (range=8-22) was used to differentiate between *high* (12-22) versus *low* (8-11) current maternal stress. The demonstrated internal reliability of this subset of items was 0.65 (Cronbach α). As mentioned above, the PSEI has a high reliability among pregnant African-American women, with a Spearman rank-order correlation coefficient of 0.73. Reliability of this subset of items used for this follow-up study was slightly lower, and likely effected due to the reduced number of items.

Table 15. Self report study-related data (questions administered during follow-up)
Child factors
Age
Birth weight
Breastfeeding
Diet (home and school environments)
Physical activity (home and school environments)
Child Sedentary habits (TV, electronic games, computer use)
Co-morbidities—both presence and type (i.e., asthma, diabetes)
Individual/Household Food Insecurity (economic assessment of current food situation)
Maternal Factors
Maternal age
Education
SES
Maternal smoking (and smoking within household)
22 item maternal perceived stress (modification of PSEI)
11-item Household Food Insecurity

III. E. Parameters, Resulting Power Calculation & Plan for Post-Hoc Analyses

Power was based on national U.S. statistics that reported approximately 12% of all U.S. households were insecure in 2003 (Nord, Andrews, & Carlson, 2004), which, was only slightly lower in 2007 reports (11.1% of all US households, see Figure 2, Chapter II) (Nord et al, 2008), as well as national U.S. statistics on prevalence of overweight among U.S. 2-11 year old children, which varies from 14% to 20%, (2-5 years of age, 14% and 6-11 years of age, 20%) (Ogden, et al, 2006). Given a two-sided $p = 0.05$, 80% power and 220 enrolled study participants, the detectable OR was estimated at 2.6 or above. In other words, based on enrollment of 220 study participants, a more than two-fold difference was anticipated between food secure and food insecure households in terms of weight outcomes in the child, based on the above indicated parameters. Windows 2005 version of NCSS/PASS was used to determine the power associated with this study. A post-hoc power analysis was planned to determine what differences might be detected by varying power between food secure and food insecure households in predicting overweight based on the actual sample size.

III.F.Analytic Plan

III.F.1 Data Management

Following data collection, the questionnaire as well as the anthropometric data were entered into the study database. All keyed data were checked for missing or unclear responses following completion of the interview. Data were entered into SPSS Version 12 database for Windows and analyzed in a SPSS version 16 database. All data were kept in a locked file cabinet that was only accessible to the research team.

III.F.2. Aims and Corresponding Analysis

To examine study Aim 1, factors predicting retention and enrollment in this study, relevant socio-demographic and clinical information was documented. To examine Aims 2 and 3, which include identifying known confounders of household food insecurity, information from both the EPS (conducted 6 years prior) and the current study were obtained. To examine Aim 4, information from the current study for exposure (food insecurity) and outcome (childhood overweight/at-risk for overweight) were obtained using EPS information to control for relevant confounding factors. The Aims and appropriate analyses were as follows:

*III.F.2.a.*Aim 1: To describe factors predicting retention and re-enrollment in an analytic, follow-up study in an inner-city population of childbearing age. Relevant demographic information from IRB approved electronic medical record (EMR) databases and prenatal exposures from EPS study were used to analyze this Aim.

Analysis Plan Aim 1: This was a descriptive assessment of the tracking process. As part of Aim 1, frequencies were computed related to how the final study sample was derived and comparisons were made between participants and all non-responders around select EMR and prenatal exposures.

*III.F.2.b.*Aim 2: To describe the percent of sampled households in the fully food secure, food insecure with and without hunger, and food insecure with marginal hunger among children categories by select socio-demographic characteristics. The 11-item version assessing household food insecurity and embedded within the 77-item follow-up survey administered during the in-home interview. (Questions 66-77; Full questionnaire included under Appendix K).

Analysis Plan Aim 2: This was a descriptive assessment of the 3 pre-defined components of food insecurity in this dissertation (fully food secure, food insecure with or without hunger, and food insecure with marginal hunger among children). As part of the analysis for Aim 2, means, SD's or percents, and results from statistical testing were reported where appropriate.

III.F.2.c. Aim 3: To assess the relationship between prior exposures, current exposures, and current household food insecurity (see Figure 1, Chapter 1). Relevant questions from the Early Pregnancy Study questionnaire (already collected data) as well as from the current 77-item questionnaire (full questionnaires included under Appendices J-K) were used to analyze this Aim.

Analysis Plan Aim 3: Bi-variate analyses were conducted to examine possible associations between relevant exposures described above, and the two groupings of food insecurity. All continuous variables were summarized by mean and standard deviation.

Categorical variables were summarized by frequencies. Comparisons were made using Student t-tests for normal continuous variables. Chi-square tests were used for categorical variables and Fisher's exact tests were used when expected cell sizes were less than five. Two-tailed $p<0.05$ were reported as statistically significant.

III.F.2.d. Aim 4: To examine the independent relationship between current food insecurity and relevant maternal/child co-variances in predicting overweight among children after adjusting for known confounders. Relevant questions from the Early Pregnancy Study and from the current 77-item questionnaire were used to explore this Aim. Health assessments conducted on the child during the in-home interview were used to classify the child overweight outcome (based on CDC gender, age-specific BMI percentile cutoffs).

Analysis Plan Aim 4: A correlation matrix was developed to better estimate how select maternal/child exposures were related to each other, and a series of exploratory models were subsequently created examining the independent effects of household food insecurity and other select prenatal as well as current maternal/child exposures in predicting child overweight. Odds ratios (OR) and 95% CI's for indicators of interest were reported separately.

A correlation matrix including maternal influences (ie, drug use in-utero such as marijuana/cigarettes, exposure to chronic stress during the pregnancy, current maternal weight, and waist/hip ratio), and child influences (presence of a co-morbidity, current child weight, and frequency of fast food servings). Odds ratios (OR) and 95% CI's for indicators of interest were reported separately. Two-tailed $p<0.05$ were reported as statistically significant.

Significant results and appropriate trends were subsequently used to develop a series of multivariate logistic regression models using childhood overweight status as the dependent variable and combinations of prenatal and current maternal/child factors as independent exposures of interest. The models were designed with the intent of exploring relationships between separate and combined prenatal origins of child overweight as well as current maternal and child influences on child weight patterns.

CHAPTER 4

RESULTS

IV.A. Recruitment and Selection Process of Study Participants

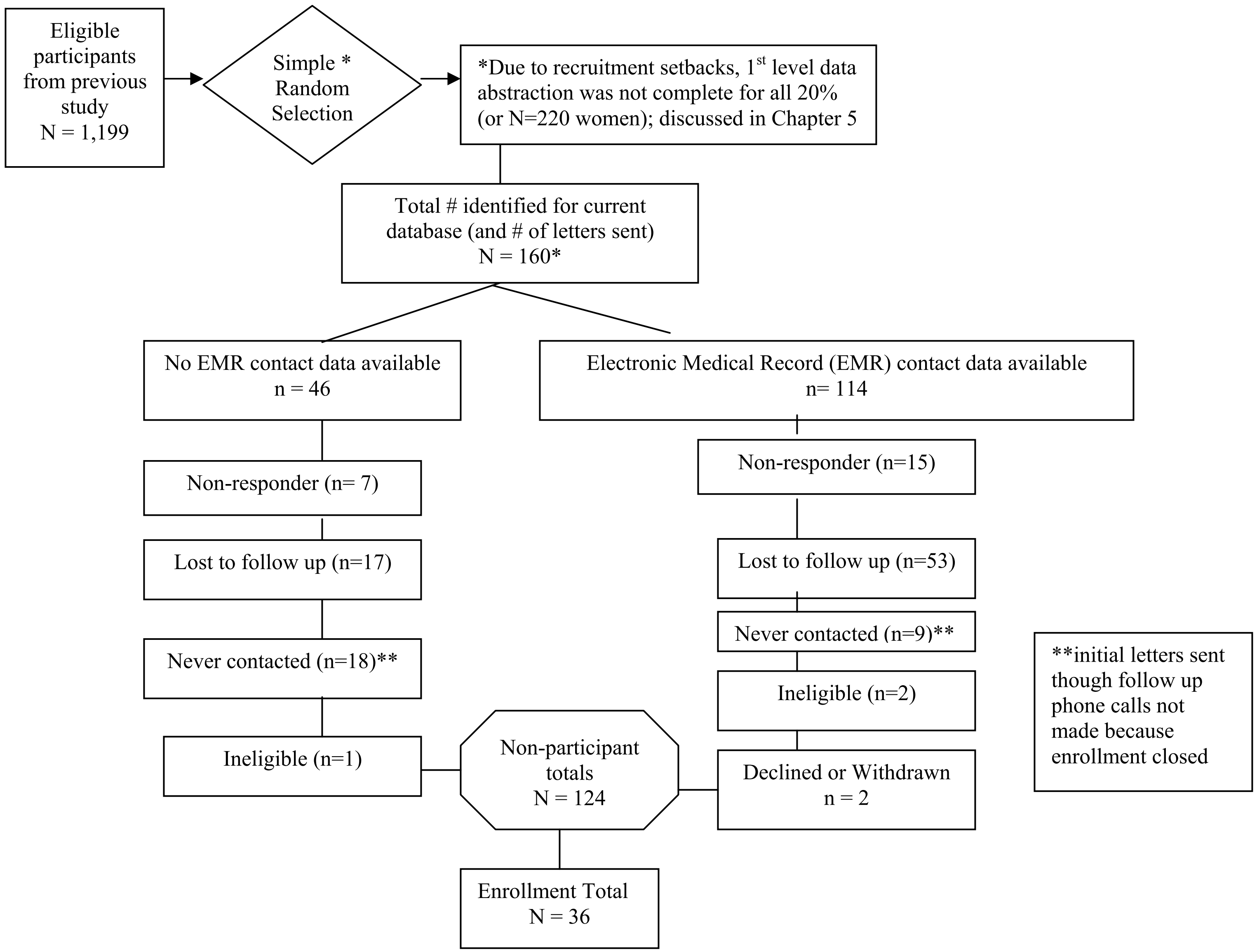
Of 1,249 pregnant women eligible to participate in the Early Pregnancy Study (EPS), 1,199 (96%) consented, 220 (20%) were randomly chosen, because this number was determined to be the minimal number needed to detect meaningful differences between food secure and food insecure households in interpreting the results. Due to recruitment setbacks (discussed in depth in Chapter 5), names and Medical Record Numbers (MRN) were examined on only 160 (13%) of these women and introductory letters subsequently sent as part of this study: "Food insecurity and BMI outcomes among toddlers and school-aged children in an inner-city setting." Next, the randomly identified subject numbers were matched against participant names and appropriate demographic information was extracted from the EPS databases (i.e., addresses, phone on the women as well as the close friends/relatives identified by her as contacts). In addition, as part of this project, updates and most recent locator information was searched and obtained through electronic medical record information (EMR) from three separate IRB approved HUP databases using the woman's name, birth date and medical record number as identifiers (Refer to procedures in Chapter 3, III.C). Introductory study letters were sent to the most recently dated home address of the 160 women eligible for this follow-up study.

Electronic medical record (EMR) locator information was available for 114 (71%) of the study sample (See Figure 6 below), and, over 60% of these same women sought healthcare service(s) at HUP (i.e., ED or outpatient clinic visit) as recent as 2006 or 2007. Among those where EMR data was available, 53 (46%) of subjects were considered lost to follow-up for this project once all contact and locator information (old and recent addresses for each woman and her listed contacts address as well as all phone numbers) were rendered invalid for re-locating the women. Fifteen (13%) women were considered non-responders, meaning, although updated locator information was found, researchers were unsuccessful at making personal contact after introductory and subsequent mailings as well as 3 or more phone call attempts to validate EMR information(s) and re-locate this group of women. In 9 (8%) of eligible women, a letter was sent, though study personnel were unable to further contact these subjects (via phone). Only one person actively refused study participation, and 1 person was withdrawn from the study (i.e., interview date/time confirmed but not completed). Two cases (2%) were ineligible because in one case, a live singleton birth was not determinable and in the second case, the mother did not have custody of the child.

Recent electronic medical record (EMR) information using IRB approved HUP databases was not available for 46 (29%) of 160 eligible cases, which made it especially difficult to contact potential participants for the follow-up study (most recent contact was as late as 2001 for this subset; also see Figure 4 below). Of these cases, 7 (15%) were deemed non-responders, 17 (37%) were lost to follow up, 18(40%) were never contacted by phone by research personnel due to resource constraints, and 1 (2%) was later deemed ineligible (ie, live singleton birth not determinable).

Overall, arriving at a final sample of enrolled subjects required first determining eligibility through an initial 'screening' of prior EPS data and current EMR data (when available). Of the entire random sample, (N = 160), anyone who was not successfully re-enrolled in this follow-up study were classified non-participants (N=124; 78%): More specifically, 70 (44%) were lost to follow up, 22 (14%) non-responders, 27 (17%) were sent letters but not further contacted due to resource and time constraints, and 5 (3%) actively declined, were ultimately ineligible (ie, contacted though did not have custody of child), or withdrawn. Thus, of the women where EMR data was available (n=114), 29% (n=33) re-enrolled in this follow-up study and, of women where EMR information was not available, 7% (n=3) were re-enrolled in the follow-up study. Overall, a total of 36 (22%) mothers and their child participating in the follow-up study. Figure 6 provides a visual illustration of the overall recruitment and selection process.

Figure 6: Recruitment and Selection Process of Study Participants



IV.B. Aim 1: Predictors of Participation in Follow-up Study

Characteristics of transient prone populations are increasingly documented in public health literature, due to biases that may be introduced in study results as a result of lack of participation over time. Because enrollment for this study relied on successfully re-contacting and re-consenting women who participated in a study 6 years prior, it was important to document certain characteristics and relevant differences between participants from non-participants in this follow-up study.

Baseline demographic and maternal health characteristics between participants in and non-participants in this follow-up study were generally similar. For example, the average age between both groups was 24 years, majority (71%) of non-participants for this follow-up study were not married at the time of the index pregnancy (data not shown), 90% were African-American, and 65% had at least completed high school. Similar numbers of women enrolled in this follow-up study and non-participating mothers reported employment within the 6 months prior to enrollment in the Early Pregnancy study (81% vs. 74% respectively). No one selected for this overall study sample was homeless at the time of enrollment in the Early Pregnancy Study (data not shown). Finally, 40% of non-participating mothers received food stamps at time of enrollment in the Early Pregnancy Study (1999-2001), and this was slightly higher at baseline for women who enrolled in this follow-up study (50%).

Results in Table 12 below describe baseline demographic and select maternal health risk factors between non-participants and those enrolled in this follow-up study. All continuous variables were summarized by mean and standard deviation. Categorical variables were summarized by frequencies. Chi-square tests were used for categorical variables and Fisher's exact tests were used when expected cell sizes were less than five. Two-tailed $p<0.05$ were reported as statistically significant. Also, documenting factors predictive of enrollment in a population where original study completion was 6 years prior proved to be challenging and complete data for all 124 non-participants was not always available.

Baseline characteristics between participants and non-participants in this follow-up study were similar and with the exception of electronic medical record (EMR) information availability (ie, updated locator information in one of 3 IRB approved HUP databases; $p<.001$), no significant differences were detected between those successfully enrolled in this follow-up study and those who did not enroll. In other words, having access to electronic medical record information alone was highly predicted re-enrollment in this follow-up study, which, was conducted 6 years past original study participation. Attrition in this study was high (~22% enrollment rate), and results of recruitment as well as qualitative findings related to this study sample are discussed in Chapter 5.

Table 16. Select associations between non-participants and participants

Characteristic	Participants N=36	Non-participants N=124	Odds Ratio (OR)	95% CI	p-value
Race		**N=122**			
African-American	29 (81%)	110 (90%)	0.452	0.16-1.25	0.12
non African-American	7 (19%)	12 (10%)			
Education Level		**N=122**			
Did not complete high school	13 (36%)	43 (35%)	1.063	0.49-2.31	0.877
Completed high school	23 (64%)	79 (65%)			
Worked for pay (Employment)		**N=121**			
Yes	29 (81%)	90 (74%)	0.726	0.29-1.83	0.495
No	7 (19%)	31 (26%)			
Authorization to receive food stamps		**N=121**			
Yes	18 (50%)	49 (41%)	0.681	0.32-1.44	0.311
No	18 (50%)	72 (60%)			
Marijuana use during index pregnancy	**N=33**	**N=107**			
Positive	8 (24%)	28 (26%)	1.11	0.45-2.74	0.825
Negative	25 (76%)	79 (74%)			
Alcohol use during index pregnancy	**N=32**	**N=105**			
Positive	3 (9%)	11 (11%)	1.13	0.30-4.33	1.00
Negative	29 (91%)	94 (90%)			
Tobacco use during index pregnancy	**N=32**	**N=106**			
Positive	5 (16%)	24 (23%)	1.58	0.55-4.55	0.393
Negative	27 (84%)	82 (77%)			
Intimate partner violence during index pregnancy		**N=119**			
Yes	6 (17%)	14 (12%)	0.67	0.24-1.90	0.442
No	30 (83%)	105 (88%)			
Exposure to chronic stress during index pregnancy		**N = 114**			
High stress	16 (44%)	53 (47%)	1.09	0.51-2.31	0.830
Low stress	20 (56%)	61 (54%)			
Electronic Medical Record (EMR) data available		**N=123**			
Yes	33 (92%)	42 (34%)	21.21	6.14-73.25	0.000**
No	3 (8%)	81 (66%)			

IV.C. Final Study Sample: Adult Socio-Demographic Characteristics

Thirty-six mother and child dyads participated in this follow-up study. The age of the participating mothers ranged from 23 to 44 years, with a mean age of 30 years. Most (81%) of the study sample was African-American, and 31 (86%) not married. Also, by the time of enrollment in this study, slightly more women had received at least a high school diploma or GED equivalent from baseline (or at time of enrollment in the EPS study; 26 women vs. 23 women respectively). Half of the participants reported an annual household income of less than or equal $15,000. Equal numbers of participants were either employed full time (n=16; 44%) or not at all employed (n=16; 44%). Half of participants were receiving food stamps at time of the EPS study (1999-2001). This percentage increased to 67% in the current study (2006-2007). A quarter (n=9) of participants received benefits from the Women, Infants, and Children (WIC) program at the time of this follow-up study.

Biologically confirmed data was not always available for participants in the EPS cohort, and of 32 mothers with a urine sample available from the index pregnancy, 5(16%) tested positive for cotinine (tobacco use) in utero, and 3(9%) tested positive for alcohol. Of 33 mothers with a urine sample collected from the index pregnancy, 8(24%) tested positive for marijuana. Of 30 mothers with a hair sample collected during the index pregnancy, 33% tested positive for cocaine use, (reflecting use in the 5 months prior including early pregnancy). Also, self-reported violence exposure among participants showed that 6 (17%) had been pushed, slapped or hurt by either an intimate or non-intimate partner during the index pregnancy. None of the participants in this follow-up study were homeless at the time of the index pregnancy, with 80% of women having reported living in an apartment, while 7 (20%) reported living in a house at the time of the index pregnancy. Anecdotally, majority of participants 31 (86%) did not live in public housing at the time of this follow-up study while 5 (14%) did currently (data not shown). Self-reported tobacco use collected as part of this follow-up study showed that 36% of mothers currently smoked cigarettes themselves (an average of 6 cigarettes per day), and 19 (53%) of mothers reported that someone in their household currently smoked.

As described in Chapter 3, the follow-up study included a collection of an in-person interview and anthropometric measure on the mother and child. At the time of the follow-up study, 5 women were pregnant. These women were excluded from the calculation of maternal BMI analyses, resulting in a total of 31 women with valid available BMI data. Of these women, 58% were obese, 26% were overweight, 13% were normal weight, and 3% were underweight. Empirical evidence indicates that children who are overweight are more likely to have a parent that is overweight. In this sample, 18 (95%) of children classified as overweight also had mothers who were classified as overweight (data shown in Table 18). The average systolic and diastolic blood pressure for women participating in this study sample was “normal” (114/74 mm Hg). Twenty-seven (90%) of thirty women had a hip to waist ratio greater than .80 cm, (which puts them at higher risk for developing certain chronic illnesses, such as heart disease, high blood pressure, and diabetes). Moreover, among women with a hip-to-waist ratio greater than .80, all of the children were currently overweight (data shown in Table 18). In terms of current household food insecurity, 26 (72%) of households were found to be fully food secure, 7 (19%) were food insecure (with or without hunger), and 3 (8%) of households showed evidence of food insecurity with marginal hunger among children. Table 17 provides socio-demographic characteristics of participating mothers and Table 18 provides maternal health risk behaviors of participants.

Table 17. Current Socio-Demographic Characteristics of Re-enrolled Mothers

Adult Socio-Demographic Characteristics	N (%)
Maternal age, years	
Mean (SD)	30 (6.50)
Median	29
Range	23-44
***Paternal age, years**	
Mean (SD)	34 (7.53)
Median	32
Range	25-52
Baseline marital status**	
Single (never married)	31 (86%)
Married (or living as married)	5 (14%)
Mother's highest education completed	
9^{th}-12^{th} grade	10 (28%)
High school graduate, GED or equivalent	16 (45%)
Associate degree: occupational, technical or vocational program	6 (17%)
Academic program: (Associate or Bachelor's degree)	3 (8%)
Doctoral Degree (PhD, EdD)	1 (3%)
Maternal Race**	
Black or African-American	29 (81%)
White	3 (8%)
Other+	4 (11%)
Gross Household Income per year (N = 34)	
Less than $10,000	13 (36%)
$10,000-$19,999	6 (17%)
$20,000-$29,999	5 (14%)
$30,000-$39,999	6 (17%)
$40,000+	4 (11%)
Employment Status	
Full-time	16 (44%)
Part-time	4 (11%)
Not employed	16 (44%)
Household Food Security Status	
Fully Food Secure	26 (72%)
Food Insecure-with or without hunger	7 (19%)
Food insecure with marginal hunger among children	3 (8%)
Authorization to receive food stamps	
Authorization to receive food stamps in past 12 months (current study)	24 (67%)
Authorization to receive food stamps in 12 months prior to index pregnancy**	18 (50%)
Participation in Women, Infant and Children (WIC) program (current)	
Yes	9 (25%)
No	27 (75%)

Note: *Percentages based on N=36 unless otherwise noted*
*Self-report data from participating mothers-unavailable in 5 cases
+ includes 1 Native American self-report and 3 other unspecified self-reported races
**Extracted from EPS data

Table 18. Health Risk Behaviors of Participating Mothers	
Maternal Risk Behaviors (N=36)	**N (%)**
Tobacco use during index pregnancy** (N=32)	5 (16%)
Cocaine use during index pregnancy** (N=30)	10 (33%)
Alcohol use during index pregnancy** (N=32)	3 (9%)
Marijuana use during index pregnancy** (N=33)	8 (24%)
Violence exposure during index pregnancy	6 (17%)
High stress exposure during index pregnancy*	18 (50%)
Current household cigarette use	19 (53%)
Current maternal cigarette use	13 (36%)
Current maternal BMI status (kg/m^2) (N=31)	
Underweight (below 18.5)	1 (3%)
Normal Weight (18.5-24.9)	4 (13%)
Overweight (25.0-29.9)	8 (26%)
Obese (30 and above)	18 (58%)
Blood Pressure (Systolic)	
Mean (SD)	114 (12.9)
Median	113
Range	90-143
Blood Pressure (Diastolic)	
Mean (SD)	75 (11.9)
Median	75
Range	53-96
Hip to Waist Ratio (cm) (N = 30)	
≤0.80	3 (10%)
>0.80	27 (90%)

Note: *Results based on N=36 unless otherwise noted*
* Extracted from EPS data, self report data from Prenatal Stress Environmental Index (PSEI)
**Extracted from EPS data, biologically confirmed

IV.D. Child Socio-Demographic Characteristics and Health Risk Behaviors

Nineteen (53%) of the child participants were boys and 17 (47%) girls. Children ranged from 4 to 7 years of age, with the mean age of 6 years. Forty-seven percent of participating children were enrolled in kindergarten at the time of the study.

The majority of children (75%) were born at a normal birth weight (between 2,501-3,999 grams), and the average birth-weight of participants was 3,170 grams (SD = 660.9). Fourteen (39%) child participants were breastfed, with over half (57.1%) being breastfed for less than 3 months. Additionally, similar numbers of overweight and normal weight children in this study sample were also breastfed (data shown in Table 19).

Regarding BMI, over half of the children in the study sample (58%) were either at risk for overweight or overweight (n= 21). Evidence demonstrates that apparent disconnects exist between parental perception of their childs weight versus their childs actual weight, which is important since, parent recognition of child weight status is an important first step in intervention (Doolen, Alpert, & Miller, 2008). Not surprisingly, in contrast with the child's measured BMI (determined through clinical assessment), mothers primarily classified their child's weight as "average" (86.1%) and only 5 (13.9%) mothers classified their child as "overweight" (data not shown). Also, the majority of mothers (97%) described their child's health as "excellent" or "good." Sixty one percent (n=22) of mothers reported that their child had at least one comorbidity (including, for example, asthma, high blood pressure, allergies, cerebral palsy, etc.). The primary co-morbidity that the mothers reported was asthma, with 10 (39%) mothers reporting that their child had this illness. Among 66% of children with a co-morbidity present, 15 (71%) were actually overweight (data shown in Table 19). This is also consistent with previous data suggesting that overweight children are more susceptible to having other comorbidities (Belamarich et al, 2000). Table 19 illustrates child demographic and health risk descriptors. Anecdotally, mothers of overweight children in this study sample reported slightly higher stress during the index pregnancy (or, at time of enrollment in the EPS study) than mothers with normal weight children (57% vs. 43% respectively) (data shown in Table 22).

Table 19. Child demographic and health risk descriptors

Descriptor	[N (%)]
Birthweight (in grams)	
<2500 grams	6 (17%)
2501-3999 grams	27 (75%)
4000 or more grams	3 (8%)
Breastfed	
Yes	14 (39%)
No	22 (61%)
Breastfeeding Duration (N = 14)	
< one month	3 (21%)
1-12 months	8 (57%)
>12 months	3 (21%)
Child age, years	
Mean (SD)	6 (1)
Range	4-7
Child gender	
Male	19 (53%)
Female	17 (47%)
School level	
Day care	1 (3%)
Pre-school	7 (19%)
Kindergarten	17 (47%)
Grade school	8 (22%)
Home or no daycare	3 (8%)
BMI Markers for child	
Underweight (<5th percentile)	2 (6%)
Normal Weight (5th-85th percentile)	13 (36%)
At-risk for overweight (85th-95th percentile)	8 (22%)
Overweight (>95th percentile)	13 (36%)
Co-morbidities present	
Yes	22 (61%)
No	14 (39%)
Co-morbidities present (N = 22)	
Asthma (only)	10 (39%)
Other medical condition (only)	8 (33%)
Asthma plus another medical condition	4 (11%)
Blood Pressure (Systolic, mm) (N = 33)	
Mean (SD)	104 (13)
Median	101
Range	81-150
Blood Pressure (Diastolic, Hg) (N = 33)	
Mean (SD)	62 (10)
Median	61
Range	28-88

IV.E. Child Dietary Food Sources, Physical and Recreational Activities

Because overweight occurs when energy intake substantially exceeds energy expenditure (Morrill et al, 2004), and that dramatically decreased exercise and increased sugar-sweetened beverage and food consumption patterns in US children have run parallel to climbing childhood obesity statistics, (Warner et al, 2006), it was important to examine this in closer detail in this follow-up study. At least three-quarters of all school-enrolled children attended schools that served breakfast and/or lunch, and also ate from the school cafeteria an average of 4 days a week. Half of all children had between one to four servings of soft drinks (including kool-aid, punch, and soda) per day, and, not including juice, half of all children had between two to six servings of fruit per week. Majority of children (67%) drank between one to four glasses of milk each day while, 7 (19%) drank between 2 to 6 servings of milk per week. Forty-two percent of child participants ate two to six servings per week of vegetables, while 44% ate 1-2 daily vegetable servings. Ninety-four percent of child participants ate meals or snacks at fast food restaurants, such as McDonald's, Burger King, or Wendy's, and, 52% ate fast food meals between one to four times per week. Finally, 60% of overweight versus about 40% of normal weight children ate fast food at least once a week, and drank one or more daily soft-drink servings, though these dietary differences were not statistically different between the two groups ($p=0.19$ and $p=0.36$ respectively; Data shown in Table 22).

Most of these nutritional characteristics did not differ between normal and overweight BMI categories. Results from this study are dissimilar to evidence demonstrating that changing patterns in the way children eat and drink contribute to increased obesity prevalence (Warner et al, 2006). Table 20 illustrates mothers' self-reported dietary food sources of child participants.

Table 20. Dietary Food Sources of Child Participants

Food Sources	**[N (%)]**
School breakfast available	27 (75%)
Days per week when child eats school breakfast	
Mean (SD)	4 (1)
School lunch available	32 (89%)
Days per week when child eats school lunch	
Mean (SD)	4 (1.36)
Soft-drink servings	
1 serving per week or less	8 (22%)
2-6 servings per week	8 (22%)
1-4 servings per day	18 (50%)
5+ servings per day	2 (6%)
Milk servings	
1 serving per week or less	2 (6%)
2-6 servings per week	7 (19%)
1-4 servings per day	24 (67%)
5+ servings per day	3 (8%)
Vegetable servings	
1 serving per week or less	4 (11%)
2-6 servings per week	15 (42%)
1-2 servings per day	16 (44%)
3-4 servings per day	1 (3%)
Fruit servings	
0-3 servings per month	2 (6%)
1 serving per week	3 (8%)
2-6 servings per week	18 (50%)
1 serving per day	6 (17%)
2+ servings per day	7 (19%)
Fast food (times eaten per week)	
Never	2 (6%)
Less than once per week	15 (42%)
1-2 times per week	16 (44%)
3-4 times per week	3 (8%)

In terms of physical activities that make a child sweat or breath hard, (such as running, basketball, soccer), 15 (42%) children engaged in such activities for at least 20 minutes daily, while 11 (31%) participated in these same activities for 0-2 days per week. Nineteen (58%) of 33 school attending children participated in physical education (or gym) at least one day a week, while 27 (82%) of 33 school attending children had recess an average of 3 days a week. Comparing BMI status, children categorized as overweight engaged in less physical activity than children categorized as normal weight. For example, 67% of children with normal weight participated in some type of physical activity 4 or more days per week, while 57% of children who are overweight participated in similar activities 4 or more days a week (Data shown in Table 22).

Majority of mothers (94%) reported that someone in the household owned either a computer or an electronic game like X-Box, Nintendo, or Gameboy. Mothers similarly reported that their children played video games approximately an hour or less on weekdays and weekends, 14 (39%) and 13 (37%), respectively. Twelve-percent of mothers reported that their children play video games for longer periods of time (4 or more hours) on weekends. Approximately 78% of children had a television in their bedroom. Majority (80%) of mothers reported that their child spent 3 or fewer hours watching television on weekdays while 56% (n=20) reported that their child spent at least 4 hours watching television on weekends. Another interesting finding is that children categorized as overweight were more likely to spend two or more hours watching television than children with normal weight (Data shown in Table 22). Table 21 illustrates physical and recreational activities of child participants. Table 22 depicts child overweight categories by select maternal and child characteristics.

Table 21. Physical and Recreational Activities of Child Participants

Child Physical/Recreational Descriptors	[N (%)]
Days per week when child has gym/PE (N=33)	
Mean (SD)	2 (1.28)
Days per week when child has recess (N=33)	
Mean (SD)	3 (1.27)
Days per week engaged in physical activities	
0-1 day	7 (19%)
2-3 days	7 (19%)
4-5 days	7 (19%)
Daily (7 days)	15 (42%)
Time spent watching television (weekdays)	
1 hour or less	7 (19%)
2-3 hours	22 (61%)
4+ hours	7 (19%)
Time spent watching television (weekends)	
None	1 (3%)
1 hour or less	4 (11%)
2-3 hours	11 (31%)
4+ hours	20 (56%)
Time spent playing video games (weekdays)	
None	16 (44%)
1 hour or less	14 (39%)
2-3 hours	6 (17%)
Time spent playing video games (weekends) (N=35)	
None	11 (31%)
1 hour or less	13 (37%)
2-3* hours	7 (20%)
4+ hours	4 (12%)

*No one reported 3 hours of child video playing time on weekends

Table 22. Child overweight categories by select maternal and child characteristics (N=36)

Characteristic	Normal Weight	Overweight	Odds Ratio	95% CI
	Number (%)	Number (%)		
Tobacco use during index pregnancy (N=32)				
Positive	2 (14%)	3 (17%)	1.20	(0.17-8.38)
Negative	12 (86%)	15 (83%)		
PSEI* (self-report data at index pregnancy)				
Low Stress	9 (60%)	9 (43%)	2.00	(0.52-7.69)
High stress	6 (40%)	12 (57%)		
Recent Maternal BMI status (N=31)				
Normal weight	4 (33%)	1 (5%)	9.00	(0.86-98.83)
Overweight	8 (67%)	18 (95%)		
Recent Maternal Hip to Waist Ratio (cm) (N = 30)				
≤0.80	3 (25%)	0 (0%)	3.00	(1.76-5.11)
>0.80	9 (75%)	18 (100%)		
Child Co-morbidities present				
Yes	7 (47%)	15 (71%)	2.86	(0.71-11.44)
No	8 (53%)	6 (29%)		
Breastfed				
Yes	5 (33%)	9 (43%)	1.50	(0.38-5.96)
No	10 (67%)	12 (57%)		
Milk servings				
6 or fewer servings per week	6 (40%)	3 (14%)		
1+ daily servings	9 (60%)	18 (86%)	4.00	(0.81-19.82)
Fruit servings				
6 or fewer servings per week	9 (60%)	14 (67%)		
1+ daily servings	6 (40%)	7 (33%)	.75	(0.19-2.97)
Vegetable servings				
6 or fewer servings per week	9 (60%)	10 (48%)	1.65	(0.43-6.31)
1+ daily servings	6 (40%)	11 (52%)		

Table 22. (Continued)				
Characteristic	**Normal Weight**	**Overweight**	**Odds Ratio**	**95% CI**
Physical Activity				
0-3 days a week	5 (33%)	9 (43%)	0.67	(0.17-2.65)
4+ days a week	10 (67%)	12 (57%)		
Fast food (# times eaten)				
Less than once a week	9 (60%)	8 (38%)	2.43	(0.63-9.47)
1+ times a week	6 (40%)	13 (62%)		
Soft drink servings				
6 or fewer servings per week	8 (53%)	8 (38%)	1.86	(0.49-7.12)
1+ daily servings	7 (47%)	13 (62%)		
Time spent watching TV (each weekday)				
An hour or less a day	4 (27%)	3 (14%)	2.18	(0.41-11.64)
2+ hours each day	11 (73%)	18 (86%)		
Time spent watching TV (weekends)				
An hour or less a day	3 (20%)	2 (10%)	2.38	(0.35-16.36)
2+ hours each day	12 (80%)	19 (90%)		

IV.F. Aim 2: Household Food Insecurity (FI) and Select Maternal Demographic Characteristics

Aim 2 was a descriptive assessment of the 3 pre-defined components of household food insecurity (fully food secure, food insecure with or without hunger, and food insecure with marginal hunger among children; see Chapter 3, operational definitions). For this Aim, descriptive statistics were computed and reported in the tables below.

Majority of households (over 70%) were fully food secure, meaning, there was no evidence that any of the household occupants lived with reduced food intake, hunger or fear of starvation over the previous 12-month period. A small number of respondents were overall food insecure 7 (14%), meaning, that at least one adult household occupant lived with or without hunger at some point in the prior 12-months. Though this sample size was limited it is consistent with national prevalence data among adults: among food insecure adults (n=7) majority were African-American, 5 (71%) and headed by a single female 6 (86%). Only 3 (8%) of the overall study sample were classified as food insecure with marginal hunger among children, meaning, in addition to adult household occupants, the child from the index pregnancy had also lived with reduced food intake, and/or experienced physical sensations of hunger at a point(s) in the prior 12-months.

In terms of factors that might protect against hunger or food insecurity, and dissimilar to what would be expected amongst food insecure adults, 3 (43%) had completed at least some college, the same percentage reported annual household incomes of $30,000 and above, and 5 (71%) were employed at least part-time. Additionally, 4 (57%) of the mothers who reported food insecurity with or without hunger were authorized to receive food stamps over the prior 12-

months to this interview, while 3 (43%) were not. Table 23 describes the 3 food insecurity categories by select maternal demographic characteristics.

Table 23. Household Food Insecurity Categories by Select Maternal Demographic Characteristics

Characteristic	**Total** **N=36**	**Fully Food Secure** **n=26**	**Food Insecure (with & without hunger)** **n=7**	**Food Insecure with marginal hunger among children** **n=3**
	Number (%)	Number (%)	Number (%)	Number (%)
Maternal Race				
African-American	29 (81%)	21 (81%)	5 (71%)	3 (100%)
White	3 (8%)	2 (8%)	1 (14%)	0 (0%)
Other	4 (11%)	3 (12%)	1 (14%)	0 (0%)
Baseline Marital Status				
Single	31 (86%)	22 (85%)	6 (86%)	3 (100%)
Married (or living as married)	5 (14%)	4 (15%)	1 (14%)	0 (0%)
Education Level				
9th-12th grade	10 (28%)	7 (27%)	2 (29%)	1 (33%)
High school diploma or equivalent	16 (44%)	12 (46%)	2 (29%)	2 (67%)
At least some college	10 (28%)	7 (27%)	3 (43%)	0 (0%)
Gross Household Income (Total N=34)				
Less than $10,000	13 (36%)	10 (42%)	3 (43%)	0 (0%)
$10,000-$29,999	11 (31%)	7 (29%)	1 (14%)	3 (100%)
$30,000+	10 (28%)	7 (29%)	3 (43%)	0 (0%)
Employment Status				
Part time or Full-time	20 (56%)	15 (58%)	5 (71%)	0 (0%)
Not employed	16 (44%)	11 (42%)	2 (29%)	3 (100%)
Authorized to receive food stamps in past 12 months (current)				
Yes	24 (67%)	17 (65%)	4 (57%)	3 (100%)
No	12 (33%)	9 (35%)	3 (43%)	0 (0%)
Authorized to receive WIC (current)				
Yes	9 (25%)	6 (23%)	2 (29%)	1 (33%)
No	27 (75%)	20 (77%)	5 (71%)	2 (67%)

Note*: Unless otherwise noted, N's are based on total study sample*
Numbers are rounded to the nearest percent for ease of interpretation

IV.F.1.Aim 2: Household FI and Select Child Health and Demographic Characteristics

At time of re-enrollment in this study, children were 4-7 years of age. Among the 3 food insecure households where the child lived with marginal hunger over the prior 12-months, 2 (67%) were enrolled in kindergarten and had at least one co-morbidity (such as asthma). In this study sample, among the 3 households classified as food insecure with marginal hunger among children, the children were similarly distributed in the underweight, normal weight, and overweight categories, (33%) in each food insecurity category (Table 24). However, amongst households with food insecurity among adults, 57% of the children were already overweight and though had not experienced food insecurity themselves. Majority of children in this study sample were classified as normal birth-weight (2501-3999 grams) across all 3 household food security categories. Moreover, the majority of the children from the index pregnancy were never breastfed. Table 24 describes the 3 food insecurity categories by select child health and demographic descriptors.

Table 24. Household Food Insecurity Categories by Select Child Health and Demographic Descriptors				
Descriptor	**Total** **N=36**	**Fully Food Secure** **n=26**	**Food Insecure (with & without hunger)** **n=7**	**Food Insecure with marginal hunger among children** **n=3**
	Number (%)	Number (%)	Number (%)	Number (%)
Child birthweight (grams)				
<2500	6 (17%)	5 (19%)	0 (0%)	1 (33%)
2501-3999	27 (75%)	19 (73%)	6 (86%)	2 (67%)
4000 or more	3 (8%)	2 (8%)	1 (14%)	0 (0%)
Breastfed				
Yes	14 (39%)	10 (39%)	3 (43%)	1 (33%)
No	22 (61%)	16 (62%)	4 (57%)	2 (67%)
Breastfeeding duration (N=14)				
< one month	3 (21%)	2 (20%)	1 (33%)	0 (0%)
1-12 months	8 (57%)	6 (60%)	2 (67%)	1 (100%)
>12 months	3 (21%)	2 (20%)	0 (0%)	0 (0%)
Child school level				
Day care or Pre-school	8 (22%)	6 (23%)	1 (14%)	1 (33%)
Kindergarten	17 (47%)	13 (50%)	2 (29%)	2 (67%)
Grade school	8 (22%)	6 (23%)	2 (29%)	0 (0%)
Home or no daycare	3 (8%)	1 (4%)	2 (29%)	0 (0%)
Child Age				
Mean (SD)	6 (1)	6 (1)	5 (1)	5 (0)
Range	4-7	4-7	4-6	5
Child BMI marker (kg/m^2)				
Underweight (<5^{th} percentile)	2 (6%)	1 (4%)	0 (0%)	1 (33%)
Normal Weight (5^{th}-85^{th} percentile)	13 (36%)	10 (38%)	2 (29%)	1 (33%)
At-risk for overweight (85^{th}-95^{th} percentile)	8 (22%)	7 (27%)	1 (14%)	0 (0%)
Overweight (>95^{th} percentile)	13 (36%)	8 (31%)	4 (57%)	1 (33%)

Table 24. (Continued)

Descriptor	Total N=36	Fully Food Secure n=26	Food Insecure (with & without hunger) n=7	Food Insecure with marginal hunger among children n=3
Co-morbidities present				
Yes	22 (61%)	15 (58%)	5 (71%)	2 (67%)
No	14 (39%)	11 (42%)	2 (29%)	1 (33%)
Co-morbidities present in child (N = 22)				
Asthma	10 (46%)	7 (47%)	2 (40%)	1 (50%)
Other medical condition (only)	8 (36%)	6 (40%)	2 (40%)	0 (0%)
Asthma plus another medical condition	4 (18%)	2 (13%)	1 (20%)	1 (50%)

Note: *Unless otherwise noted, N's are based on total study sample*

Note: Numbers are rounded to the nearest percent for ease of interpretation

IV.F.2. Aim 2: Household FI & Select Child Dietary Food Sources & Recreational Activities

Results comparing food insecurity and select nutritional intake factors and recreational activities among enrolled children were unclear, particularly given the limited sample size. For example, all 3 of the children living with marginal hunger (over the prior 12 months) were engaged in physical activity daily yet also watched 4 or more hours of television on weekends. In comparison, 46% of children living in fully food secure homes engaged in daily physical activity, and half watched 4 or more hours of television on weekends. In addition, over half of children living in fully food secure homes had at least one soft-drink serving per day and 50% ate fast food at least 1-2 times per week, and children living in households with marginal hunger had slightly higher percentages of soft drink and fast food consumption (67%) compared to .

Results regarding milk, fruit and vegetable consumption among participating children across the food security categories were also inconclusive. Only 19% of children living in homes classified as fully food secure ate 2 or more fruit servings per day. Among the 3 children living with marginal food insecurity, only 1 mother reported that her child had one serving of fruit per day, and the other 2 consumed less than 6 fruit servings per week. The majority of children (73%) living in fully food secure households drank between 1-4 servings of milk per day, while among the 3 classified as food insecure with marginal hunger among the child from the index pregnancy, milk servings were evenly distributed across categories (2-6 servings per week, 1-4 servings per day, and 5 or more servings a day). Also, 46% of children living in fully food secure homes had between 1-2 vegetable servings per day, while, only one out of the three children living with marginal food insecurity had the same amount of vegetable servings per day (33%). Table 25 describes the 3 food insecurity categories by select child dietary food sources and recreational activities.

Table 25. Household Food Insecurity Categories by Select Child Dietary Food Sources and Recreational Activities

Characteristic	**Total** N=36	**Fully Food Secure** n=26	**Food Insecure (with & without hunger)** n=7	**Food Insecure with marginal hunger among children** n=3
	Number (%)	Number (%)	Number (%)	Number (%)
Soft-drink servings				
1 serving per week or less	8 (22%)	8 (31%)	0 (0%)	0 (0%)
2-6 servings per week	8 (22%)	4 (15%)	3 (43%)	1 (33%)
1-4 servings per day	18 (50%)	12 (46%)	4 (57%)	2 (67%)
5+ servings per day	2 (6%)	2 (8%)	0 (0%)	0 (0%)
Fruit servings				
0-3 servings per month	2 (6%)	1 (4%)	0 (0%)	1 (33%)
1 serving per week	3 (8%)	3 (12%)	0 (0%)	0 (0%)
2-6 servings per week	18 (50%)	13 (50%)	4 (57%)	1 (33%)
1 serving per day	6 (17%)	4 (15%)	1 (14%)	1 (33%)
2+ servings per day	7 (19%)	5 (19%)	2 (29%)	0 (0%)
Vegetable servings				
1 serving per week or less	4 (11%)	2 (8%)	1 (14%)	1 (33%)
2-6 servings per week	15 (42%)	12 (46%)	2 (29%)	1 (33%)
1-2 servings per day	16 (44%)	12 (46%)	3 (43%)	1 (33%)
3-4 servings per day	1 (3%)	0 (0%)	1 (14%)	0 (0%)
Milk Servings				
1 serving per week or less	2 (6%)	2 (8%)	0((0%)	0 (0%)
2-6 servings per week	7 (19%)	5 (19%)	1 (14%)	1 (33%)
1-4 servings per day	24 (67%)	19 (73%)	4 (57%)	1 (33%)
5+ servings per day	3 (8%)	0 (0%)	2 (29%)	1 (33%)

Table 25. (Continued)				
Characteristic	**Total** **N=36**	**Fully Food Secure** **n=26**	**Food Insecure (with & without hunger)** **n=7**	**Food Insecure with marginal hunger among children** **n=3**
Fast-food (times eaten per week				
Never	2 (6%)	0 (0%)	0 (0%)	0 (0%)
Less than once per week	15 (42%)	11 (42%)	3 (43%)	1 (33%)
1-2 times per week	16 (44%)	11 (42%)	3 (43%)	2 (67%)
3-4 times per week	3 (8%)	2 (8%)	1 (14%)	0 (0%)
Days per week engaged in physical activities				
0-1 day	7 (19%)	5 (19%)	2 (29%)	0 (0%)
2-3 days	7 (19%)	5 (19%)	2 (29%)	0 (0%)
4-5 days	7 (19%)	4 (15%)	3 (43%)	0 (0%)
Daily (7 days)	15 (42%)	12 (46%)	0 (0%)	3 (100%)
Time spent watching television (weekdays)				
1 hour or less	7 (19%)	7 (27%)	0 (0%)	0 (0%)
2-3 hours	22 (61%)	13 (50%)	7 (100%)	2 (67%)
4+ hours	7 (19%)	6 (23%)	0 (0%)	1 (33%)
Time spent watching television (weekends)				
1 hour or less	5 (14%)	3 (12%)	2 (29%)	0 (0%)
2-3 hours	11 (31%)	10 (38%)	1 (14%)	0 (0%)
4+ hours	20 (55%)	13 (50%)	4 (57%)	3 (100%)

IV.F.3. Aim 2: Household FI & Select Health Risk Behaviors of Participating Mothers

Given growing evidence concerning early life events and longer-term child health outcomes, the relationship between food insecurity and prior select maternal health risk behaviors was explored. Only a small number 2 (29%) of households with food insecurity among adults were exposed to violence during the index pregnancy; the remaining 5 (71%) were not. Similarly, none of the 3 children classified as food insecure with marginal hunger were exposed to violence in-utero. In considering other biologically confirmed markers of drug use, though limited by small sample size, patterns of in-utero drug exposure (tobacco, cocaine and marijuana) among all participants classified as food insecure were similar, and in fact, among the 3 children classified as food insecure with marginal hunger, none were exposed to alcohol use during the pregnancy. However, among all participants classified as food insecure, slightly more had been exposed to current household smoking versus those classified as food secure, as indicated by self-report data.

Empirical literature generally supports a positive association between household food insecurity and overweight among women, which is consistent with this study's findings, where 4 (67%) of food insecure adults with and without hunger were classified as obese, having a BMI over 30 kg/m^2 and 2 (33%) were classified as overweight; no one in this category was normal weight. A related finding includes that among households with food insecurity among adults, most had a hip-to-waist ratio greater than 0.80 cm, 5 (83%), compared with only 1 (17%) having a hip-to-waist ratio less than 0.80 cm. Table 26 describes the 3 pre-defined household food insecurity categories by select health risk behaviors of participating mothers.

Table 26. Household Food Insecurity Categories by Select Health Risk Behaviors of Participating Mothers

Characteristic	Total N=36	Fully Food Secure n=26	Food Insecure (with & without hunger) n=7	Food Insecure with marginal hunger among children n=3
	Number (%)	Number (%)	Number (%)	Number (%)
Exposure to violence during index pregnancy				
Yes	6 (17%)	4 (15%)	2 (29%)	0 (0%)
No	30 (83%)	22 (85%)	5 (71%)	3 (100%)
Tobacco use during index pregnancy (N=32)				
Positive	5 (16%)	2 (9%)	2 (33%)	1 (33%)
Negative	27 (84%)	21 (91%)	4 (67%)	2 (67%)
Cocaine use during index pregnancy (N=30)				
Positive	10 (33%)	7 (30%)	2 (40%)	1 (50%)
Negative	20 (67%)	16 (70%)	3 (60%)	1 (50%)
Marijuana use during index pregnancy (N=33)				
Positive	8 (24%)	4 (17%)	3 (50%)	1 (33%)
Negative	25 (76%)	20 (83%)	3 (50%)	2 (67%)
Alcohol use during index pregnancy (N=32)				
Positive	3 (10%)	3 (13%)	0 (0%)	0 (0%)
Negative	29 (90%)	20 (87%)	6 (100%)	3 (100%)
Current household cigarette use*				
Yes	19 (53%)	13 (50%)	4 (57%)	2 (67%)
No	17 (47%)	13 (50%)	3 (43%)	1 (33%)
Current maternal cigarette use*				
Yes	13 (36%)	8 (31%)	3 (43%)	2 (67%)
No	23 (64%)	18 (69%)	4 (57%)	1 (33%)

Table 26. (Continued) Characteristic	**Total** N=36	**Fully Food Secure** n=26	**Food Insecure (with & without hunger)** n=7	**Food Insecure with marginal hunger among children** n=3
Hip to Waist Ratio (cm) (N = 30)				
≤0.80	3 (10%)	1 (5%)	1 (17%)	1 (50%)
>0.80	27 (90%)	21 (96%)	5 (83%)	1 (50%)
Current maternal BMI status (kg/m^2) (N=31)				
Underweight (below 18.5)	1 (3%)	0 (0%)	0 (0%)	1 (50%)
Normal Weight (18.5-24.9)	4 (13%)	4 (17%)	0 (0%)	0 (0%)
Overweight (25.0-29.9)	8 (26%)	6 (26%)	2 (33%)	0 (0%)
Obese (30 and above)	18 (58%)	13 (57%)	4 (67%)	1 (50%)

**Self-report data from mothers for this follow-up study*

IV.F.4.Aim 2: Household FI & Select Stress Characteristics of Participating Mothers

Empirical evidence indicates that maternal stress perception increases susceptibility to certain health outcomes (ie, infertility, miscarriage, late pregnancy complications, etc.,) (Nakamura, Sheps, & Arck, 2008) as well as to increased risk of adverse longer-term child health outcomes (Middlebrooks & Audage, 2008). As such, this study explored the relationship between household food insecurity by select maternal stress characteristics reported during the index pregnancy from (data from EPS study described in Chapter 3). For this study sample, reported average Index of Spousal Abuse scores (ISA) increased across the household food security categories, or, mean scores for mothers who reported experiencing nonphysical, controlling behavior from the intimate partner during that index pregnancy were highest amongst children currently living with food insecurity and lowest in fully food secure homes. Although the mean perceived stress (PSS) scores were similar across the 3 pre-defined food security categories, mean scores were highest for adults classified as food insecure with and without hunger, indicating that this group of adults also perceived having experienced the most distressing life situations with respect to the month prior to enrollment in the original EPS study.

Mean Prenatal Social Environment (PSEI) scores were similarly highest for adults classified as food insecure with and without hunger, indicating that, on average, participating mothers who had lived with food insecurity over the past year also experienced highest levels of chronic stress during their index pregnancy. For this follow-up study, a subset of 22 (of the 41) questions from the PSEI were used in order to measure current maternal perceived environmental stress (described in Chapter III.D.5). Similar to reported results from the original PSEI measure, scores for the modified stress scale were highest for adults classified as food insecure with and without hunger, indicating that, on average, mothers reporting household food insecurity amongst adults also experienced the highest levels of stress during the year prior to enrollment in this follow-up study. Table 27 describes food insecurity by select maternal stress characteristics.

Table 27. Household Food Insecurity Categories by Select Stress Characteristics of Participating Mothers

Characteristic	**Total** **N=36**	**Fully Food Secure n=26**	**Food Insecure (with & without hunger) n=7**	**Food Insecure with marginal hunger among children n=3**
Prior Stress Scores	Number (%)	Number (%)	Number (%)	Number (%)
PSEI*				
Mean (SD)	11 (5.43)	11 (5.24)	16 (9.06)	9 (2.00)
Median	10	10	17	9
PSS**				
Mean (SD)	5 (3.35)	5 (2.89)	8 (4.39)	4 (3.06)
Median	5	4	9	3
ISA***				
Mean (SD)	16 (5.95)	15 (6.46)	17 (3.18)	20 (1.73)
Median	15	13	18	19
Current perceived maternal stress****				
Mean (SD)	17 (3.14)	17 (3.40)	18 (1.98)	16 (3.46)
Median	17	17	17	14

*PSEI=Prenatal Stress Inventory Index (Scale range: 0 – 41); **PSS=Perceived Stress Scale (Scale range: 0 – 16)
***ISA=Index of Spousal Abuse (Scale range: 0 – 40); ****Current maternal perceived stress (22 questions derived from PSEI, questions specifically addressing perceived stress during pregnancy were omitted for this follow-up study as well as other perceived environmental stressors to reduce respondent burden; Cronbach-alpha of 0.65, discussed in Chapter III.D.5)

IV.G. Aim 3: Analysis of Associations between Child and Maternal Exposures and Household Food Insecurity

To analyze Aim 3, bivariate analyses were conducted to examine possible associations between relevant exposures described above and household food insecurity. Due to the limited sample size, household food insecurity categories were collapsed for purposes of this aim in order to minimize spurious associations as much as possible (food secure vs. food insecure).

In all of the bivariate analyses, no significant relationships were detected between maternal or child demographic, health and social-environmental characteristics and the risk of food insecurity (see Tables 28-32). There were also no significant findings between food insecurity and dietary food sources and recreational activities for children in this study sample. In fact, the majority of the children in both FI groupings had one or more soft-drink servings per day and ate fast food at least once a week (Table 30).

Although no significant relationships with household food insecurity were detected, over 80% of children on both groups were born at a normal birthweight, and upon participation in this subsequent study, (i.e., 4-7 years of age), approximately 60% of children in both groups, as determined through clinical assessment, were classified as overweight. Similarly, over 80% of participating mothers in both food secure and food insecure groups were overweight. Contrary to what would be expected, mothers reporting household food security 96% had a hip-to-waist ratio above 0.80 cm, while only 75% of those households categorized as food insecure had the same results. This finding was non-significant (p=0.17), though this marginal inverse association is interesting, since, food secure households show little to no evidence of reduced food quality, supply or food intake; therefore, it would be expected that these same households would have lower hip-to-waist ratio results than food insecure households (Data shown in Table 31).

Another interesting finding was that all children in food insecure households and 73% of children in food secure households watched 2 or more hours of television on weekdays. Though this finding is non-significant, the p-value of 0.16 indicates that children in food insecure households are marginally more likely to engage in sedentary activities than those in food secure households (Data shown in Table 30).

Though no statistically significant associations were detected between any of the select perceived maternal stress characteristics and current household food insecurity, within two of the measures used for the EPS study were interesting (Data shown in Table 32). Mean Prenatal Social Environment Index (PSEI) scores were higher for food insecure households, (p=0.15), indicating that, food insecure households were slightly more likely to experience higher stress during the index pregnancy than food secure households. Similarly, food insecure households were slightly more likely to experience violence (as reported through the Index of Spousal Abuse-ISA) by an intimate partner during the index pregnancy, (p=0.14).

Finally, trends were indicated for one of the biologically confirmed markers of drug use, (in-utero tobacco use), suggesting that, substance use during pregnancy may be linked to current household food insecurity (Table 31). Approximately 75% of the entire study sample tested negative for in-utero tobacco use during the index pregnancy, however, among mothers where tobacco use was biologically confirmed, a slightly higher proportion of households classified as food insecure tested positive for in-utero tobacco use during the index pregnancy (33% vs. 9%; p=0.12). Similarly, more than one-half of the overall study sample tested negative for in-utero marijuana use during the index pregnancy. Yet, among those who tested positive, food insecure households were slightly more likely to have positive marijuana results in-utero (44% vs. 17%; p=0.17). Tables 28-32 provide results for Aim 3.

Table 28. Measures of Association between Household Food Insecurity and Socio-Demographic Characteristics of Mothers

Characteristic	Fully Food Secure n=26	Food Insecure n=10	Odds Ratio (OR)	95% CI	p-value
	Number (%)	Number (%)			
Maternal Race					
African-American	21 (81%)	8 (80%)	0.95	(0.15-5.94)	1.00
non African-American	5 (19%)	2 (20%)			
Education Level					
Did not complete high school	7 (27%)	3 (30%)	1.16	(0.23±5.80)	1.00
Completed high school	19 (73%)	7 (70%)			
Gross Household Income* (Total N=34)					
Less than $10,000	10 (42%)	3 (30%)	1.67	(0.34-8.07)	0.70
$10,000 or more	14 (58%)	7 (70%)			
Employment Status					
Not Employed	11 (42%)	5 (50%)	0.73	(0.17-3.17)	0.677
Employed	15 (58%)	5 (50%)			
Authorized to receive food stamps in past 12 months (current)					
Yes	17 (65%)	7 (70%)	1.24	(0.26-5.97)	1.00
No	9 (35%)	3 (30%)			
Authorized to receive WIC (current)					
Yes	6 (23%)	3 (30%)	1.43	(0.28-7.30)	0.686
No	20 (77%)	7 (70%)			

Table 29. Measures of Association between Household Food Insecurity Child Demographic and Health Risk Factors

Characteristic	Fully Food Secure n=26	Food Insecure n=10	Odds Ratio (OR)	95% CI	p-value
	Number (%)	Number (%)			
Birthweight					
Underweight	5 (19%)	1 (10%)	2.14	(0.22-21.01)	0.655
Normal weight	21 (81%)	9 (90%)			
Breastfed					
Yes	10 (39%)	4 (40%)	1.07	(0.24-4.74)	1.00
No	16 (62%)	6 (60%)			
Breastfeeding duration (N=14)					
≤ 6 months	6 (60%)	4 (100%)	0.60	(0.36-1.00)	0.251
> 6 months	4 (40%)	0 (0%)			
Child school level (N=33)					
Pre school	6 (24%)	2 (25%)	0.95	(0.15-5.99)	1.00
Grade school	19 (76%)	6 (75)%			
Co-morbidities present					
Yes	15 (58%)	7 (70%)	1.71	(0.36-8.12)	0.706
No	11 (42%)	3 (30%)			
Child BMI status					
Normal weight	11 (42%)	4 (40%)	1.10	(0.25-4.86)	1.00
Overweight	15 (58%)	6 (60%)			

Table 30. Measures of Association between Household Food Insecurity and Dietary Food Sources and Recreational Activities

Characteristic	Fully Food Secure n=26	Food Insecure n=10	Odds Ratio (OR)	95% CI	P-value
	Number (%)	Number (%)			
Milk servings*					
6 or fewer servings per week	7 (27%)	2 (20%)	1.47	(0.25-8.70)	1.00
1+ daily servings	19 (73%)	8 (80%)			
Fruit servings*					
6 or fewer servings per week	17 (65%)	6 (60%)	1.26	(0.28-5.65)	1.00
1+ daily servings	9 (35%)	4 (40%)			
Vegetable servings*					
6 or fewer servings per week	14 (54%)	5 (50%)	1.17	(0.27-5.02)	0.836
1+ daily servings	12 (46%)	5 (50%)			
Physical Activity*					
0-3 days a week	10 (39%)	4 (40%)	0.94	(0.21-4.12)	1.00
4+ days a week	16 (62%)	6 (60%)			
Fast food (# times eaten)					
Less than once a week	13 (50%)	4 (40%)	1.50	(0.34-6.59)	0.717
1+ times a week	13 (50%)	6 (60%)			
Soft drink servings					
6 or fewer servings per week	12 (46%)	4 (40%)	1.29	(0.29-5.66)	1.00
1+ daily servings	14 (54%)	6 (60%)			
Time spent watching TV (each weekday)					
An hour or less a day	7 (27%)	0 (0%)	0.73	(0.58-0.92)	0.155
2+ hours each day	19 (73%)	10 (100%)			
Time spent watching TV (weekends)					
An hour or less a day	3 (12%)	2 (20%)	0.52	(0.07-3.71)	0.603
2+ hours each day	23 (88%)	8 (80%)			

*Classifications based on approximate USDA daily food serving recommendations (www.mypyramid.gov—*Inside the pyramid*)

Table 31. Measures of Association between Household Food Insecurity and Health Risk Behaviors of Mothers

Characteristic	Fully Food Secure n=26	Food Insecure n=10	Odds Ratio (OR)	95% CI	P-value
	Number (%)	Number (%)			
Exposure to violence during index pregnancy					
Yes	4 (15%)	2 (20%)	1.38	(0.21-9.02)	1.00
No	22 (85%)	8 (80%)			
Tobacco use during index pregnancy (N=32)					
Positive	2 (9%)	3 (33%)	5.25	(0.71-39.03)	0.121
Negative	21 (91%)	6 (67%)			
Cocaine use during index pregnancy (N=30)					
Positive	7 (30%)	3 (43%)	1.71	(0.30-9.77)	0.657
Negative	16 (70%)	4 (57%)			
Marijuana use during index pregnancy (N=33)					
Positive	4 (17%)	4 (44%)	5.33	(0.73-21.83)	0.17
Negative	20 (83%)	5 (56%)			
Alcohol use during index pregnancy (N=32)					
Positive	20 (87%)	9 (100%)	0.69	(0.54-0.88)	0.541
Negative	3 (13%)	0 (0%)			
Current maternal cigarette use					
Yes	8 (31%)	5 (50%)	2.25	(0.51-10.02)	0.282
No	18 (69%)	5 (50%)			
Current household cigarette use					
Yes	13 (50%)	6 (60%)	1.50	(0.34-6.59)	0.717
No	13 (50%)	4 (40%)			
Maternal BMI status (N=31)					
Normal weight	4 (17%)	1 (13%)	1.47	(0.41-15.55)	1.00
Overweight	19 (83%)	7 (88%)			
Hip to Waist Ratio (cm) (N = 30)					
≤0.80	1 (5%)	2 (25%)	0.14	(0.01-1.86)	0.17
>0.80	21 (96%)	6 (75%)			

Table 32. Measures of Association between Household Food Insecurity and Mean Stress Scale Scores of Participating Mothers

Characteristic	Fully Food Secure n=26	Food Insecure n=10	df	t	p-value
Prior Stress Scores					
PSEI					
Mean (SD)	10.46 (5.24)	13.80 (8.16)	34	-1.459	0.154
PSS					
Mean (SD)	4.84 (2.89)	6.40 (4.30)	34	-1.256	0.218
ISA					
Mean (SD)	14.58 (6.46)	17.80 (3.12)	34	-1.503	0.142
Current Stress					
Mean (SD)	16 (3.40)	17 (2.44)	34	-0.626	0.536

IV.H. Selection Process For Developing Multivariate Models Predicting Child Overweight

Overall, due to the limited sample size, and as far as all preliminary results have shown, relationships between recent child weight status and prior maternal/household food insecurity were indeterminable. However, interesting trends were found among certain maternal influences and child factors that are worthy of further statistical review. Before developing final predictive models to analyze Aim 4, a correlation matrix (data shown in Table 33) was created to better estimate possible relationships between maternal and child influences. In addition to maternal/child food insecurity, the following maternal influences were selected: drug use in-utero (marijuana/cigarettes), exposure to chronic stress during the index pregnancy, current maternal weight, and waist/hip ratio. The following child influences were also selected: presence of a co-morbidity, current child weight, and frequency of fast food servings. Certain factors were chosen because of increasing evidence linking pregnancy risk factors to adverse long-term child health outcomes. Other factors were chosen because of established evidence directly linking maternal obesity to child overweight.

While most of these bi-variate analyses yielded non-significant results, drug use in-utero was significantly related. For instance, mothers who tested positive for tobacco use during the index pregnancy were also likely to test positive for marijuana use, as determined through biological confirmation. In addition, marginal significance was detected between in-utero tobacco use during the index pregnancy and experience of high chronic stress (measured via the self-reported Prenatal Stress Environmental Inventory (PSEI) scores) ($p=0.053$). There were also significant results between certain maternal factors and child factors, which are also consistent with previous findings, and, current child weight status was significantly related to current maternal BMI as well as maternal waist/hip ratio ($p=0.05$ respectively).

Similarly, results for this study mirror general consensus about known protective benefits of breastfeeding. For example, marginal significance was demonstrated with whether or not a child was breastfed and maternal drug use (marijuana) during the index pregnancy ($p=0.051$). In addition, marginal significance was demonstrated between breastfeeding practices and mothers' current weight status ($p=0.063$). These findings indicate that mothers who reported breastfeeding were slightly less likely to test positive for marijuana use during that pregnancy. Moreover, mothers who reported having breastfed their infant were less likely to be overweight. While the relationship between child fast food frequency and current maternal BMI was non-significant, there is a trend of $p=0.09$ (Data shown in Table 29). Finally, one unexpected finding includes a significant association between current maternal BMI and presence of a co-morbidity in the child ($p=0.05$).

Table 33. Pearson Correlation Matrix Among Select Maternal and Child Health Characteristics

	Food Insecurity	Tobacco use (in-utero)	Marijuana use (in-utero)	Chronic stress (in-utero)++	Maternal waist/hip ratio	Maternal BMI (current)	Child ever breastfed	Current child weight	Presence of co-morbidity (child)
Tobacco use (in-utero)	0.305								
Marijuana use (in-utero)	0.289	0.547**							
Chronic stress (in-utero)++	0.194	0.345	0.268						
Maternal waist/hip ratio	-0.302	0.104	-0.094	0.067					
Maternal BMI (current)	0.058	0.169	0.269	-0.307	0.149				
Child ever breastfed	0.014	-0.181	-0.343	0.089	0.291	-0.338			
Current child weight	0.021	0.033	-0.052	0.189	0.408*	0.372*	0.576		
Presence of co-morbidity (child)	0.113	0.156	-0.013	-0.089	-0.254	0.408*	0.763	0.250	
Fast food frequency	0.090	-0.086	0.124	-0.162	0.134	0.307	0.686	0.216	0.159

**Correlation is significant at 0.01 significance level (2-tailed)

* Correlation is significant at 0.05 significance level (2-tailed)

+ Subsequent exploratory models focus on in-utero tobacco use versus marijuana use because of confirmed evidence regarding adverse health outcomes for mothers and children as a result of smoking cigarettes

++While this data is not shown, the PSEI, earlier described, was highly correlated with the Perceived Stress Scale, (PSS). Therefore, this study focused on the factor more directly related to stress during pregnancy (PSEI), over a more general focus on stressful life events (PSS). The Index of Spousal Abuse (ISA) was not significantly correlated with either stress scale.

IV.I. Aim 4: Exploratory Multivariate Regression Models

A range of early life factors are generally thought to influence long-term child health outcomes, including cigarette use during pregnancy, whether the child was breastfed, maternal (or paternal) BMI, or chronic stress during pregnancy. Similarly, a number of intermediate steps occur in the pathway linking maternal exposures (like pregnancy risk factors) with direct environmental and behavioral child exposures. Given the small sample size, multivariate models exploring the independent effects of these exposures to child overweight were evaluated through separate models. The primary outcome was collapsed for analytic using standard CDC cutoffs for normal child weight versus child overweight (two children were classified as underweight in this study sample, these cases were included in the normal weight category. Child overweight was defined as having a BMI for age and gender greater than the 85^{th} percentile, therefore, children classified as at-risk for overweight and child overweight were combined into one group. Odds ratios (OR) and 95% CI's for indicators of interest were reported separately. The first model included household food insecurity and select prenatal factors (i.e., chronic stress and tobacco use) predicting child overweight, the second model included household food insecurity and select current maternal and child risk factors (i.e., child co-morbidity and current maternal BMI) predicting child overweight, and the third model included household food insecurity and select current child health and nutritional risk factors (i.e., fast food frequency and child comorbidity) predicting child overweight.

For Model 1 (Table 34 below), household food insecurity was dichotomized using earlier discussed cut-offs for food secure vs. food insecure (0-1 affirmative responses to one or fewer FI scale items=food secure; food insecure=affirmative response to 2+ items). Similarly, chronic stress in-utero was determined through creating a summary score of "yes" responses to the self-reported PSEI (Prenatal Social Environmental Index) questions, and subsequently categorized using the frequency distribution scores to differentiate between *high* (range: 12-31) versus *low* stress (range: 8-11). Tobacco use in utero was confirmed through results of urinalysis (presence or absence of cotinine). According to findings below, mothers who reported elevated chronic stress during the index pregnancy were more likely to have an overweight child. Contrary to what might be expected, mothers with confirmed tobacco use during the index pregnancy were only slightly more likely to currently have an overweight child. However, these results were non-significant.

Table 34. Child overweight predictor model 1-select prenatal factors & household food insecurity

Characteristic	Adjusted Odds Ratio (AOR)	95% CI	p-value
Household Food Insecurity	0.876	(0.17-4.55)	0.875
Chronic stress in-utero	1.45	(0.31-6.75)	0.634
Tobacco use in-utero	1.06	(0.12-9.15)	0.957

In Model 2 (Table 35 below), household food insecurity was explored in combination with current maternal and child health factors where earlier associations were found. Presence of a child co-morbidity (yes/no) was obtained through adult self-reported data. Maternal BMI was collapsed for analytic purposes using standard CDC cutoffs for defining adult normal weight versus adult overweight (one subject was underweight in this study sample, this case was included in the normal weight category, or less than 24.9 kg/m^2). Maternal overweight was defined as having a BMI greater than 25 kg/m^2, therefore, maternal overweight and obese categories were combined. Consistent with established findings, maternal overweight in this study was predictive of child overweight status, and mothers who were overweight were at least 10 times more likely to have an overweight child (marginally significant results).

Table 35. Child overweight Predictor Model 2--select combined maternal and child risk factors			
Characteristic	**Adjusted Odds Ratio (AOR)**	**95% CI**	**p-value**
Maternal BMI	10.65	(0.80-140.94)	0.073
Child co-morbidity present	0.741	(0.12-4.69)	0.751
Household Food insecurity	0.986	(0.16-5.93)	0.988

For Model 3 (Table 36), household food insecurity was explored in conjunction with select current child health risk factors (presence of a comorbidity), and nutritional risk factors (frequency of fast-food intake). Fast-food intake was obtained through maternal self-report data and dichotomized by number of times eaten per week (<1 per week vs. 1+ times per week). As shown in Table 36, there was at least a two fold increase in presence of childhood overweight given the presence of a co-morbidity or frequent fast-food consumption, meaning, children with at least one comorbidity and children who ate fast food at least once a week were twice as likely to be overweight than children without a co-morbidity or children without frequent fast-food consumption (results non-significant).

Table 36. Child overweight Predictor Model 3--select child health and nutritional risk factors			
Characteristic	**Adjusted Odds Ratio (AOR)**	**95% CI**	**p-value**
Child co-morbidity present	2.64	(0.64-10.98)	0.18
Fast-food frequency	2.21	(0.54-9.00)	0.268
Household Food insecurity	0.89	(0.19-4.18)	0.887

Because of the strong relationship between current maternal BMI and child weight status, the next series of models explored how maternal factors might be particularly connected to predicting child overweight. For Model 4, maternal influences were considered separate from childhood risk factors, and included examining tobacco use in-utero, current maternal BMI and breastfeeding practice (ever breastfed; yes/no) in predicting child overweight. While results should be interpreted with caution because of the small sample size, mothers who are overweight are nearly 24 times more likely than normal weight mothers to have an overweight child, and this result was statistically significant after adjusting for cigarette use and breastfeeding (see Table 37). Similarly, considering only child health risks and environmental exposures (fast food frequency, presence of a co-morbidity), maternal BMI still remains a strong predictor of child overweight; mothers who are overweight are nearly 9 times more likely to have an overweight child than mothers who are normal weight (see Table 38).

Table 37. Child overweight Predictor Model 4—select maternal pregnancy influences & maternal BMI

Characteristic	**Adjusted Odds Ratio (AOR)**	**95% CI**	**p-value**
Tobacco use in-utero	1.70	(0.12-24.58)	0.699
Child breastfed	6.27	(0.59-67.05)	0.129
Maternal BMI	23.67	(1.21-464.34)	0.037

Table 38. Child overweight Predictor Model 5—select child risk factors & maternal BMI

Characteristic	**Adjusted Odds Ratio (AOR)**	**95% CI**	**p-value**
Fast-food frequency	1.65	(0.33-8.26)	0.542
Child co-morbidity present	0.73	(0.11-4.65)	0.737
Maternal BMI	8.96	(0.64-126.33)	0.104

Though not central to earlier analyses, given links between maternal stress during pregnancy to longer term maternal and child health outcomes, a model was developed looking at a subset of questions similar to those described within the Prenatal Social Environmental Index (PSEI), to assess current maternal stress perception. Positive responses to this 22-item subscale were counted to create summary scores and the frequency distribution was used to differentiate between *high* (range: 12-22) versus *low* (range: 8-11) current maternal stress. Mother's who reported high current stress were nearly 2 times more likely to have an overweight child (similar to the odds of having an overweight child among mother's reporting high chronic stress during pregnancy; results non-significant). Maternal BMI remained a significant predictor of child overweight in this model.

Table 39. Child overweight Predictor Model 6--select maternal pregnancy and current stress scores and maternal BMI

Characteristic	**Adjusted Odds Ratio (AOR)**	**95% CI**	**p-value**
Current life-stress	1.84	(0.35-9.66)	0.472
Chronic stress in-utero	2.40	(0.39-14.92)	0.348
Maternal BMI	15.62	(1.15-211.69)	0.039

IV.J. Post Hoc Power Analyses

Because accrual goals were not met, (N=220), assessing meaningful differences between food secure and food insecure households as originally hypothesized was compromised. Therefore, using a readily available statistical program (www.openepi.com), post-hoc power calculations were assessed using the enrolled study sample (N=36) to determine if any differences could be detected between food secure (n=26) and food insecure (n=10) households by varying power. Given a two-sided Fisher's exact test and a Type 1 error set to 0.05, in all of the analyses, only large differences could be detected. For example, given the above-mentioned parameters, only 22% power is achieved to detect a 3-fold difference between the food secure and food insecure groups and the child overweight outcome. Results from these analyses are presented in Table 40.

Table 40. Post Hoc Analyses—Detectable Differences between Food Secure/Insecure Households and Child Overweight Outcome by Varying Power

Power	Food Insecure (n=10)	Food Secure (n=26)	Detectable Difference OR's	Target Alpha	Actual Alpha	Beta
22%	80%	57%	3.00	0.05	0.022	0.78
32%	84%	57%	4.00	0.05	0.022	0.68
41%	87%	57%	5.00	0.05	0.022	0.59
48%	89%	57%	6.00	0.05	0.022	0.52
53%	90%	57%	7.00	0.05	0.022	0.47
57%	91%	57%	8.00	0.05	0.022	0.43
60%	92%	57%	9.00	0.05	0.022	0.40
63%	93%	57%	10.00	0.05	0.022	0.37

IV.K. Results Summary Statement

A series of models were developed to explore combinations of relevant maternal and child influences in predicting child overweight. The only factor remaining consistently predictive of child overweight was maternal BMI. Evidence suggests that having one overweight parent alone is predictive of child overweight (Evers et al, 2007; Whitaker et al, 1997). While this study sample was small, these findings are consistent with empirical evidence, which reinforces the notion that childhood obesity may be more effectively prevented when treating the whole family. In addition, process notes were created in order to better characterize the study sample (see Appendix N-O for Process Notes and Neighborhood characteristics). The next chapter will discuss study findings in more detail, discussing serendipitous findings, and, drawing appropriate conclusions and implications for public health agendas and future research.

CHAPTER 5

DISCUSSION

V.A. Summary of Results

V.A.1. Brief Summary

The purpose of this follow-up study was to re-enroll a randomly selected 20% subset (N=220) of the same women who participated in the Early Pregnancy Study (EPS); the minimal number of participants needed to detect meaningful differences between food secure and food insecure households in predicting child overweight outcomes. However, by the close of recruitment, (see Appendix F for timeline of recruitment procedures), only 36 women (and their child) were successfully re-enrolled. Post-hoc power analyses on the actual sample further confirmed that even by varying power as low as 21%, the odds ratio needed to detect differences between food secure and food insecure households in predicting overweight was at least 3-fold. Recruitment setbacks endured throughout, giving rise to Aim 1 (which explored differences between non-participants and participants in this follow-up study) as well as less explored conundrums about the process of retaining as well as less informed characteristics about this study population. The results and implications of the recruitment strategies used for this follow-up study and Aim 1 are discussed below.

V.B. Recruitment Results

V.B.1 Recruitment Setbacks

Several studies have documented the difficulties with attrition in longitudinal studies (Chretien et al, 2007; Shavers et al, 2002). In anticipation of high attrition as a result of a 6-year time difference from original study participation to this follow-up study, several mechanisms were in place early on to try and offset the impact this time lag could have on recruitment and re-enrollment endeavors. For example, IRB approval was obtained to abstract demographic and health encounter information from 3 different electronic [hospital] medical record (EMR) databases, mass mailings were conducted, and follow-up phone calls were made to validate or "rule out" as many contact numbers listed in the EPS data form and resulting from the EMR review, all of which were conducted on an ongoing basis. In addition, one of the members of the original EPS study team (a licensed Social Worker) was also able to participate in recruitment efforts for this follow-up study, providing some continuity in terms of research personnel and understanding of the study population. Due to her institutional affiliation, she was also the research member of this follow-up study who had permission to access demographic and other relevant information from the 3 IRB approved EMR databases. Finally, when possible, 2 trained interviewers participated in the in-home assessment and administering of the interview to mothers.

Even with the above mechanisms in place, major setbacks occurred in recruitment efforts for this follow-up study. For example, while 220 women were randomly identified for purposes of re-contacting them, abstraction of first level demographic information using EMR data was not complete for the entire selection within the given time frame. Resources and "manpower" were still limited, since, as stated above, only one research member was permitted to access EMR data, and this was on limited time. Along these lines, due to other commitments, the person responsible for EMR data abstraction was unable to continue with this task through the entire recruitment phase. However, among women sent letters introducing the follow-up study (N=160), most were matched to EMR information.

Moreover, EMR data was not always available because most recent contact information was only as recent as 2001, and when EMR data was available, it was not always up-to-date, and was limited to women who had a healthcare encounter within HUP's system (and within the bounds of IRB approved hospital databases). Thus, even with available EMR, contact information on those who sought healthcare elsewhere (ie, outside of HUP's healthcare network) or had a residential change was outdated and unknown. Following EMR data abstraction, a list was generated to 1 or 2 trained research staff when possible, to make phone calls to all numbers listed and to rule out contact numbers. Upon successful contact, study eligibility was assessed and an in-home interview with the mother and her child was scheduled. This often required multiple phone calls and sometimes multiple visits to accommodate participant schedules. Recruitment efforts for this study proved laborious and challenging, and attrition rates were particularly high. Overall, of the entire available sample for this follow-study only 22% were successfully enrolled.

Studies have documented the importance of tailoring recruitment and follow-up methods to maximize retention of participants at higher risk for drop-out, because of minority status, education level, and income, (Milburn, Gary, Booth, & Brown, 2006; Corbie-Smith, 2004; Shavers, Lynch, & Burmeister, 2002; Blumenthal, Coates, Williams, & Liff, 1995). Other studies note the importance of community based participatory research in designing public health agendas in certain subgroups, in order to "gain a better understanding of the social context in which disease outcomes occur, while involving community partners in the research process, and insuring that action is part of the research process itself" (Kumanyika & Grier, 2006; Cook, 2008; Savage, Xu, Lee, Rose, Kappesser, & Anthony, 2006; Leung, Yen, & Minkler, p. 499, 2004). A related concept involves taking a grassroots approach to engaging minority participants in research (Kumanyika et al, 2006). Beyond anticipated time costs of making multiple phone calls and in some cases, going to a person's home multiple times before an interview was successfully completed, safety concerns became paramount. It was important to travel in pairs, which, inevitably had to be appropriately balanced against obtaining earlier designated enrollment numbers.

On weekdays, and during school months for children, interviews in the woman's home generally took place after 5:00pm and some interviews took place as late as 8:00pm. During the initial recruitment phase, enrollment took place during the fall/winter season, when the sun naturally goes down earlier in the day. Coordinating in home study visits with two interviewers present was not always possible. In cases where an interview was scheduled and the neighborhood deemed safe to travel into alone based on zip code and general knowledge of area, the interviewer was still able to opt out of going into a participants home if she felt hesitant or threatened by the surrounding environment in any way.

Neighborhood safety evaluation was admittedly subjective because perception of actual threat varies with the individual, (since one persons perception of what constitutes a threat could have been much higher or lower depending on their own upbringing, exposure to different types of neighborhoods and communities, or clinical training and expertise for example), though a "quick" safety assessment was an important general "rule of thumb" to follow as a measure of protection for the researcher. After two unsuccessful attempts to meet with a woman in the winter season during the day, a 3rd attempt was made to schedule the interview, and, the interviewer and mother agreed to a 7:00pm interview time. She called a second interviewer, and inquired about availability to travel to the woman's home together. The recruiter commented that, while she believed the area to be generally safe, that the actual block the participant lived on "felt" unsafe. Knowing that the interviewee was home and willing to participate, she did not want to pass up the opportunity to potentially re-enroll someone. Process notes from this encounter are detailed below.

> Each time I said "it [the street area] didn't seem "that bad," she [the other interviewer] would respond, "you'll see." As soon as we made a right at this particular stop light, I was almost embarrassed at how "broken" the block appeared…[it] was nearly pitch black, incredibly desolate, narrow, visible garbage on the street, and abandoned homes… "third world" came to mind. I noticed that when we got on the block, she made a u-turn in order to park, and, when I asked her why she did that, she said, "I want to face the car so that when we get out of here we can just shoot out quickly." … Once inside we were greeted by an adolescent female, who went to get the mom. The front door opened directly into the kitchen … the smell from the garbage was unbearable, and there were at least four young, (maybe adolescent ages) females sitting and/or standing around the stove, with the oven door wide open. While we did not go past the kitchen area, the rest of the house appeared dark, and when the mother came out, she was holding a toddler. I did not hear the full exchange between her and the mother, we left the house and were back in the car within 5 minutes. Though I was relieved, I was wondering why we had left so quickly. As we were driving away, she commented that, the mother was not eligible, and had lost custody of the child that the assessment would need to be completed with. Then, I was wondering why eligibility had not been determined through the initial phone screen. In this particular situation, she explained that, because the mother had so many children that she still had custody of, that it was hard to really be sure that she did not have custody of the child we needed to assess without further in-person follow-up. What was more interesting is that she explained to me that the reason why the kids were sitting in the kitchen around the stove was to get heat, and that most likely, the rest of the electricity and heat in the house were shut off. (Full observation in Appendix P).

This example is a more salient one in terms of setting clear parameters for balancing exposure to risk for the researcher with need for increasing accrual results, since, the safety concerns and time costs were insurmountable, and did not result in successful re-enrollment anyway. In other situations, this "threat" was much less obvious, and much more "subjective," such as pitbulls being within steps of the researchers, or households being infested with roaches. In one case, the adult participants mother was visiting at the time, and asked one of the interviewers if she would be willing to give her and her grandson a ride, since, she was going in the same direction at the close of the interview. In other cases, neighborhoods that "appeared" safe to the researcher were not described as safe by the women themselves, as noted by spontaneous participant comments.

Process Note 2.
During one scheduled study visit, the interviewers had planned to debrief outside of her home when finished, since, upon parking, met up and decided that the neighborhood was safe and that it would be fine to do so following interview completion. It was interesting because, we both assumed the neighborhood would not be "too unsafe" and were traveling in pairs during summer months (and it was still daylight outside). … Just after thanking the mother for her time, and before leaving, the mother peeked through the shades (which were closed shut the entire time we were there) and spontaneously commented that there was just a "shootout" the night before on her block, and, that was why the block was particularly quiet the day we were there. She said that there were bullet holes in her father's car, where stray bullets had hit. She also commented that it was much safer to keep her child in the house. When we left the house, we did not debrief and instead, called each other from our cell phones once we got to our cars. We agreed that we should just talk later instead, though also both expressed our shared sentiment that, "it [the block/neighborhood] didn't seem unsafe" [on the surface].

Roaches were present in some of the households and one was infested with roaches. In one observation,

"… There were a lot of row homes, and we just seemed out of place ... A black woman opened the door, w/ three children (boys, aged maybe 4-7), running behind her. Her hair was in long braids (with extensions), and they were memorable because, the style of her hair--one side of the braids was clearly covering her eye. … Her house was dimly lit, very cluttered, and there was a man upstairs. The kids were running back and forth from the couch to the back of the house, and K and I sat together on one couch, getting everything done. Her house felt very dirty and K was moving faster than usual. … I saw one roach the entire time … When we left, I saw several people outside, who also stared in our direction. K was shaking the bags outside of the car, and I couldn't figure out why. She grabbed my bags too, and also started shaking those, and I told her to hurry up and get in the car. She looked around and saw why I was asking her to (because it was an unfamiliar, unwelcoming, and uncomfortable environment) and moved quickly, hopped in the car and said, I just didn't want any roaches to be in the bags. I hadn't even thought about that. She asked if I saw all the roaches crawling up the wall behind where the mom was sitting, (behind a pipe), I wasn't sitting quite in that area, and told her I was so thankful I didn't see that." (Full observation in Appendix N)

Overall, despite addition of a centralized study site (see Recruitment Site section, III.C.1.) to address some of these safety and perhaps boundary issues, participants were not willing to travel to North Philadelphia. The implications of the above results are compelling, and can be interpreted along related thematic categories:

Implications:

1) Re-think the poverty paradigm in exploring determinants of childhood obesity to better characterize certain subgroups. Participants for this study were categorized along usual socio-demographic proxies, (ie, "urban" population, low-income African-American women, etc.,) though this only captures a piece of the picture. While participants for this study did not live in "extreme poverty," since, they were able to meet their own basic needs of food, water, shelter and sanitation, their experiences of poverty were still severe and likely poorly understood. Along these lines, in considering the above mentioned observations, "abject poverty" should treated as a different but related concept of poverty, and because the conditions of abject poverty are significantly different from how poverty is currently thought of, researchers and policy makers need to expand efforts to parse out differences in circumstances of poverty to better characterize and meet the needs of particular sub-groups.

2) Consider alternative, "obesogenic risk factors." While this follow-up study did not measure neighborhood safety or the role of social support systems in influencing child weight outcomes, in lieu of heightened safety concerns in this follow-up study, future studies should consider decreased opportunity(ies) for young children to engage in exercise or physical activity outdoors as a result of their neighborhood environment and subsequently measure the extent to which immediate neighborhood environment acts as a risk-factor in influencing child overweight outcomes.
3) Explore micro and systemic level influences together. This follow-up study was limited in scope since it only explored risk factors and health outcomes within a child's very immediate (micro-system level) environment (ie, pre-natal and current maternal, self, household, and school influences; refer to Figure 5).

V.C. Neighborhood Characteristics

A brief search of socio-economic descriptors (neighborhood racial make-up, average household income, and average home value) by zip code for this study sample revealed that participants generally lived in Southwest and West Philadelphia, as well as Germantown or in neighboring suburbs (ie, Clifton Heights or Darby (see Appendix Q on neighborhood characteristics). Amongst the following zip codes in Southwest Philadelphia -- 19139, 19142, 19143, 19146, and 19153, the lowest average household earning was in zip code 19139, with a reported mean household income of $21,329 in 2009 (data updated every month according to US postal service zip code data), which, is much lower than US statistics where, in Black households, the median income in 2007 was $33,916 (See Appendix Q). Even with national data, among all race groups and Hispanics in 2007, Black households had the lowest median income. In these same zip codes in this study sample, over half of the residents are African-American, the lowest average home value was $36,600 and the highest was $77,000.

Expanding research agendas beyond the micro-system level is critical, particularly when considering the earlier discussion regarding unusual factors mitigating abject poverty, the complexity of factors influencing child overweight, and inherent influences in the built environment (such as neighborhood). Overall, understanding already existing distal systemic factors juxtaposed with known factors within ones micro-system environment might provide a more complete picture in terms of better characterizing already disenfranchised communities.

V.D. Results of Aim 1

In lieu of a host of pragmatic and other concerns, Aim 1 was added to this follow-up study in order to characterize, what, if any, differences existed between participants and non-participants 6 years past original study participation, using select demographic, prenatal, and EMR tracking characteristics. There were no significant differences between participants and non-participants in this follow-up study in terms of socio-demographics, in-utero drug exposure, or in-utero experience of intimate partner violence or stress. Among a random sample of 160 women, about 22% (36 mother/child dyads) were re-enrolled, and, availability of electronic medical record (EMR) data alone significantly predicted whether or not someone was successfully contacted and re-enrolled in this follow-up study ($p<0.001$). This study finding suggests that a generally transient prone study population can be identified within the same hospital network, regardless of visit type (ie, ED, outpatient or inpatient encounter) with availability of contact information from at least one hospital database alone.

This statistically significant finding is important it is somewhat tangential to the overwhelming questions that remain when reflecting on recruitment challenges and implications in this follow-up study. Though debatable, research questions as well as recruitment strategies and implementation must also be tailored to reflect that communities values, and be culturally appropriate and sensitive. Some techniques that have been met with some success include matching interviewers and subjects by comparable ethnic, racial, or language, or other cultural characteristics (Peterson, 2001). There are several reasons offered for why this technique is useful. A tacit mutual understanding as well as comfort level exists between the researcher and the subject. In turn this reduces built in ‘inequities’ between the researcher and the subject, increases trust levels, and, improves the quality of self-reported results. One of the in-home study visits located in a neighboring suburb of Philadelphia brought attention to this phenomenon.

Process Note 3:
I was administering the interview to the mother, and, in addition, conducted the height and weight assessment on her as well. The “mood” was upbeat, ‘rap’ music was playing and the mother who was participating had a female friend over. She [the second interviewer] stepped out to get something from the car, and, in the time that she was gone, the participant’s friend asked me why a second interviewer was present, and, before I could respond, the mother laughed, and said, “come on now, you can’t send the black girl out without ‘massa’ present.” She thought the second interviewer (who was White), was my boss, there to check over me, and make sure that I was doing the “right thing.” I didn’t say anything. I was glad that I was being seen as an “insider,” after all, didn’t that mean that I was getting more accurate data? Yet I also couldn’t help but to be somewhat bothered by this, since, the interviewer I was traveling with, was literally my peer.

Earlier the question was raised as to whether I was somehow becoming one of “them,” and, the example presented directly above is also particularly important because, across different disciplines the “Ivory Tower” is a metaphor used to designate a world or atmosphere where intellectuals engage in explorations that fail to truly recognize the practical concerns of everyday life. Perhaps this particular individual had been more receptive to an African-American researcher, but one cannot be certain that this was the case. Moreover, in processing the comment made in reference to “massa”, a colloquialism denoting ones authority over another, the Tuskegee study came to mind, since relics of distrust . However, an observation from another study visit highlights a related point:

Process Note 4:
I left this interview today with a completely different notion of what food insecurity might “look like,” and wonder if, this is even the right question to be asking … I went to her office, which was on the basement level of one of the Penn buildings near spruce street. Her office was very small, and there were stacks of folders and papers all over the place…We went over all of the consent materials, and talked briefly. She was pregnant, and had 6 other children! She had a lot of grey hair, and it was fairly long, and I guessed that she was about 40 years old … through conversation, she informed me that she actually had a PhD, and I was completely shocked. It also sounded as if her neighborhood was “mixed” racial/ethnic demographics (white/black), and that, she seemed to get along w/ everyone. Overall, she didn’t strike me as someone who had a PhD … I was curious about her EPS “data”, and since the EPS study cohort looked at difference between smokers and non smokers, I completely assumed that she was a non-smoker—in the control group! (It’s interesting what happens when you judge a book by it’s cover. I made it a point to note that I was going to look at her responses to the EPS study and to the food insecurity questions … When I got home, I checked her responses, and couldn’t help but to note how far off my assumptions about her were—her tobacco results in-utero were positive! She smoked cigarettes while pregnant? Unbelievable! And she endorsed a “1” for 3 of the 11 food insecurity questions—q67. “The food that I bought just didn’t last, and I/we didn’t have money to get more. Often true, sometimes true, never true, refused/don’t know—she noted, “sometimes true”. Q69. In the last 12 months did you or other adults in your household ever cut the size of your meals or skip meals because there wasn’t enough money for food.” Her response “yes”. (in one or 2 months of the past 12 months). Q72. “In the last 12 months, were you ever hungry but didn’t eat because you couldn’t afford enough food?” –her response, “yes.” None of the questions related to child experience of household food insecurity were endorsed, but in the end, a white female, born in 1960, now with her Phd, and an income of $75,000 and above, “suffered” from household food insecurity—how bizarre.

Consistent with the need for researchers and policymakers to extend paradigmatic thinking around poverty standards, there are pitfalls to “profiling” research participants as well as researchers themselves. Overall, contextual biases and “stereotyping” on the part of the researcher need to be checked and balanced in order to achieve optimal study outcomes. In addition, given the context of poverty interwoven throughout the above-discussed examples, is there a real way for public health agendas to be "reconciled" with the needs a community might have? What are the implications if the two are found to be irreconcilable, and what are the implications for how poverty is defined vs. what poverty actually is? NIH emphasizes, as part of its research agenda, the importance of including minorities and women within the scope of one's research. However, within this there need to be new infrastructures created to expand targeted pursuits of impoverished communities or to ensure that the definition of poverty is accurate and not bound by exogenous research limitations.

V.D.1. Aim 1: Implications & Recommendations for Future Research.

Public health professionals are tasked with exploring epidemics, monitoring trends, and identifying ways of reducing morbidity and risks attributing to disease onset. Understanding determinants of childhood obesity and why certain subgroups are disparately impacted by disease onset and burden fits within this rubric. This study supports well-established research documenting the challenges of recruiting minorities into research studies (Corbie-Smith et al, 2004; Moody et al, 1999; Shavers et al, 2002). Ultimately, taking all of these serendipitous findings together, researchers are left to ponder the following questions: what, if anything, can be done, to reasonably and responsibly reconcile public health agendas in order to truly work to reduce disparities in the very populations that we are being educated to serve? While this study was not feasible, findings from this study could be leveraged to ensure that balanced, purposeful attempts are made to reach the most vulnerable populations, to ensure that such groups are not "forever" lost.

Below are recommendations to improve the effectiveness of studies for communities in abject poverty:

- Clarify the scope of conceptualizing and operationalizing poverty standards.
- Create better infrastructures to protect the safety and well being of researchers who are conducting these studies with vulnerable communities.
- Consider health and programmatic goals when accessing hard to reach populations.
- Develop and mentor minority researchers in order to balance academic experiences with appropriate community based efforts.

V.E. Results of Aim 2

The purpose of Aim 2 was to describe the percentage households in the fully food secure, food insecure with and without hunger, and food insecure with marginal hunger among children categories by select socio-demographic characteristics. Majority of households in this follow-up study were classified as food secure (72%), meaning, all household members had continued access to enough and well-nourishing food for a productive, healthy life throughout the preceding 12 months. Estimates in this study were lower than national household food security estimates throughout 2007, where, 89% of all US households were considered food secure (Nord, Andrews & Carlson, 2008). Similarly, in 2007, 4.1% of all US households experienced very low food security, meaning that, food intake of one or more of the adult occupants had been reduced and normal eating patterns disrupted because of the households food insecurity (Nord, et al, 2008). This estimate was inflated in the category, “food insecure with or without hunger amongst adults” in this study. This may be because certain questions specifically addressing adult food insecurity were omitted for study purposes, and, 19% of all households in this study were found to be food insecure. According to USDA report, children are generally protected from reduced food intake or disrupted eating patterns, because adults will forgo meals to shield their children first. Among US households with children in 2007, only 0.8% had children and adults had experienced instances of food insecurity in the preceding 12 months (Nord, Andrews, & Carlson, 2008). In this study, 8.3% of all households in the "food insecurity with marginal hunger among children," was inflated over national prevalence estimates.

Contrary to what would be expected amongst food insecure adults, 3 (43%) completed some college, 3 (43%) reported annual household incomes of $30,000 and above, and 5 (71%) were employed at least part-time. Additionally, 57% of the mothers who reported food insecurity with or without hunger were authorized to receive food stamps over the prior 12-months to this interview, while 43% were not.

V.E.1. Aim 2: Implications and Recommendations for future research

- Continue to explore the characteristics of food insecurity, since other "non-traditional groups" beyond those with usual risk factors and protective factors such as low SES or receipt of food stamps and might also experience food insecurity.
- Conceptualize and in turn measure hunger as an individual construct that may represent, a separate, yet related component of food insecurity.

V.F. Results of Aim 3

The purpose of Aim 3 was to examine bi-variate associations between selected pre-natal and current maternal/child exposures. The EPS study examined the influence of stress on early pregnancy loss. The authors found that women with high stress as measured by the Prenatal Social Environment Inventory (PSEI) were more likely to use cigarettes and marijuana during pregnancy (Nelson et al, 2003). The results from this follow-up study approached significance associations between high prenatal stress and cigarette smoking (p=0.053), speaking to this studies internal validity. Other marginally significant findings include that borderline significance was detected between whether or not a child was breastfed and maternal drug use (marijuana), meaning, mothers who reported ever having breastfed were less likely to test positive for in-utero marijuana use.

Amongst 66% of children with a co-morbidity present, 15 (71%) were actually overweight. This consistent with previous data suggesting that overweight children are more susceptible to having other illnesses (Belamarich et al, 2000, Berkey et al, 2000). This study's findings support that one parent's weight status alone highly predicts child weight status. However, it is less obvious how maternal weight status impacts child illness. One unexpected finding in this study is a significant bivariate association between current maternal BMI and presence of at least one co-morbidity in the child. This finding is difficult to qualify, and further confirmatory analyses would have to be conducted to better understand the nature of this relationship. This finding also supports the notion that preventing child overweight and susceptibility to other illnesses is a familial concern.

While not a direct result of Aim 3, over half of the children in the study sample (58%) were either at risk for overweight or overweight. In contrast with the child's measured BMI, mothers primarily reported their child's weight as "average" (86%) and only 14% of mothers classified their child as "overweight." Also, 97% of mothers described their child's health as "excellent" or "good," while 61% of these same women reported that their child had at least one co-morbidity, such as, asthma, high blood pressure, allergies, and cerebral palsy. In one particular interview, a mother commented that her child had been diagnosed with "overweight" and similarly commented, that her daughter was "a little heavy," though she had "big bones."

V.F.1. Aim 3: Recommendations for future research

- Continue to explore immediate and distal influences in child's environment on child weight outcomes (for example, pre-pregnancy weight, weight gain through pregnancy, pre-pregnancy co-morbidities).
- Explore apparent disconnects between objective assessment and parental perception of child weight and child morbidity, to better inform understanding of how familial and/or cultural dynamics facilitate or act as barriers to appropriate nutritional and exercise practices in young children, particularly since, various familial and cultural norms may similarly have an effect on a child's perception of himself and his behaviors, irrespective of known adverse health outcomes.

V.G. Results of Aim 4

Independent effects of multivariate models did not result in significant predictions of child overweight status. However, in several of the models, mother's BMI slightly or was highly predictive of the child's weight. This study mirrors empirical evidence suggesting that having one overweight parent alone is highly predictive of child overweight (Evers et al, 2007).

Anecdotally, several participants spontaneously commented when responding to household food insecurity items, expressing, “I would forgo eating before I ever let that happen to my child.” In one case, a mother originally responded “yes” to the question, “did you ever cut the size of your child’s meals because there wasn’t enough money for food, then contemplated her response, and ultimately changed this choice to a “no” response. It was not apparent as to why, or which was the “honest” response--though one plausible speculation for the changed response could be that this participant was embarrassed to have an affirmative response to the question, or that, in line with shielding young children from food insecurity, that upon further reflection, the mother felt that she would find a way or forgo eating before her child would have to do so and thus wanted to record a different response. Along these lines, in a couple of the interviews, mothers would report that neither she nor anyone in the household smoked [cigarettes] though the smell of smoke in the home was apparent.

V.G.1. Aim 4: Implications and Recommendations for future research

- Apply prospective, longitudinal techniques to investigate predictors of child overweight, particularly given predictive power of maternal overweight, and that, overweight patterns in toddlers and that early obesity onset often persists into adulthood.
- Consider different questions beyond household food insecurity in predicting child overweight, particularly given this age group (4-7 years), what the household food insecurity instrument measures (ie, what if individual hunger among children is unable to be captured through this instrument?) and underreporting perhaps, due to participant embarrassment or fear of what will happen with study information.

- Use biologically confirmed assessments to enhance precision in obtaining results.

V.H. Study Limitations

The following study limitations are acknowledged:

- Recall bias was introduced in this follow-up study as a result of use of self-report questionnaires (for example, recalling a child's diet and exercise history during school hours could impact study results).
- High attrition was introduced as a result of 6 year time difference between this follow-up study and original study participation.
- Limited generalizability as a result of limited sample size of a study population of primarily African-American inner-city women of child-bearing age.

V.I. Conclusions

This study provided a rare opportunity to examine attrition more closely, document factors predictive of participation in an analytic study conducted nearly 6 years later, and provide information about an attrition prone population beyond usual proxies such as race, income, and education level used to characterize these subgroups.   While this study was limited to a finite sample, the use of comprehensive biologic markers, including, measuring height and weight, hip to waist ratio measurement and blood pressure to ascertain appropriate markers for current overweight status in both mothers and children was also a study strength. Findings in this follow-up study support findings from the EPS study that found a relationship between stress and in-utero drug use).   Along these lines, for this follow-up study, data was collected at two different points of time, and, the EPS data used for this study provided a validated "baseline," or history of important prenatal exposures through self-report data and biologic confirmation, that potentially mitigate current household food insecurity and longer term child weight outcomes.

This study was strengthened by its ability to prospectively look at the relationship between household food insecurity and prior biologically confirmed prenatal exposures less explored in the literature (i.e., in-utero drug use) and how these factors impact overweight outcomes in young children. Oken and Gillman noted in a 2003 review in Obesity Research that, “a new paradigm for prevention has emerged in recent years…evolved from the notion that environmental factors in early life and in utero can have a profound influence on lifelong health” (Oken & Gillman, p. 496, 2003). Oken and colleagues’ approach is consistent with the paradigmatic framework informing this research, as earlier discussed, Urie Brofenbrenner’s ecologic model, which conceptualizes human development along several concentric circles, starting with the child herself and extending out into the larger society (see Appendix C). While this study only focused on the innermost circle, Kumanyika and Grier (p. 61) sum up the role of policymakers, pointing out that “many existing policy levers [can be used] to reach ethnic minority and low-income children and families”, and that “winning the fight against childhood obesity in minority and low-income communities will depend on the nation's will to change the social and physical environments in which these communities exist” (2006). Overall, future pursuits should dually explore fetal and longer-term maternal influences on child weight outcomes as well as the role of the environment at large in contributing to the obesity epidemic, particularly given overweight prevalence in children as young as three and since families, whole communities and populations are still alarmingly impacted by its multifaceted consequences.

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APPENDIX A

11-ITEM ADAPTATION OF HOUSEHOLD FOOD INSECURITY (HFI) SCALE

*Highlighted questions omitted from the follow-up study

1. "We worried whether our food would run out before we got money to buy more." Was that often, sometimes, or never true for you in the last 12 months?

2. "The food that we bought just didn't last and we didn't have money to get more." Was that often, sometimes, or never true for you in the last 12 months?

3. "We couldn't afford to eat balanced meals." Was that often, sometimes, or never true for you in the last 12 months?

4. In the last 12 months, did you or other adults in the household ever cut the size of your meals or skip meals because there wasn't enough money for food? (Yes/No)

5. (If yes to Question 4) How often did this happen—almost every month, some months but not every month, or in only 1 or 2 months?

6. In the last 12 months, did you ever eat less than you felt you should because there wasn't enough money for food? (Yes/No)

7. In the last 12 months, were you ever hungry, but didn't eat, because you couldn't afford enough food? (Yes/No)

8. In the last 12 months, did you lose weight because you didn't have enough money for food? (Yes/No)

9. In the last 12 months did you or other adults in your household ever not eat for a whole day because there wasn't enough money for food? (Yes/No)

10. (If yes to Question 9) How often did this happen—almost every month, some months but not every month, or in only 1 or 2 months?

(Questions 11-18 are asked only if the household included children under 18 years old)

11. "We relied on only a few kinds of low-cost food to feed our children because we were running out of money to buy food." Was that often, sometimes, or never true for you in the last 12 months?

12. "We couldn't feed our children a balanced meal, because we couldn't afford that."
Was that often, sometimes, or never true for you in the last 12 months?

13. "The children were not eating enough because we just couldn't afford enough food." Was that often, sometimes, or never true for you in the last 12 months?

14. In the last 12 months, did you ever cut the size of any of the children's meals because there wasn't enough money for food? (Yes/No)

15. In the last 12 months, were the children ever hungry but you just couldn't afford more food? (Yes/No)

16. In the last 12 months, did any of the children ever skip a meal because there wasn't enough money for food? (Yes/No)

17. (If yes to Question 16) How often did this happen—almost every month, some months but not every month, or in only 1 or 2 months?

18. In the last 12 months did any of the children ever not eat for a whole day because there wasn't enough money for food? (Yes/No)

APPENDIX B

REVISED NOTES & CURRENT 18-ITEM QUESTIONNAIRE USED FOR CURRENT US FOOD SECURITY SCALE

U.S. HOUSEHOLD FOOD SECURITY SURVEY MODULE:
THREE-STAGE DESIGN, WITH SCREENERS
Economic Research Service, USDA
July 2008

Revision Notes: The food security questions are essentially unchanged from those in the original module first implemented in 1995 and described previously in this document.

July 2008:

- Wording of resource constraint in AD2 was corrected to, "…because there wasn't enough money for food" to be consistent with the intention of the September 2006 revision.
- Corrected errors in "Coding Responses" Section

September 2006:

- Minor changes were introduced to standardize wording of the resource constraint in most questions to read, "…because there wasn't enough money for food."
- Question order was changed to group the child-referenced questions following the household- and adult-referenced questions. The Committee on National Statistics panel that reviewed the food security measurement methods in 2004-06 recommended this change to reduce cognitive burden on respondents. Conforming changes in screening specifications were also made. NOTE: Question numbers were revised to reflect the new question order.
- Follow up questions to the food sufficiency question (HH1) that were included in earlier versions of the module have been omitted.
- User notes following the questionnaire have been revised to be consistent with current practice and with new labels for ranges of food security and food insecurity introduced by USDA in 2006.

Transition into Module (administered to all households):
These next questions are about the food eaten in your household in the last 12 months, since (current month) of last year and whether you were able to afford the food you need.

Optional USDA Food Sufficiency Question/Screener: Question HH1 (This question is optional. It is not used to calculate any of the food security scales. It may be used in conjunction with income as a preliminary screener to reduce respondent burden for high income households).

HH1. [IF ONE PERSON IN HOUSEHOLD, USE "I" IN PARENTHETICALS, OTHERWISE, USE "WE."]

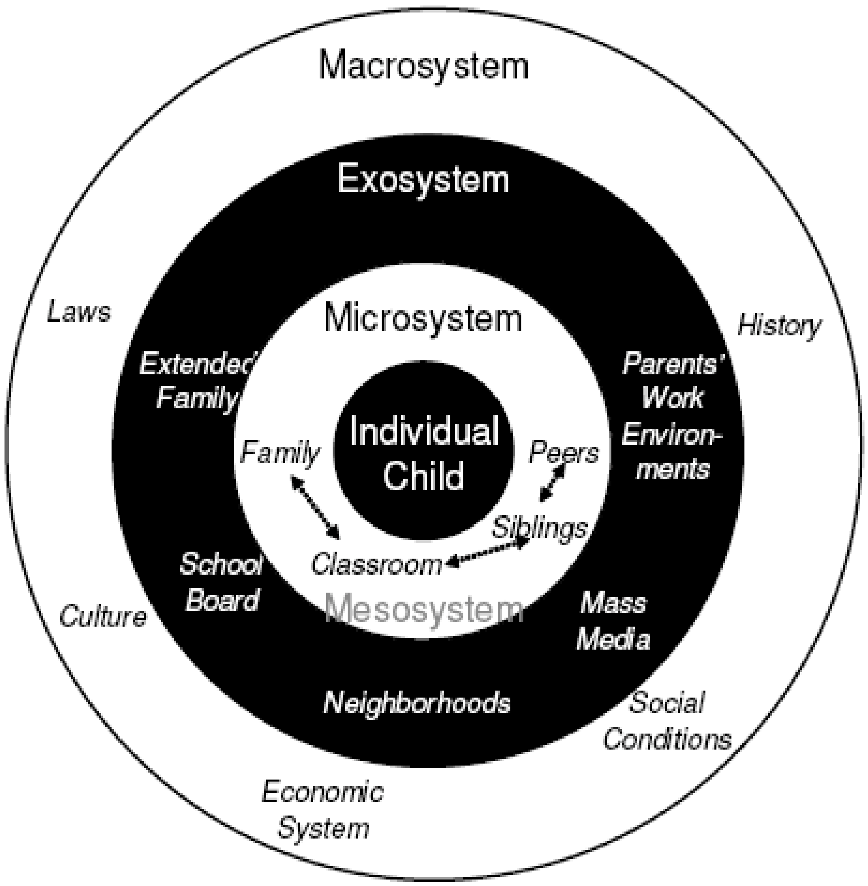
Which of these statements best describes the food eaten in your household in the last 12 months: —enough of the kinds of food (I/we) want to eat; —enough, but not always the kinds of food (I/we) want; —sometimes not enough to eat; or, —often not enough to eat?

[1] Enough of the kinds of food we want to eat
[2] Enough but not always the kinds of food we want
[3] Sometimes not enough to eat
[4] Often not enough to eat
[ ] DK or Refused

APPENDIX C

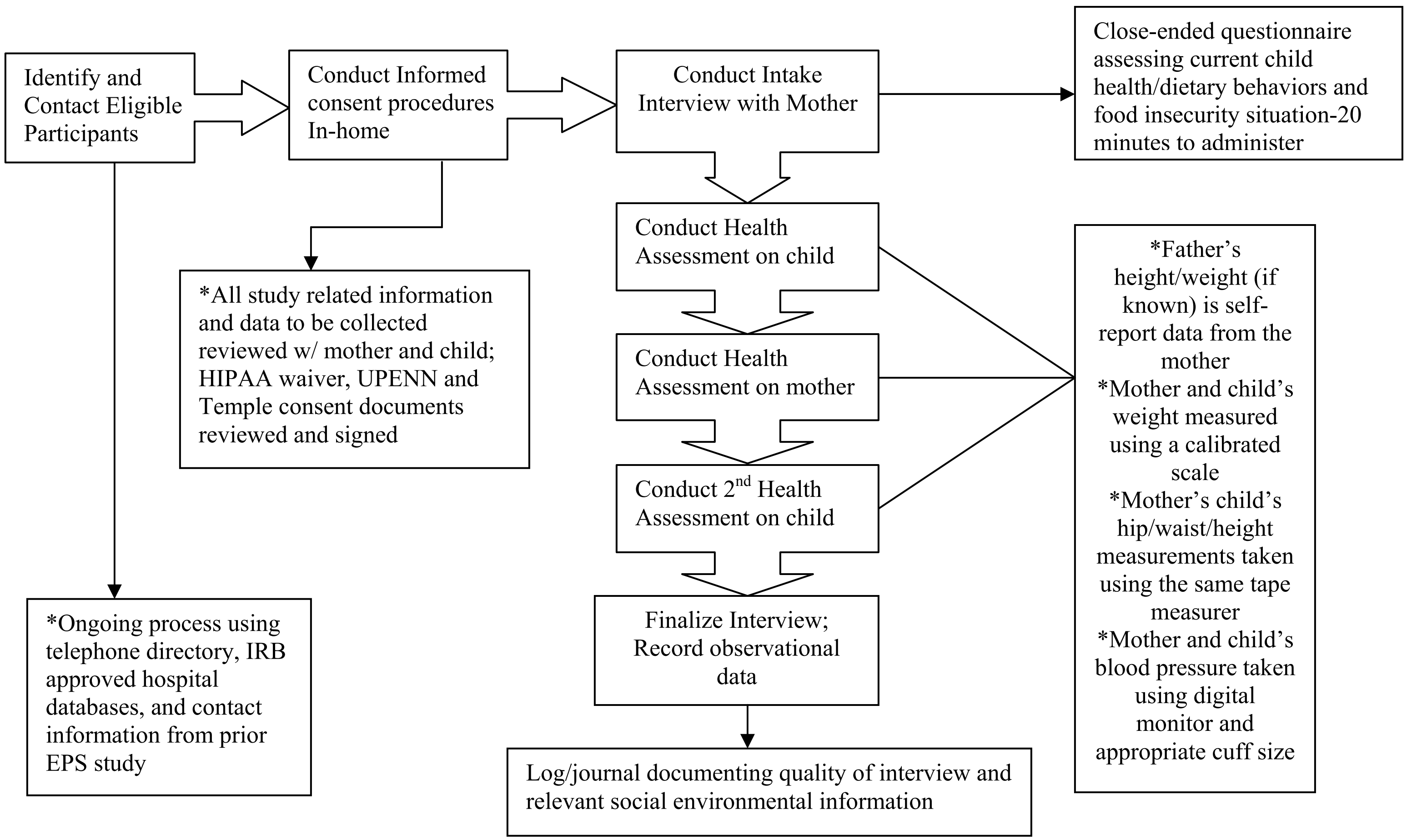
BROFENBRENNERS ECOLOGICAL MODEL

NESTED ENVIRONMENTAL INFLUENCES ON CHILD



APPENDIX D

DETAILS OF RECRUITMENT PROCEDURES/DEVICES FOR HEALTH ASSESSMENTS ON MOTHER/CHILD



- Hip and waist measurements of mother and child and child's height are recorded using a standard tape measurer. For waist measurements the tape measurer is placed at the base of the belly button, and circumference is measured and recorded in inches. For hip measurements the tape measurer is placed at the base of the pelvic bone, and circumference is measured and recorded in inches. Recording child's height is standardized, and the child is asked to stand as straight as possible, with his/her back and shoulders straight back and relaxed, and heels of feet placed as close as possible to the base of the wall. The child's height is then measured from base of wall to crown of child's head and height is recorded in inches. Mother and child's weight is recorded using a digital scale that is calibrated each time before it is used. Weight is recorded in pounds.

- Blood pressure is measured using the Omron IntelliSense Professional Digital Blood Pressure Monitor. Using the appropriate size cuff per child and mother, the cuff is placed around the dominant arm of each participant, appropriately around the brachial artery. The monitor is reset per use and is set on single use test mode. For the child, systolic pressure is set between 180-220 and for adults over 220. Blood pressure is recorded in mm/Hg units.

APPENDIX E

RECRUITMENT TELEPHONE SCRIPT

THE ROLE OF EXPOSURES DURING GESTATION AND SUBSEQUENT CHILD HEALTH

A1.	ID Number	[__ __ __ __ __]
A2.	Interviewer ID Number	[__ __]
A3.	Date of Interview	[__ __ / __ __ / __ __]

Introduction:
Hello ___________ (name of subject). My name is [Recruiter name] and I am calling on behalf of Dr. Datner from the University of Pennsylvania. We met you a while ago in the HUP emergency department when you were nice enough to participate in the Early Pregnancy Study. I recently sent you a letter describing a new study we are conducting for women and their children who enrolled in the Early Pregnancy Study.

A4. Did you get that letter?
No ……………………………………………………………………………0
Yes ……………………………………………………………………………1

If no, read the letter and re-send the HIPAA form, go on to A5
If yes, go to A5

A5. Great! At this point, we'd like to know if you'd be willing to participate in another follow-up project on the health. We are following up with all the moms and their children that participated in the Early Pregnancy Study. Would you and you son/daughter be interested?

No ………………………………………………………………………………0
Yes………………………………………………………………………………1

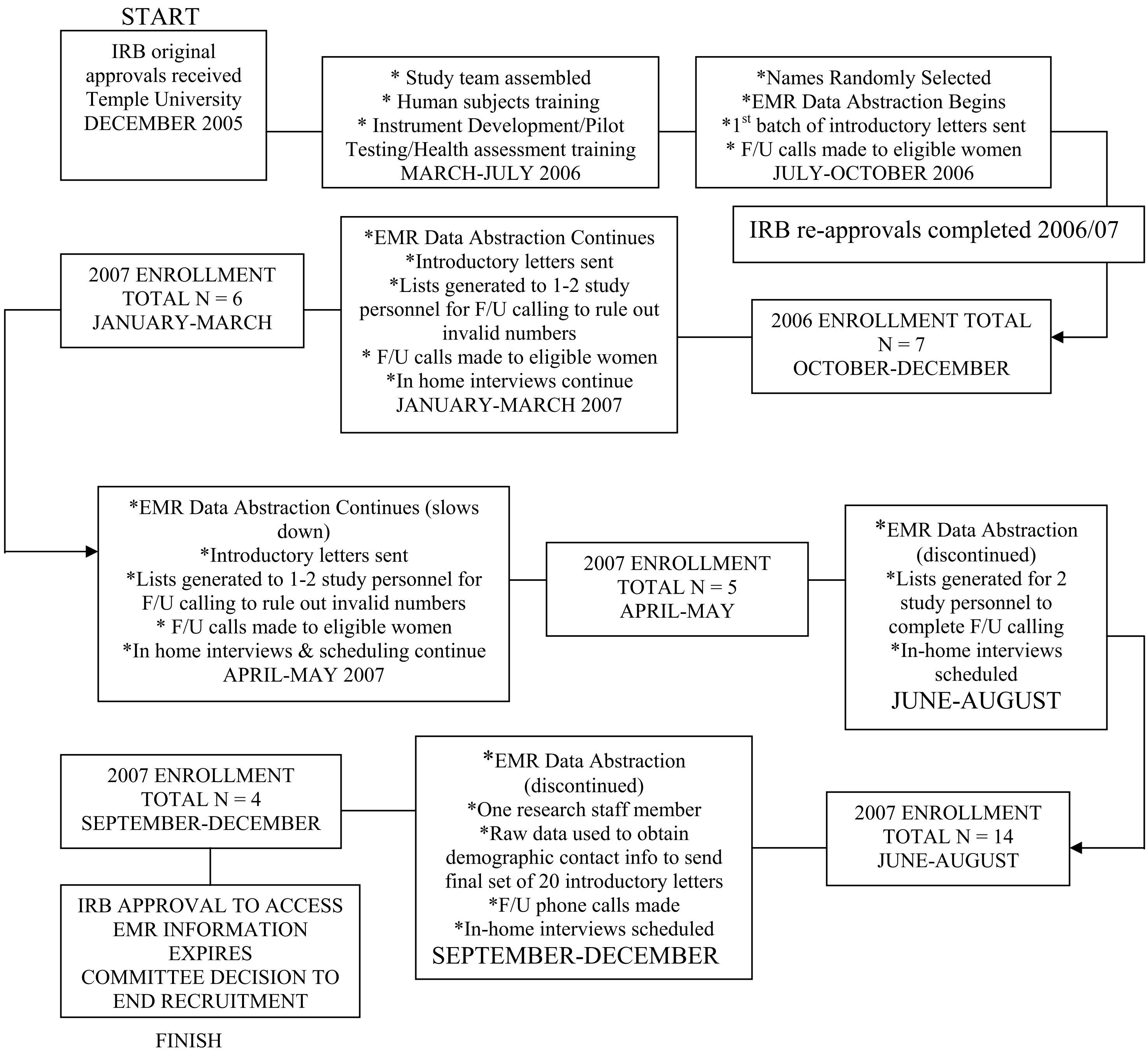
A6. **If Yes;** GREAT! I'd like to set up a home visit to discuss the project with you further. It was so nice to speak with you again, can you tell me what days and times would be good for me to set up a home visit next week? ____

Is this number and address still a good way to reach you?

A7. **If No;** I'd like to thank you for taking the time to speak with me today/tonight and for your past participation in our project. The information that you have given us is really important to the project and contributes to our understanding of early pregnancy. If you should change your mind about participating in the follow-up study, please feel free to contact Deb Nelson at 215-204-9659.

APPENDIX F

TIMELINE OF RECRUITMENT & DATA COLLECTION PROCEDURES



*Timeline does not reflect delays w/ staffing changes, training multiple research personnel, weekly meetings to discuss ongoing issues in recruitment and enrollment and resolutions. Also does not reflect database entry and management discussion.

APPENDIX G

STUDY PROTOCOL

A. STUDY TITLE:
The Role Of Exposures During Gestation And Subsequent Child Health

B. OBJECTIVES:
The proposed research project is to develop a research agenda to examine the role of exposures during gestation and subsequent child health. This project is designed to follow-up the children of a randomly selected cohort of women who previously enrolled in two prospective cohort studies during pregnancy. The goals of the proposed project are:

- To document the feasibility and successfulness of locating, re-contacting and re-enrolling eligible women and their children into a second follow-up study, and
- To collect pilot data for a NIH resubmission designed to examine the role of in-utero exposure to cigarettes and childhood overweight.

This proposed follow-up study is in response to comments from a 2004 NIH review. The reviewer comments suggested conducting an in-depth follow-up study of at least a 10% randomly selected sample of eligible, previously enrolled women to document the projected follow-up and re-consent rates and to collect preliminary pilot data. The proposed project will address these concerns by re-enrolling a sample of eligible women, collecting weight parameters on the children, obtaining information on confounding factors from a short in-person interview, and analyzing these data for preliminary results. The information gained from this follow-up study will be incorporated in an NIH grant resubmission in late 2006.

C. BACKGROUND
The theory of in-utero exposures influencing chronic health outcomes has been examined by many in the past decade. Numerous in-utero exposures, encountered at critical periods of gestation, have been linked to later onset of cardiovascular disease (CVD), type 2 diabetes, adult obesity, and hypertension. More recently, epidemiologic studies have examined the role of in-utero exposure to cigarette smoke and low birth weight, semen quality, and childhood obesity. However, to date, many of these studies have relied on self-reported measures of cigarette use during pregnancy which is plagued by recall bias both due to the unreliability of assessing self-reported substance use during pregnancy and the time lag between substance use and outcome, which may span several decades.

We previously conducted two cohort studies in the city of Philadelphia, from 1995-1997 and 1999-2001, which enrolled pregnant women prior to 22 weeks gestation and collected urine samples to confirm cigarette use. Given this unique cohort and the collection of biologically confirmed substance use during pregnancy, we are particularly suited to re-contact these women, and their children, to examine the role of biologically confirmed cigarette use during pregnancy and health of the children. We are particularly interested in examining the role of in-utero exposure to cotinine (a metabolite associated with cigarette smoking) and childhood overweight.

D. ELIGIBILITY CRITERIA
Women who participated in either of the two prior cohort studies will be eligible for the proposed follow-up study if: 1) they provided a urine sample to document cigarette use, and 2) they reported a live born, singleton birth. A 10% randomly selected group of women meeting these follow-up study eligibility criteria will be actively located and asked to participate in the proposed follow-up study. The randomization process will occur as follows: 1) from the participants in the two prior cohort studies, women who reported a live birth infant and provided a urine sample in addition to completing the baseline questionnaire will be identified, 2) among this group of potentially eligible women, a 10%

randomly generated list of their Study ID numbers will be identified. The identified Study ID's numbers randomly selected using this method will be included in the proposed follow-up study.

E. TREATMENT PLAN: NA

F. RISKS

One potential risk of participation in the study is loss of confidentiality, which will be minimized by conducting private, home-based interviews and by assigning all data collection forms unique identification numbers. The results of all data collected as part of the study will be stored by unique identification number in a password protected spreadsheet and results will not be given to the participants or their health care providers. Risk related to research measurements are minimal. There are no anticipated psychological or social risks.

G. BENEFITS

The expected outcome of the proposed follow-up study is: 1) to document success in locating, recontacting, and re-enrolling eligible women, and 2) to collect and analyze these data for preliminary results relating in-utero exposure to cigarettes and childhood overweight. These results will be included as preliminary study data as part of an NIH resubmission. If an association is found between maternal smoking during pregnancy and obesity, these results will have several important implications. First, this will be additional evidence, based on a specific biomarker measurement of exposure, for fetal life as a critical period for the development of obesity. Second, if positive, our findings are likely to generate a significant interest for basic and translational research to investigate and understand the underlying mechanisms of this association using animal models. Third, as pediatric obesity is becoming an increasing concern, a solid demonstration of maternal smoking during pregnancy as a risk factor for obesity in the offspring may be, for some women, a strong motivator to stop smoking before or during pregnancy. This will lead to tremendous public health benefit, both for the child and for the mother. At this point in the pediatric obesity epidemic, any possible preventive intervention, even with limited effect size, requires careful attention.

There is no direct benefit to participate in the study but the information gained may improve children's health in the future. One potential benefit to the study subjects is the possible detection of unknown high blood pressure. In these cases, the results will be reviewed and appropriate action taken, including referral to the primary care provider or specialized care.

F. ALTERNATIVE TREATMENTS: NA

G. DATA COLLECTION AND STATISTICS

Data Collection: Each children will be dichotomously classified as "exposed to cigarettes in-utero (y/n)" based on the urine toxicology results collected from the mother during pregnancy. For example, children born to a women with a urine sample positive for cotinine will be classified in the exposed group and children born to a women with urine tests negative for cotinine will be classified in the non-exposed group. The primary measure of overweight is gender- and age-specific body mass index (BMI) at or above the 95^{th} percentile. Although BMI is only a surrogate for adiposity, it has repeatedly been validated as a good indicator of overweight in children, as long as weight and height are carefully measured in standardized conditions. We will also collect other secondary markers of childhood overweight (see Table 1).

Table 1. Outcome Markers of Childhood Overweight

Outcome	Emphasis
BMI $\geq$ 95th percentile (dichotomous)	Primary
Blood pressure adjusted for gender, age and height percentile (continuous)	Secondary
Skin-fold measurements	Secondary

The main goal of the proposed follow-up study will be to locate, re-contact, and re-consent women previously enrolled in the two prior pregnancy-related cohort studies. Thus, follow-up activities are critical to the success of this proposal. Dr. Nelson and the follow-up coordinator will be responsible for identifying and locating eligible subjects, arranging for the children and their mothers to be visited at home, completing the in-person questionnaire to obtain information on potential confounding factors, and collecting the childhood overweight parameters (see Table 2). To this end, we will implement many of the successful strategies we have incorporated in prior studies to ensure high follow-up and participation rates.

For example, we anticipate about 90% of women will still live within the City of Philadelphia and the rest will live in close proximity to Philadelphia. We will initially use the address and telephone numbers recorded in the contact form each woman completed during enrollment in the previous studies. As part of the contact form, we asked women to provide the names, addresses and home/work/cell phone numbers for up to four family members and friends. The follow-up coordinator will first attempt to contact the woman at her last known telephone number, send mailings, and/or conducting home visits to the woman's address. In some cases, the last known telephone number or address may still be their current residence or may be the residence of a family member who knows of the woman's current address. Subsequently, the phone, address and other locating information for the listed family members and/or friends will be used to locate each woman. If neither the woman nor a family member can be located, it may then be necessary to consider alternative approaches.

One approach will be to attempt to trace the woman and/or her family and friends through the current on-line telephone directories. Another approach will be to obtain from the State Department of Transportation a list of registered driver licenses matching our sample. Another approach will be to use the services of EQUIFAX or Lexis-Nexis P-Trak to locate the subjects.

Once a subject is located, the follow-up coordinator will introduce herself/himself by telephone, and introduce the new study. The women will be told that participation involves a short home visit to assess the mother's BMI, the child's health, and completion of an intake interview. Consent to obtain the biologic markers and administer the intake questionnaire will be obtained in writing.

A list of data items to be collected as part of participation are summarized in Table 2.

Table 2. Study-related Data Collection

A. In-person questionnaire:
Child factors
Child's birthdate
Birth weight
Gestational age at birth
Infant feeding mode
Current diet
Current physical activity
Sedentary habits (TV, electronic games, computer use)
Asthma and other chronic conditions
Maternal Factors
Maternal BMI (measured at the time of the study)
Maternal age
Education
SES
Maternal smoking
Maternal dietary habits (use of fast-food restaurant, family meals, TV on during meals)
Food Insecurity (economic assessment of current food situation)
B. Laboratory Data
Gender and sex-specific BMI
Blood pressure and skin fold measurements

Statistical Analysis

The primary analysis is to compare the prevalence of BMI at or above the 95th percentile among children in the exposed (confirmed in utero exposure to cotinine) and unexposed groups. An initial bivariate analysis will use Pearson chi-square test of association to compare the two groups. In addition, the relative risk and corresponding 95% confidence intervals for the overweight incidence will be calculated. Multiple logistic regressions will be used to examine whether observed differences, if any, are attributable to potential confounding factors. For the continuous outcomes listed in Table 1, a t-test will be used to compare the means of the cotinine exposed and cotinine unexposed groups. The difference between the two group means and the 95% confidence intervals will be calculated. A multiple linear regression model will then be fit to explore the impact of confounding factors. Potential confounding variables (i.e., those variables associated with both outcome and exposure) should be considered in order to determine the true magnitude of the effect of maternal smoking on child overweight. These variables represent factors that may affect a child's chance of being overweight. In logistic regression, the potential confounders will enter the models based on several criteria: a) if the confounder prevalence is large enough (generally >5%); b) if the variable is found to be statistically significantly associated with the outcome, in unadjusted analyses, at a p-value of 0.20 or less; or c) if adjustment for the variable in stratified analyses produces a change in the odds ratio for the relationship between exposure and the primary outcome of 15% or more. All other assessments of confounding variables (i.e., variables not in the list below) will be for exploratory (i.e., hypothesis-generating) purposes. Criteria similar to the above are to be used to determine the confounders in linear regression for continuous outcomes considered.

APPENDIX H

hccs

Health Care Compliance Strate
30 Jericho Executive Plaza
Suite 400C
Jericho, NY 11753-1098

http://www.hccs.com

Course Selection Menu Status

Diana Harris
Logon ID: 0053954
Internal hccs control code: HARR2412529865299
Sat Feb 10 19:54:07 EST 2007

Research Compliance: Human Subjects
Completion Status: Completed
Last Log-in: June 7, 2006

Research Compliance: Conflicts of Interest and Scientific Misconduct
Completion Status: Completed
Last Log-in: June 7, 2006

Research Compliance: Grants & Contracts
Completion Status: Completed
Last Log-in: June 7, 2006

APPENDIX I

TEMPLE UNIVERSITY

Office for Human Subjects Protections
Institutional Review Board
Medical Intervention Committees A1 & A2
Social and Behavioral Committee B

3400 North Broad Street
Philadelphia, Pennsylvania 19140
Phone:215.707.3390 Fax:215.707.8387
e-mail: richard.throm@temple.edu

Research Review Committee A

Recertification of Approval for a Project Involving Human Subjects

Protocol Number:	**4874**
PI:	NELSON, DEBORAH
Expires On:	19-Dec-2007
Committee:	A2 - MEDICAL INTERVENTION
School/College:	College of Health Professionals
Department:	CHP-PUBLIC HEALTH (0910)
Project Title:	THE ROLE OF EXPOSURES DURING GESTATION AND SUBSEQUENT CHILD HEALTH

Based on a review of your status report, the Institutional Review Board hereby re-approves protocol number **4874** , originally approved on 20-Dec-2005, for the period ending 19-Dec-2007

* Original Review Date: 21-Nov-2005
* Re-Review Date: 21-Nov-2006

It is understood that it is the investigator's responsibility to notify the Committee immediately of any untoward results of this study to permit review of the matter. In such case, the investigator should call Richard Throm at 707-8757.

MICHAEL R. JACOBS, PHARM.D.
CHAIRMAN, IRB

APPENDIX J

College of Health Professions
TEMPLE UNIVERSITY

Department of Public Health
1700 North Broad Street
Suite 304
Philadelphia, PA 19122

phone 215-204-8726
fax 215-204-1854
email publichealth@temple.edu
web www.temple.edu/publichealth

Research Subject Information and Consent Form
Assent to Act as a Subject in a Study

PROJECT TITLE: The Role of Exposures During Gestation and Subsequent Child Health

IRB PROTOCOL #: 4874

SPONSOR: Temple University
Philadelphia, PA 19122

INVESTIGATOR: Deborah B. Nelson, PhD
Assistant Professor
Department of Public Health
Temple University
1700 North Broad Street
Philadelphia, PA 19122
United States

STUDY RELATED PHONE NUMBER: 215-204-9659

This consent form may have words that you do not understand. Please ask the doctor or the interviewer to explain any words that you do not understand. You may take this form to think about or talk with family or friends before making your decision to sign.

PURPOSE OF THE STUDY:

You are being asked to take part in a research study to understand how factors during pregnancy change later health. You are being asked to join this study because your mother participated in a research study while she was pregnant. This study will examine if things during pregnancy, such as cigarette use, change health and weight. If smoking during pregnancy does change health, this study may provide useful information that can lead to better health in the future for both children and their mothers.

PROCEDURES:

You understand that the study involves having your weight, height and blood pressure measured. All information collected during this study will be confidential (meaning we can't tell anyone the results), except as may be required by law, and any reports resulting from the research will not include your name or personally identify you. A total of 120 children will participate in this research study.

RISKS AND DISCOMFORTS:

There are no risks associated with participating in this study, which involves having your weight, height, and blood pressure measured.

TEMPLE UNIVERSITY
IRB (A2) APPROVAL

DEC 20 2006

VALID FOR NO MORE
THAN ONE YEAR

The Role of Exposures During Gestation and Subsequent Child Health

NEW FINDINGS:

You will be told about new information that might change your decision to be in the study. You will also be told about new information that may change your future medical care. You may be asked to sign a revised informed consent form that contains the new information.

BENEFITS:

This is not a treatment study. You are not expected to receive any direct medical care from your participation in the study however other people may benefit from knowledge gained from the study.

COSTS:

There are no costs for participation in this study.

PAYMENT FOR PARTICIPATION:

For participation in this study, your mother will be paid $50 for completion of the interview, and for having your weight, height, and blood pressure measured. A check will be mailed to your mother in two months.

ALTERNATIVE:

Your alternative is to not participate in this study.

CONFIDENTIALITY:

Study information about you will be kept in locked files, and your name or a description of you that allows you to be identified will never be used in the reporting of the results. All documents and information collected in this study will be kept locked and confidential in accordance with all laws and regulations. Information collected by the study may be reviewed by Temple University's Institutional Review Board and the Office for Human Subjects Protections (OHRP), and the Office of the Vice President for Research to assure proper conduct of the study and compliance with federal regulations. You understand that the results of this study may be published and if any data is published, you will not be identified by name.

COMPENSATION FOR INJURY:

If you sustain an injury as a result of your participation in this study, care and treatment of your injury that is not covered by your medical and hospital coverage or other third party coverage will be provided at Temple University Hospital at no cost to you or your family. Other financial compensation (such as lost wages or pain and suffering) for such injuries is not routinely available. By signing this consent form you are not waiving any of the legal rights that you otherwise would have as a participant in a research study.

VOLUNTARY PARTICIPATION AND WITHDRAWAL

Your participation in this study is entirely voluntary, and refusal to participate will involve no penalty or loss of benefits to you. You may discontinue your participation at any time without penalty or loss of benefits. Your participation in this study may be stopped at any time by the study doctor or the sponsor without your consent.

QUESTIONS

If you have any questions about your rights as a research subject, you may contact the Institutional Review Board Coordinator, Richard Throm at (215) 707-8757. If I have any questions about research-related injuries, you may contact Deborah Nelson at 215-204-9659. Please do not sign this consent form unless you have had a chance to ask questions and have received satisfactory answers to all of your questions. If you agree to participate in this study, you will receive a signed and dated copy of this consent form for your records.

TEMPLE UNIVERSITY
IRB (A2) APPROVAL

DEC 2 0 2006

VALID FOR NO MORE
THAN ONE YEAR

The Role of Exposures During Gestation and Subsequent Child Health

CONSENT

I have read this consent form (or it has been read to me *(if applicable)*) and the study has been explained to me. All my questions about the study and my participation in it have been answered. I freely consent to participate in this research study. By signing this consent form I have not waived any of the legal rights that I otherwise would have as a subject in a research study.

Name of Subject	Signature of Subject	Date/Time

CHILD ASSENT DOCUMENTATION

I certify that this study and the procedures involved have been explained to ________________ in terms that he/she could understand and that she freely assented to participate in this study.

Name of Person Obtaining Consent	Signature of Person Obtaining Consent	Date/Time

TEMPLE UNIVERSITY
IRB (A2) APPROVAL

DEC 2 0 2006

VALID FOR NO MORE THAN ONE YEAR

APPENDIX K

TEMPLE UNIVERSITY
Office for Human Subjects Protections
Institutional Review Board
Medical Intervention Committees A1 & A2
Social and Behavioral Committee B
3400 North Broad Street
Philadelphia, Pennsylvania 19140
Phone:215.707.3390 Fax:215.707.8387
e-mail: richard.throm@temple.edu

MEMORANDUM

To: **NELSON, DEBORAH**
CHP-PUBLIC HEALTH (0910)

From: Richard C. Throm
Director, Office for Human Subjects Protection
Institutional Review Board Coordinator

Date: 23-Mar-2007

Re: Exempt Request Status for IRB Protocol:
10901: FOOD INSECURITY AND WEIGHT STATUS AMONG WOMEN AND THEIR CHILDREN

It has been determined by Expedited Review that this study qualifies for exemption status as follows:

45 CFR 46 Protection of Human Subjects

Section 101 (b): Unless otherwise required by department or agency heads, research activities in which the only involvement of human subjects will be in one or more of the following categories are exempt from this policy:

Exemption 4: Collection or Study of Existing Data. Research involving the collection or study of existing data, documents, records, pathological specimens, or diagnostic specimens, if these sources are publicly available or if the information is recorded by the investigator in such a manner that subjects cannot be identified, directly or through identifiers linked to the subject.

Nothing further is required from you at this time; however, if anything in your research design should change, you must notify the Institutional Review Board immediately.

If you should have any questions, please feel free to contact me at 215-707-8757.

Thank you for keeping the IRB informed of your clinical research.

APPENDIX L.

LETTER INTRODUCING STUDY

Deborah B. Nelson, PhD
Temple University
1700 North Broad Street – Room 304F
Philadelphia, PA 19122

November 15, 2007

Name
Address
Philadelphia, PA

Dear [Insert Name],

I am writing on behalf of the Early Pregnancy Study you joined at the University of Pennsylvania on / / . I wanted to speak with you briefly over the phone to find out how you are doing and find out if you would be interested in participating in another follow-up study. The follow-up involves a one -time interview that takes about 30 minutes of your time.

We appreciate the time that you have given us in the past and would love to speak with you again. Please give me a call at (215) 779-9323 if you have any questions and we will be contacting you by phone in the next week or so. I look forward to speaking with you.

Thanks so much!

Deborah Nelson, PhD
Temple University
Department of Public Health

ID No. [_ _ _ _]

EARLY PREGNANCY II STUDY
BASELINE QUESTIONNAIRE

UNIVERSITY OF PENNSYLVANIA, SCHOOL OF MEDICINE

INTERVIEWER: ____________________
DATE OF INTERVIEW:_____________________
DATE RECEIVED:_________________________
CHECKING COMPLETE:______________________
DATA ENTERED:___________________________
CONTINUATION PAGE USED: No = 0; Yes = 1

Revision: July 14, 1999
c:\dbn\eps2\forms\epsa_n.qes (Word Perfect 8.0)

INITIAL EVALUATION

ID Number: [_ _ _ _ _]

Interviewer ID Number: [_ _]

Place of Interview: [_]

1=Hospital room 2=Emergency Dept. 3=Clinic
4=Telephone 5=Ultrasound
6=Day surgery 7=Labor and Delivery
8=Other ***(Specify)***

Interview completed later by phone/in person visit?

No 0
Yes 1

Date of Interview: [_ _/_ _/_ _]
mm dd yy

Time Interview Began: [_ _ : _ _]
[AM=1 PM=2]

Time Interview Ended: [_ _ : _ _]
[AM=1 PM=2]

Date of Second Interview *(if needed)*: [_ _/_ _/_ _]
mm dd yy

Time Second Interview Began *(if needed)*: [_ _ : _ _]
[AM=1 PM=2]

Time Second Interview Ended *(if needed)*: [_ _ : _ _]
[AM=1 PM=2]

Approximate Duration of Interview: [_ / _ _]
hr min

Thank you for agreeing to participate in this important study of women's health. In this interview, we will be discussing a number of topics including your medical history, your menstrual and reproductive history, your relationships with intimate partners and other people, stress and current life events, and other health related topics. Please feel free to interrupt and ask about anything that is not clear.

SECTION A
DEMOGRAPHICS

A1. First I'd like to ask you, why did you come to the emergency room/clinic today/tonight?

____

____

____

[__ __ __ __]
CODE

A2. Did a friend or family member come with you today/tonight?
No 0
Yes 1

A3. What is your date of birth? [_ _/_ _/_ _]
mm dd yy
(missing: 99/99/99)

A4. What race do you consider yourself to be?
(CIRCLE ONE, READ RESPONSES ALOUD)
Black or African American 1
White 2
Hispanic 3
Asian / Pacific Islander 4
Native American 5
Other ***(Specify)*** 8
______________________________ [__ __]
CODE

A5. What is your current marital status? **(CIRCLE ONE, READ RESPONSES ALOUD)**
Married or living as married 1
Separated 2
Divorced 3
Single, Never Married **(--> GO TOA7)** 4

A6. In the last year, did you become separated or divorced?
No 0
Yes 1

A7. What is the highest grade or year of school that you completed? **(CIRCLE ONE)**
None 0
Some grade school (1-6 years) 1
Some junior high school (7-9 years) 2
Some high school (10-11 years) 3
High school graduate (12 years) or GED 4
Post high school training other than college (vocational, technical, etc.) 5
Some college 6
College graduate 7
Postgraduate work 8

A8. Have you been a student or in training in the past six months?

No..0
Yes 1

IF "YES", Were you full time or part time?
Full Time...2
Part Time...3

A9. Have you worked for pay in the past six months?
No **(--> GO TO A11)** 0
Yes 1

A10. How many hours per week do you work on average? [__ __
]
hours

A11. Are you currently receiving any type of public assistance or government support like WIC, ACCESS, food stamps or cash assistance?
No..0
Yes **(GO TO A13)**...1
Don't Know..9

A12. In the past year, have you received any public assistance or government support?
No..0
Yes 1
DK..9

A13. In the past year, were you told you would lose or not be eligible for any type of public assistance or government support, including cash assistance?
No..0
Yes 1
Don't Know..9

SECTION B
MENSTRUATION AND CURRENT PREGNANCY HISTORY

Now I'm going to ask you about your menstrual history and your current pregnancy.

B1. How old were you when you had your first menstrual period? [_ _]
age

98 = Never had menstrual period
99 = DK

B2. What was the date of the first day of your last menstrual period? [_ _ /_ _ /_ _]
mm dd yy

RECORD LMP MONTH ___________

B3. Before coming to the hospital today, have you had any routine prenatal visits for this

pregnancy?
No 0
Yes 1
DK 9

B4. When you found out you were pregnant did you feel mostly happy or sad?
Happy 1
Sad..2

B5. Do/Did you plan to do anything to try to end this pregnancy **(CIRCLE ONE)**
No 0
Yes 1
Maybe.. 2
Don't Know.. 9

SECTION C
PAST OBSTETRICAL HISTORY

Now I'd like to ask about previous pregnancies. These questions will refer to all types and outcomes of pregnancy including live births, stillbirths, miscarriages, abortions, and tubal pregnancies.

C1. How many times have you been pregnant before, that is, before this current pregnancy?

[__ __]

If 0 skip to D1

	PREG #1	PREG #2	PREG #3	PREG #4
C2. Let's talk about your very first pregnancy (the next pregnancy), for how many weeks or months were you pregnant?	[__ __]	[__ __]	[__ __]	[__ __]
weeks	weeks	weeks	weeks	
C3. In what month and year did your [FIRST/ NEXT] pregnancy end? (99 DK)	[_ _ /_ _] mm yy	[_ _ /_ _] mm yy	[_ _ /_ _] mm yy	[_ _ /_ _] mm yy
C4. Looking at this card, what was the outcome of this pregnancy? **(READ RESPONSES ALOUD)**				
Live birth.............	1	1	1	1
Stillbirth..............	2	2	2	2
Miscarriage...........	3	3	3	3
Induced abortion.......	4	4	4	4
Tubal or ectopic pregnancy....	5	5	5	5
Molar pregnancy.......	6	6	6	6
Don't know.....	9	9	9	9
(IF NO LIVE BIRTH, GO TO NEXT PREGNANCY)				
C5. **IF LIVE BIRTH,** Was this a single birth or twins?				
Single birth...........	1	1	1	1
Twins...................	2	2	2	2
Other..........	3	3	3	3
(Specify)	________	________	________	________
	________	________	________	________
	________	________	________	________

	Don't Know	9	9	9	9
		PREG #1	PREG #2	PREG #3	PREG #4
C6.	What was/were the birth weight(s)? DK 99/99	[_ _/_ _] lb oz [_ _/_ _] lb oz	[_ _/_ _] lb oz [_ _/_ _] lb oz	[_ _/_ _] lb oz [_ _/_ _] lb oz	[_ _/_ _] lb oz [_ _/_ _] lb oz
C7.	Did the baby (one or more of these babies) have any birth defects?				
	No...............	0	0	0	0
	Yes	1	1	1	1
	(Specify)	________ ________ ________	________ ________ ________	________ ________ ________	________ ________ ________
	Don't know.....	9	9	9	9
C8.	Is this child (are these children) alive now?				
	No................	0	0	0	0
	Yes...**(Go to next pregnancy)**	1	1	1	1
	Some............	2	2	2	2
	Don't know..........	3	3	3	3
	IF "SOME" (multiple births)				

How many are alive now? [__]

[__] [__][__]

(Go to next pregnancy or C16)

		PREG #5	PREG #6	PREG #7	PREG #8
C9.	How many weeks or months were you pregnant for this pregnancy?	[_ _] weeks	[_ _] weeks	[_ _] weeks	[_ _] weeks
C10.	In what month and year did your [FIRST/NEXT] pregnancy end? (99 DK)	[_ _/_ _] mm yy	[_ _/_ _] mm yy	[_ _/_ _] mm yy	[_ _/_ _] mm yy

	PREG #5	PREG #6	PREG #7	PREG #8
C11. What was the outcome of this pregnancy?				
Live birth.......	1	1	1	1
Stillbirth.......	2	2	2	2
Miscarriage.............	3	3	3	3
Induced abortion.......	4	4	4	4
Tubal or ectopic pregnancy....	5	5	5	5
Molar pregnancy.......	6	6	6	6
Don't Know	9	9	9	9
(IF NOT LIVEBIRTH, GO TO NEXT PREGNANCY)				
C12. **IF LIVE BIRTH,** Was this a single birth or twins?				
Single birth.......	1	1	1	1
Twins...................	2	2	2	2
Other..........	3	3	3	3
(Specify)	________	________	________	________
Don't Know	9	9	9	9
C13. What was/were the birth weight(s)?	[_ _/_ _] lb oz [_ _/_ _] lb oz	[_ _/_ _] lb oz [_ _/_ _] lb oz	[_ _/_ _] lb oz [_ _/_ _] lb oz	[_ _/_ _] lb oz [_ _/_ _] lb oz
C14. Did the baby (one or more of these babies) have any birth defects?				
No........................	0	0	0	0
Yes	1	1	1	1
(Specify)	________ ________ ________	________ ________ ________	________ ________ ________	________ ________ ________
Don't Know	9	9	9	9
C15. Is this child (are these children) alive now?				
No................	0	0	0	0
Yes...**(Go to next pregnancy)**	1	1	1	1
Some............	2	2	2	2
Don't know..........	3	3	3	3
IF "SOME" (multiple births) How many are alive now?	[__]	[__]	[__]	[__]
(Go to next pregnancy or C16)				

C16. We've recorded [_____] previous pregnancies (not counting your current pregnancy) and

[_____] live births. Were there any other pregnancies that you can recall?
(If any other pregnancies recalled, add to chart)

[______] / [______]
total previous pregnancies/total live births

C17. Did any partner ever physically hurt you when you were pregnant?
No..0
Yes 1
DK..9

IF YES, during how many pregnancies?
[__ __]

SECTION D
Medical History since LMP month

Now I'm going to ask you about some things that may have happened since _______ (LMP month).

D1. Since __________ (LMP month), how many times have you fallen down and hit your stomach or accidentally hurt your stomach in some other way?
[__ __]

D2. Have you had any vaginal bleeding since ______ (LMP month), **including** today/tonight? **(PROBE:** By bleeding we mean spotting; like when you go to the bathroom there may be a little blood on the toilet paper). **(CIRCLE ONE)**
No **(--> GO TO D4)** 0
Yes 1
DK **(--> GO TO D4)** 9

D3. How many pads or tampons did you use for the bleeding at its heaviest? **(CIRCLE ONE)**
Spotting (<1 soaked pad/tampon per day) 1
1-2 pads/tampons per day 2
3-4 pads/tampons per day 3
>4 pads/tampons per day 4
DK..9

D4. Have you had any vaginal bleeding in the past 24 hours, **including** today/tonight?
No..0
Yes 1
DK..9

D5. Have you had a fever since ______ (LMP month), including today/tonight? **(CIRCLE ONE)**
No **(--> GO TO E1)** 0
Yes 1
DK **(--> GO TO E1)** 9

D6. What was your temperature at its highest? **(CIRCLE ONE)**
Took temperature and it was

Less than 100 1
100 - 100.9 2
101.0 - 102.9 3
>103.0 4
Fever above 100 but DK exact temperature 5
Felt hot but didn't take temperature 6
DK..9

D7. Did a health provider tell you what caused your fever?
No...0
Yes 1
DK.. 9

IF "YES", What did you have?

SECTION E
FAMILY CHARACTERISTICS

The next few questions are about your living arrangements and people in your life such as family, friends and neighbors.

E1. Think of the main place where you have lived since _________ (LMP month). Is it an apartment, a house, boarding house, facility or shelter, or have you been homeless?
Apartment 1
House 2
Facility/shelter ***(What kind of facility/shelter ___________________)*** **(SKIP TO E4)** 3
Boarding House **(SKIP TO E4)** 4
Homeless **(--> GO TO E6)** 5
[_ _]

E2. Is it public housing?
No..0
Yes **(--> GO TO E4)** 1
DK...9

E3. **(IF E1=HOUSE),** Is it a house or apartment owned by you or your family?
No..0
Yes 1
DK...9

E4. How long have you lived at this address? [__ __/__ __]
#yy/# mm
(Code duration in months and years)

E5. Again, thinking about the main place where you have lived since _________ (LMP month) have you lived with any of the following people?
(READ ALL CHOICES)

	N	Y	[__ __]
a. Father of your current pregnancy	0	1	
			IF "YES", How many
b. Your own children	0	1	[__ __]
c. Someone else's children	0	1	[__ __]
d. One or both of your parents	0	1	[__ __]
e. Your brothers or sisters	0	1	[__ __]
f. Other relative ***(Specify)*****_________**	0	1	[__ __]
g. Friends ***(Specify)*****_________**	0	1	[__ __]
h. Anyone else ***(Specify)*****_________**	0	1	[__ __]

TOTAL + RESPONDENT= [__ __]

Let's see, including you that makes _____ people living together is that right?

E6. About how many times <u>per week</u> do you talk with friends or relatives on the telephone?
[__ __]
1=day 2=week

(IF THEY SAY EVERYDAY, PROBE FOR TIMES/DAY)

E7. About how many times per week do you get together with a friend or relative who you don't live with? [__ __] times per
(IF THEY SAY EVERYDAY, PROBE FOR TIMES/DAY) 1=wk; 2=mo; 3=yr

E8. How often would you like to see friends or relatives? **(READ ALOUD)**

More often..1
Less often 2
It's about right...0

E9. How many close friends do you have? [__ __]
number

E10. How many people can you count on in times of need? [__ __]
number

E11. **[ASK ONLY FOR WOMEN WITH CHILDREN UNDER 18]** How many people would be able to take care of your child/children for several hours if needed? [__ __]
number

a. How many of these people are from your neighborhood? [__ __]
number

E12. Over the past six months, did you regularly attend church or other religious services?
No 0
Yes 1

No matter how well people get along, there are times when they disagree, get annoyed or just have fights. The next set of questions are about some things that might happen when people have arguments or fights. We find that a lot of women who come to the Emergency Department experience violence in their lives. Again, remember this is private and I will not share this with anyone, including your doctors and nurses.

E13. How many times since _____ (LMP month) have you had an argument or fight with someone you know or with a stranger?

[__ __]

E14. Since ________ (LMP month), during any argument or fight did you get pushed, slapped or hurt in anyway?

No **(GO TO E20)** 0
Yes 1

E15. **IF YES;** About how many times did this happen?

[__ __]

E16. Who did this?/Who else did this? **Anyone else?**
(DO NOT READ, CIRCLE ALL THAT APPLY)

1. Baby's Father	10. Female Partner	19. Uncle	28. Other - Male specify _______________)
2. Boyfriend	11. Mother	20. Cousin- Male	29. Other - Female specify _______________)
3. Ex-boyfriend	12. Stepmother	21. Cousin- Female	
4. Spouse	13. Grandmother/ Step-grandmother	22. Friend - Male	
5. Ex-spouse	14. Brother	23. Friend - Female	
6. Date - Male	15. Sister	24. Acquaintance/ Neighbor - Male	
7. Father	16. Son	25. Acquaintance/ Neighbor - Female	
8. Stepfather	17. Daughter	26. Stranger - Male	
9. Grandfather/ Step-grandfather	18. Aunt	27. Strnager - Female	

If number 1-5, Is he the father of your current pregnancy?

No..0
Yes 1

Anyone else?

E17. During this fight or argument (any of these fights or arguments), were you stabbed or cut with anything?

No..0
Yes 1

IF YES, About how many times did this happen?

[__ __]

E18. Since _____ (LMP months), during this fight or argument (any of these fights or arguments), where on your body were you hit or hurt in anyway? **(CIRCLE ALL APPLY)**

Anywhere else?

Face 1
Head/not face 2
Neck 3
Back/butt 4
Arm/shoulder 5
Hand/wrist 6
Breast 7
Chest/not breast 8
Stomach (number of times _____) 9
Groin 10
Leg 11
Foot/ankle 12
Other (specify _______________) 13
DK 14

E19. Since _____ (LMP month), did the number of times you were hurt go up, go down or remain the same?

Went Up 1
Went Down 2
Remained the same 3
First time it happened 4

E20. Since _____ (LMP month), has anyone shot at you with a gun?

No **(GO TO E23)** 0
Yes 1

IF YES, How many times did this happen?

[__ __]

E21. Were you hit?

No **(SKIP TO E23)** 0
Yes 1

IF "YES", Looking at this picture, where were you hit? **(CIRCLE ALL THAT APPLY)**

Face 1
Head/not face 2
Neck 3
Back/butt 4
Arm/shoulder 5
Hand/wrist 6
Breast 7
Chest/not breast 8
Stomach 9
Groin 10
Leg 11
Foot/ankle 12
Other (specify ________________) 13
DK 14

E22. Who did this?/Who else did this? **Anyone else?**
(DO NOT READ, CIRCLE ALL THAT APPLY).

. Baby's Father	0. Female Partner	19. Uncle	28. Other - Male ecify _______________)
2. Boyfriend	11. Mother	20. Cousin- Male	29. Other - Female ecify _______________)
3. Ex-boyfriend	12. Stepmother	1. Cousin- Female	
4. Spouse	3. Grandmother/ Step-grandmother	22. Friend - Male	
5. Ex-spouse	14. Brother	3. Friend - Female	
6. Date - Male	15. Sister	24. Acquaintance/ Neighbor - Male	
7. Father	16. Son	25. Acquaintance/ Neighbor - Female	
8. Stepfather	17. Daughter	6. Stranger - Male	
9. Grandfather/ Step-grandfather	18. Aunt	7. Stranger - Female	

If number 1-5, Is he the father of your current pregnancy?

No 0
Yes 1

Anyone else?

E23. Since _____ (LMP month), did anyone else harm you in any other way?........... No **(Skip to E26)**
Yes 1

E24. **IF YES,** Can you tell me what happened?

____

____

____

[__ __]

E25. Who did this?/Who else did this? **Anyone else?**
(DO NOT READ, CIRCLE ALL THAT APPLY).

1. Baby's Father	10. Female Partner	19. Uncle	28. Other - Male (specify ______________)	[__ __]
2. Boyfriend	11. Mother	20. Cousin- Male	29. Other - Female (specify ______________)	[__ __]
3. Ex-boyfriend	12. Stepmother	21. Cousin- Female		
4. Spouse	13. Grandmother/ Step-grandmother	22. Friend - Male		
5. Ex-spouse	14. Brother	23. Friend - Female		
6. Date - Male	15. Sister	24. Acquaintance/ Neighbor - Male		
7. Father	16. Son	25. Acquaintance/ Neighbor - Female		
8. Stepfather	17. Daughter	26. Stranger - Male		
9. Grandfather/ Step-grandfather	18. Aunt	27. Stranger - Female		

[__ __]
CODE

If number 1-5, Is he the father of your current pregnancy?
No..0
Yes 1

Anyone else?

Now I'd like to ask you some questions about your neighborhood...

E26. Looking at this card, how safe do you feel walking in your neighborhood after dark. **(READ RESPONSES ALOUD)**

Not safe..1
Cautious..2
Comfortable but aware 3
Comfortable...4
Very Safe..5

E27. In the past year, how many times in your neighborhood have you felt afraid or thought that you would get hurt?

[__ __]

E28. In the past year, how many times has anyone been jumped or attacked in your neighborhood?

[__ __]

E29. In the past year, how many times have you seen someone carrying or holding a gun or knife in your neighborhood, not including the police or security officers?

[__ __]

E30. In the past year, how many times have you heard the sound of gunfire in your neighborhood?

[__ __]

SECTION F
CURRENT PARTNER

The next few questions are about your most recent relationship.

F1. Do you have a boyfriend or are you currently in an intimate relationship?
No 0
Yes 1

If YES; how many times per week or per month do you see him? [__ __]
(If living together, code 89) 1= week/2=month
(If incarcerated over a month ago, code 66)

If NO; when were you last in an intimate relationship? [__ __/__ __]
mm yy
If never, enter 88/88
and Skip to G1

F2. These next questions are about your current or most recent intimate partner. I'll show you a sheet to look at so you can pick your answer. The possible answers to these questions are:
Never 1
Rarely 2
Occasionally 3
Frequently 4
Very Frequently 5

	Never	Rarely	Occasionally	Frequently	Very Frequently
1. My partner doesn't want me to go out with my friends	1	2	3	4	5
2. My partner tells me I am ugly and unattractive	1	2	3	4	5
3. My partner insults or shames me in front of others	1	2	3	4	5
4. My partner is a kind person	1	2	3	4	5
5. My partner becomes very angry if I disagree with his point of view	1	2	3	4	5
6. My partner is generous in giving me enough money	1	2	3	4	5
7. My partner demands sex whether I want it or not	1	2	3	4	5
8. My partner is jealous of other men	1	2	3	4	5

SECTION G
USE OF DRUGS AND ALCOHOL

Now I'd like to ask you about your lifestyle.

G1. Do you smoke cigarettes now?
No **(--> GO TO G3)** 0
Yes **(--> GO TO G2)**....................1

G2. **IF "YES"**,
a. How long have you smoked cigarettes? [__ __]
2=mm; 3=yy

b. Since ____ (LMP month), how many cigarettes do you usually smoke per day?
IF NOT REGULAR SMOKER: How many in a week? (DIVIDE ANSWER BY 7 DAYS)
__ __. __ / day

c. And before ______ (LMP month), how many cigarettes did you usually smoke per day?
IF NOT REGULAR SMOKER: How many in a week? (DIVIDE ANSWER BY 7 DAYS)
__ __. __ / day

G3. **IF "NO"**,
d. Have you ever smoked cigarettes?
No **(--> GO TO G4)** 0
Yes 1

e. How long did you smoke? [__ __]
2=mm; 3=yy

f. When did you quit? [__ __/ __ __]
mm yy

g. On average, how many cigarettes did you smoke on a typical day? [__ __]
number

G4. Have you ever smoked marijuana?
No **(--> GO TO G7)** 0
Yes 1

G5. Have you smoked marijuana since ______ (LMP month)?
No....................0
Yes 1

G6. When did you last smoke marijuana? [__ __/__ __]
mm yy

G7. Have you ever used crack or cocaine?
No **(--> GO TO G10)** 0
Yes..1

G8. Have you used crack or cocaine since ______ (LMP month)?
No 0
Yes..1

G9. When did you last use crack or cocaine? [__ __/__ __]
mm yy

G10. Since _____ (LMP month), how often have you been drinking beer, wine/wine coolers or liquor? **(READ RESPONSES)**
Never **(--> GO TO G12)** 1
Sometimes 2
Everyday 3

G11. On the days you drink, how much do you drink on average?**(Interviewer should adjust number if participant reports larger or smaller drink size, for example, 40 ounce Bottle of beer =3.33 standard drinks)**

__ __. __

G12. Before _____ (LMP month), how often did you drink beer, wine/wine coolers or liquor? **(READ RESPONSES)**

Never **(--> GO TO G14)** 1
Sometimes 2
Everyday 3

G13. On the days you drank, how much did you drink on average? **(Interviewer should adjust number if participant reports larger or smaller drink size, for example, 40 ounce Bottle of beer = 3.33 standard drinks)**

__ __. __

G14. **(ASK ONLY FOR WOMEN RESPONDING NEVER TO G10 and G12)**
In the past year, have you drunk beer, wine/wine coolers or liquor?
No **(--> GO TO G20)**...0
Yes 1

The next few questions ask about your drinking in the past year.

G15. How many drinks can you hold?
[___]
number

G16. Have close friends or relatives worried or complained about your drinking in the past year?

No..0
Yes 1
DK..9

G17. Do you sometimes take a drink in the morning when you first get up?

No..0
Yes 1
DK..9

G18. Has a friend or family member ever told you about things you said or did while you were drinking that you could not remember?

No..0
Yes 1
DK..9

G19. Do you sometimes feel the need to cut down on your drinking?

No..0
Yes 1
DK..9

G20.	Have you ever tried...? Y DK	Have you used it since _____ (LMP month)? Y DK	How many times e _____ (LMP month)?
a. Uppers,bennies,speed,crank or Amphetamines	1 9	1 9	1=wk;2=mo.
b. Downers, barbs, or Barbiturates	1 9	1 9	1=wk;2=mo.
c. LSD, acid or mescaline	1 9	1 9	1=wk;2=mo.
d. Hash, hashish,THC or sensemilla	1 9	1 9	1=wk;2=mo.
e. Methadone/Heroin	1 9	1 9	1=wk;2=mo.
f. Percoset, codeine	1 9	1 9	1=wk;2=mo.
g. PCP or angel dust	1 9	1 9	1=wk;2=mo.
h. Anything Else ***(Specify)***____________ [__ __ __ __] CODE	1 9	1 9	1=wk;2=mo.

SECTION H
Life Events

(ASK ONLY IF 16 YEARS OR OLDER)
Now I'm going to ask you about your experience with fights or violence since you've been 16 years old. Again, all this information is private and will not be shared with anyone.

H1. Thinking about all of your past sexual relationships including your current partner..... How many times, <u>since you were 16</u>, have you been slapped, pushed or hurt by a partner?
[__ __]

H2. Now thinking about a family member or anyone else that you know, **not** including a sexual partner.....
<u>Since you were 16</u>, how many times have you been slapped, pushed or hurt by someone in your family or someone else you know? [__ __]

H3. Who did this? **Anyone else?**

[__ __]
CODE

1. Father	9. Sister	17. Friend - Female	
2. Stepfather	10. Son	18. Acquaintance/ Neighbor - Male	
3. Grandfather/ Step-grandfather	11. Daughter	19. Acquaintance/ Neighbor - Female	
4. Mother	12. Aunt	20. Stranger - Male	
5. Stepmother	13. Uncle	21. Stranger - Female	
6. Grandmother/ Step-grandmother	14. Cousin-Male	22. Other- Male *(Specify)* _______________	[__ __]
7. Mother's boyfriend	15. Cousin-Female	23. Other- Female *(Specify)* _______________	[__ __]
8. Brother	16. Friend - Male		

H4. Now thinking about **strangers**, how many times have you been slapped, pushed or hurt by a stranger <u>since you were 16</u>?
[__ __]

H5. How many times has anyone (including the father of this pregnancy, a boyfriend, a stranger or anyone else), shot at you with a gun <u>since you've been 16 years old</u>?
[__ __]
(If 0 skip to H8)

H6. Who did this? **Anyone else?**
(DO NOT READ, CIRCLE ALL THAT APPLY)

1. Baby's Father	10. Female Partner	19. Uncle	28. Other - Male (specify _______________)	[__ __]	[__ __] CODE
2. Boyfriend	11. Mother	20. Cousin- Male	29. Other - Female (specify _______________)	[__ __]	
3. Ex-boyfriend	12. Stepmother	21. Cousin- Female			
4. Spouse	13. Grandmother/ Step-grandmother	22. Friend - Male			
5. Ex-spouse	14. Brother	23. Friend - Female			
6. Date - Male	15. Sister	24. Acquaintance/ Neighbor - Male			
7. Father	16. Son	25. Acquaintance/ Neighbor - Female			
8. Stepfather	17. Daughter	26. Stranger - Male			
9. Grandfather/ Step-grandfather	18. Aunt	27. Stranger - Female			

H7. Were you hit?
No....................0
Yes....................1

IF "YES", Looking at this picture, where were you hit? **(CIRCLE ALL THAT APPLY)**
Face....................1
Head/not face....................2
Neck....................3
Back/butt....................4
Arm/shoulder....................5
Hand/wrist....................6
Breast....................7
Chest/not breast....................8
Stomach....................9
Groin....................10
Leg....................11
Foot ankle....................12
Other (**Specify** ______________)....................13
Don't know....................14

H8. Since you were 16 years old, has anyone ever forced you to have sex when you didn't want to?
No **(skip to H9)** 0
Yes 1

How many times did this happen? [__ __]

Who did this? **Anyone else?**
(DO NOT READ, CIRCLE ALL THAT APPLY)

1. Father	9. Grandmother/ Step-grandmother	17. Acquaintance/ Neighbor - Male	[__ __] CODE
2. Step-father	10. Mother	18. Acquaintance/ Neighbor - Female	
3. Mother's boyfriend	11. Sister	19. Parent of friend - Male	
4. Uncle	12. Date - Male	20. Parent of friend - Female	
5. Baby's Father	13. Cousin - Male	21. Stranger - Male	
6. Boyfriend	14. Cousin - Female	22. Stranger - Female	
7. Brother	15. Friend - Male	23. Other - Male *(Specify)* ______________	[__ __]
8. Grandfather/ Step-grandfather	16. Friend - Female	24. Other Female *(Specify)* ______________	[__ __]
		25. Exboyfriend	

(ASK EVERYBODY) Now I'm going to ask you about your experience with fights or violence before you were 16 years old.

H9. How many times, before you were 16, were you slapped, pushed or hurt in anyway by a sexual partner or boyfriend? [__ __]

H10. Now thinking about family, friends or anyone else that you know, **not** including a past or current sexual partner...
How many times, before you were 16, were you slapped, pushed or hurt by someone in your family or someone else you know?
[__ __]**(If 0, skip to H12)**

H11. Who did this? **Anyone else?**
(DO NOT READ, CIRCLE ALL THAT APPLY)

1. Father	9. Sister	17. Friend - Female	[__ __] CODE
2. Stepfather	10. Son	18. Acquaintance/ Neighbor - Male	
3. Grandfather/ Step-grandfather	11. Daughter	19. Acquaintance/ Neighbor - Female	
4. Mother	12. Aunt	20. Stranger - Male	
5. Stepmother	13. Uncle	21. Stranger - Female	
6. Grandmother/ Step-grandmother	14. Cousin-Male	22. Other- Male *(Specify)* ______________	[__ __]
7. Mother's boyfriend	15. Cousin-Female	23. Other- Female *(Specify)* ______________	[__ __]
8. Brother	16. Friend - Male		

H12. Now thinking about **strangers**, how many times, before you were 16, have you been slapped, pushed or hurt by a stranger?

[__ __]

H13. When you were growing up, that is before you were 16 years old, did **anyone** ever force you to have sex?

No **(skip to H14)** 0
Yes 1

How many times did this happen? [__ __]

Who did this? **Anyone else?**

1. Father	9. Grandmother/ Step-grandmother	17. Acquaintance/ Neighbor - Male	[__ __] CODE
2. Step-father	10. Mother	18. Acquaintance/ Neighbor - Female	
3. Mother's boyfriend	11. Sister	19. Parent of friend - Male	
4. Uncle	12. Date - Male	20. Parent of friend - Female	
5. Baby's Father	13. Cousin - Male	21. Stranger - Male	
6. Boyfriend	14. Cousin - Female	22. Stranger - Female	
7. Brother	15. Friend - Male	23. Other - Male *(Specify)* ______________	[__ __]
8. Grandfather/ Step-grandfather	16. Friend - Female	24. Other Female *(Specify)* ______________	[__ __]

H14. The next group of questions are about things that may have happened **during the past year**. Did any of the following things happen to you in the past year?

	No	Yes
1. A member of your family died.	0	1
2. You were worried about the safety of your children.	0	1
3. Someone close to you was in an accident.	0	1
4. You were hospitalized.	0	1
5. You were worried because you had a health problem such as high blood pressure, diabetes, or other ongoing condition.	0	1
6. You were worried about the influence of neighborhood problems on your children.	0	1
7. Your husband or boyfriend lost his job.	0	1
8. One of your children was in an accident.	0	1
9. You were ill for a week or more.	0	1
	No	Yes

10. You were worried about the emotional well-being of your children.	0	1
11. You were worried about the health of your baby (this pregnancy).	0	1
12. You had to delay the start of prenatal care because of financial reasons.	0	1
13. You lost your job.	0	1
14. Your husband or boyfriend had a problem with alcohol.	0	1
15. Someone close to you was in trouble with the law or police.	0	1
16. You were worried about your ability to be a good parent.	0	1
17. You were worried about how your separation from your husband/boyfriend would affect your children.	0	1
18. One of your children had a chronic health problem.	0	1
19. You were worried about money.	0	1
20. One of your children was sick for more than 3 days.	0	1
21. You were worried about bleeding/spotting or pain with this pregnancy.	0	1
22. Your house or apartment is too crowded.	0	1
23. One of your children had a serious ear infection.	0	1
24. You were worried about the possible influences of other children upon your children.	0	1
25. You were worried about having enough money to pay your bills now or in the future.	0	1
26. You became separated/divorced from your husband/boyfriend.	0	1
27. You were worried because you had problems with a pregnancy in the past.	0	1
28. Your husband/boyfriend or another adult family member was sick for more than a week.	0	1
29. A close family member had money problems.	0	1
30. A close family member was using drugs.	0	1
31. Caring for a baby or toddler all the time was a problem for you.	0	1
32. You had a poor relationship with your parents.	0	1
33. A close family member had an alcohol problem.	0	1
34. You did not get along with another family member.	0	1
35. You were worried about the effects of your drug use upon the baby you're carrying.	0	1
	No	Yes
36. You were nauseated (sick on the stomach) with this pregnancy.	0	1

37. You wanted to return to school, and could not.	0	1
38. You were unhappy with your job.	0	1
39. You were worried about labor and delivery.	0	1
40. Your husband/boyfriend was unemployed for more than one (1) month.	0	1
41. You were unemployed for more than one (1) month.	0	1

SECTION I
MEDICAL AND GYNECOLOGIC HISTORY

Now I'd like to ask you some questions about your medical history...

I1. Has a doctor or nurse ever told you that you had.......**(READ DOWN THE ENTIRE LIST)**

		No	Yes	DK	**IF "YES",** "When was the last time you saw a doctor or nurse for this problem?
a.	Anemia (when you were not pregnant)	0	1	9	[_ _ /_ _] mm yy
b.	Asthma	0	1	9	[_ _ /_ _] mm yy
c.	Diabetes (when you were not pregnant)	0	1	9	[_ _ /_ _] mm yy
d.	Epilepsy, fits or seizures	0	1	9	[_ _ /_ _] mm yy
e.	Heart disease (do not code murmurs here) ***(Specify)*** _________________	0	1	9	[_ _ /_ _] [__ __ __ __] mm yy CODE
f.	High blood pressure during pregnancy	0	1	9	[_ _ /_ _] mm yy
g.	High blood pressure (not during pregnancy)	0	1	9	[_ _ /_ _] mm yy
h.	Incompetent cervix	0	1	9	[_ _ /_ _] mm yy

		No	Yes	DK	**IF "YES",** "When was the last time you saw a doctor or nurse for this problem?
i.	Two abnormal pap smears in a row or colposcopy	0	1	9	[_ _ /_ _] mm yy
j.	Thyroid Problem				
	(IF YES), Underactive	0	1	9	[_ _ /_ _] mm yy
	Overactive	0	1	9	[_ _ /_ _] mm yy
	Other (***Specify***) __________	0	1	9	[_ _ /_ _] mm yy
k.	Preeclampsia	0	1	9	[_ _ /_ _] mm yy
l.	Problems getting pregnant ***(Specify)*** _____________	0	1	9	[_ _ /_ _] mm yy
m.	Any Other Medical Conditions ***(Specify)*** _________________	0	1	9	[_ _ /_ _] mm yy

[__ __]
CODE

I2. Do you take any medications regularly?

No 0
Yes 1
DK 9

IF "YES", what? ____
____
____

For what? ____
____
____

Codes: [__ __] [__ __]
[__ __] [__ __]

SECTION J
HISTORY OF PID AND STD

Now I'd like to ask you about different infections you may have had.

J1. Have you ever had:

	N	Y	DK
Pelvic Inflammatory Disease/PID (an infection in the tubes, ovaries, or womb)	0	1	9
Gonorrhea	0	1	9
Syphilis	0	1	9
Chlamydia	0	1	9
Warts on genitals or buttocks	0	1	9
Trichomonas (Trich)	0	1	9
Bacterial Vaginosis (BV)	0	1	9
Another sexually transmitted disease ***Specify***___________________________	0	1	9

J2. Since ___________ (LMP month), have you been told by a doctor or nurse that you have gonorrhea, chlamydia, syphilis or bacterial vaginosis? **(CIRCLE ONE)**

No 0
Yes 1
DK 9

IF "YES", What did you have? **(CIRCLE ALL THAT APPLY)**

Gonorrhea.. 2
Chlamydia 3
Syphilis.. 4
Bacterial Vaginosis 5
DK 9

J3. Has a doctor or nurse ever told you that you are infected with HIV, the virus that causes AIDS? **(CIRCLE ONE)**

No 0
Yes 1
Maybe ***(Specify)*** ______________________ 2
DK 9

J4. Have you ever had a blood or other test that was positive for HIV? **(CIRCLE ONE)**

No 0
Yes 1
Maybe ***(Specify)*** ______________________ 2
DK 9

SECTION K
PHYSICAL CHARACTERISTICS

Now I would like to ask you some questions about your height and weight.

K1. How tall are you? [_ / _ _]
ft in

K2. What would be your best guess as to how much you weigh now? [_ _ _]
lbs.

K3. Since ______ (LMP month), how many hours of the day do you usually spend standing up? [__ __]
hours

K4. Since ______ (LMP month), how many hours per day do you spend sitting or watching television? [__ __]
hours

K5. Since ______ (LMP month), how many times per day or per week did you lift 10 pounds or .... more? [__ __]
1=day, 2 = week

SECTION L
STRESS AND LIFE EVENTS

L1. These last questions are about how you have been feeling **recently**. For each question, please indicate how often you have felt this way during the past week. The choices are:

Rarely or none of the time (less than 1 day)
Some or little of the time (1-2 days)
Occasionally or a moderate amount of the time (3-4 days)
Most of the time (5-7 days)

	Rarely	Some of the time	Occasionally	Most of the time
a. I was bothered by things that usually do not bother me.	0	1	2	3
b. I did not feel like eating: my appetite was poor.	0	1	2	3
c. I felt that I could not shake the blues even with help from my family or friends.	0	1	2	3
d. I felt that I was just as good as other people.	3	2	1	0
e. I had trouble keeping my mind on what I was doing.	0	1	2	3
f. I felt depressed.	0	1	2	3
g. I felt that everything I did was an effort.	0	1	2	3
h. I felt hopeful about the future.	3	2	1	0
I. I thought my life had been a failure.	0	1	2	3
j. I felt fearful.	0	1	2	3
k. My sleep was restless.	0	1	2	3
l. I was happy.	3	2	1	0
m. I talked less than usual.	0	1	2	3
n. I felt lonely.	0	1	2	3
o. People were unfriendly.	0	1	2	3
p. I enjoyed life.	3	2	1	0
q. I had crying spells.	0	1	2	3
r. I felt sad.	0	1	2	3
s. I felt that people disliked me.	0	1	2	3
t. I could not get “going.”	0	1	2	3

L2. The next few questions are also about how you have been feeling recently. Please be as honest and accurate as you can, the answers to these questions are:

I agree a lot 5
I agree a little 4
I neither agree nor disagree 3
I disagree a little 2
I disagree a lot 1

	I agree a lot	I agree a little	I neither agree or disagree	I disagree a little	I disagree a lot
1. In uncertain times, I usually expect the best.	5	4	3	2	1
2. It's easy for me to relax.	5	4	3	2	1
3. If something can go wrong for me, it will.	5	4	3	2	1
4. I'm always optimistic about my future.	5	4	3	2	1
5. I enjoy my friends a lot.	5	4	3	2	1
6. It's important for me to keep busy.	5	4	3	2	1
7. I hardly ever expect things to go my way.	5	4	3	2	1
8. I don't get upset too easily.	5	4	3	2	1
9. I rarely count on good things happening to me.	5	4	3	2	1
10. Overall, I expect more good things to happen to me than bad.	5	4	3	2	1

L3. The following questions are about your feelings and thoughts during **the last month**. The categories are:

Never 0
Almost Never 1
Sometimes 2
Fairly Often 3
Very Often 4

	Never	Almost Never	Sometimes	Fairly Often	Very Often
1. In the last month, how often have you felt that you were unable to control the important things in your life?	0	1	2	3	4
2. In the last month, how often have you felt confident about your ability to handle your personal problems?	0	1	2	3	4
3. In the last month, how often have you felt that things were going your way?	0	1	2	3	4
4. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?	0	1	2	3	4

ADDITIONAL INFORMATION

As I said, your opinion really matters. My last question is about services that you might like to have in an ER.

L4.In the future, would you like to be offered any of the following services in the Emergency Room if you needed them? **(READ ALOUD)**

	No	Yes
Talking with a counselor	0	1
Getting pain or nerve medicine	0	1
Finding a new place to stay	0	1
Finding out how to get a lawyer	0	1
Child care in the waiting area	0	1
Anything else	0	1

(Specify) ____

____

Thank you so much for participating in this personal interview.

Closing Statement: *Thank you for the time you have taken to answer these questions. You have been very patient and very helpful. Thank you for your help with this important study. We will be contacting you again by telephone within the next two to three months to see how you are doing.*

**** END OF SURVEY ****

(Interviewers, please turn to next page)

SECTION M
ENDING

Type of Health Insurance
_ None
_ Private
_ Private HMO
_ Medicaid HMO
_ No Information
_ Other

M1. In order to send you payment for your participation, we will need your:

a. Social Security number __ __ __/__ __/__ __ __ __

b. Home address ________________________________

____

c. Telephone number (__ __ __)__ __ __/__ __ __ __

d. Beeper number (__ __ __)__ __ __/__ __ __ __

e. When is a good time to reach you? __ __:__ __

1=am 2=pm

M2. Is there an alternate phone number where we can reach you?

a. Telephone number (__ __ __)__ __ __/__ __ __ __

b. Whose number is this? ________________________________

c. Relationship ________________________________

d. What's her/his address? ________________________________

____

M3. One other phone number:

a. Telephone number (__ __ __)__ __ __/__ __ __ __

b. Whose number is this? ________________________________

c. Relationship ________________________________

d. What's her/his address? ________________________________

____

M4. And another phone number, if we still can't reach you?

a. Telephone number (__ __ __)__ __ __/__ __ __ __

b. Whose number is this? ________________________________

c. Relationship ________________________________

d. What's her/his address? ________________________________

____

INFORMATION FOR FOLLOW-UP:

INTERVIEWER COMMENTS

1. Reliability of patient **(CIRCLE ONE)**

Good	0
Fair	1
Poor	2
DK	9

2. Brief narrative regarding the discussion with the subject.

3. Referrals Made: Organizations/Shelter, Phone Number, (Name if Applicable), etc.:

A)

B)

C)

D)

APPENDIX N
FOLLOW-UP 77-ITEM QUESTIONNAIRE

Study ID______________________
Date of visit______________________

Name of child who is participating in the study:_____________________________

Gender of the child:

1 Male
2 Female

This questionnaire will ask questions about both you and [CHILD'S NAME]. If you have more than one child, please answer specifically about that child.

1. When was [CHILD'S NAME] born? [_ _ /_ _ / __ __]
mm dd yy

2. When [CHILD's NAME] was born, how much did he/she birth weight?

[_____/______]
lb oz

MEDICAL HISTORY

Now I'd like to ask you some questions about [CHILD'S NAME] medical history...

3. Has a doctor or nurse ever told you that she/he had.......**(READ DOWN THE ENTIRE LIST)**

IF "YES", "When was the last time you saw a doctor or nurse for this problem?

		NO	YES	DK	
a.	Asthma	0	1	9	[/] mm yy
b.	Diabetes	0	1	9	[/] mm yy
c.	High blood pressure	0	1	9	[/] mm yy
d.	Any Other Medical Conditions ***(Specify)*** __________________	0	1	9	[/] mm yy

4. Does he/she take any medications regularly?
No 0
Yes... 1
DK9

IF "YES", what? ____
____
____

For what? ____
____
____

5. In general, how would you describe (CHILD'S NAME) health?
- ☐$_1$ Excellent
- ☐$_2$ Good
- ☐$_3$ Fair
- ☐$_4$ Poor

6. How would you classify [CHILD'S NAME]'s current weight?
- ☐$_1$ Very underweight
- ☐$_2$ Underweight
- ☐$_3$ Average
- ☐$_4$ Overweight
- ☐$_5$ Very overweight

The following are general questions about [CHILD'S NAME]'S SCHOOL OR DAYCARE CENTER:

7. What is [CHILD'S NAME]'s school level or child care arrangements?
- ☐$_1$ Day care
- ☐$_2$ Pre-school
- ☐$_3$ Kindergarten
- ☐$_4$ Grade school
- ☐$_5$ Junior high school
- ☐$_6$ Home school (skip to question 18)
- ☐$_7$ Home daycare (skip to question 18)
- ☐$_8$ Doesn't attend school or daycare (skip to question 18)

8. Does [CHILD'S NAME]'s school serve any breakfast?
- ☐$_2$ Yes
- ☐$_1$ No (skip to question 10)
- ☐$_9$ Refused / Don't know (skip to question 10)

9. During the school year, approximately how many times a week does [CHILD'S NAME] eat a breakfast from the school cafeteria.
- _______ Number of times
- ☐$_0$ None
- ☐$_9$ Refused / Don't know

10. Does [CHILD'S NAME]'s school serve any lunch?
- ☐$_2$ Yes
- ☐$_1$ No (skip to question 14)
- ☐$_9$ Refused / Don't know (skip to question 14)

11. During the school year, approximately how many times a week does [CHILD'S NAME] eat lunch from the school cafeteria.
- _______ Number of times
- ☐$_0$ None
- ☐$_9$ Refused / Don't know

12. Does [CHILD'S NAME]'s school offer brand-name fast foods such as Pizza Hut, Taco Bell, or Subway?

☐2 Yes
☐1 No
☐9 Don't know

13. Does [CHILD'S NAME]'s school offer soft drinks or any sugared drinks as a beverage choice at lunch? (soda, Hawaiian Punch, Kool-Aid, etc.)

☐2 Yes
☐1 No
☐9 Don't know

14. In school, how many times per week does [CHILD'S NAME] have gym or PE?

☐0 None
☐1 1
☐2 2
☐3 3
☐4 4
☐5 5
☐9 Don't know

15. In school, how many days per week does [CHILD'S NAME] have at least one recess?

☐0 None (skip to question 18)
☐1 1 to 2 days
☐2 3 to 4 days
☐3 Every school day
☐9 Don't know (skip to question 18)

16. On days that [CHILD'S NAME] has recess, how many times per day does he/she have recess?

☐0 None
☐1 1 to 2 times per day
☐2 3 to 4 times per day
☐3 more than 4 times per day

17. Does [CHILD'S NAME] go outside for recess?

☐0 Never
☐1 Rarely
☐2 Sometimes
☐3 Most of the time
☐4 Always

The following are general questions about [CHILD'S NAME]'S EATING:

18. Was [CHILD'S NAME] ever breastfed or fed breastmilk?

☐2 Yes
☐1 No (skip to question 20)
☐9 Refused / Don't know / Don't remember (skip to question 20)

19. How old was [CHILD'S NAME] when he/ she completely stopped breastfeeding or being fed breastmilk?

__________ days$_1$ / weeks$_2$ / months$_3$ / years$_4$ (circle one)

☐5 Still breastfeeding
☐9 Refused / Don't know / Don't remember

20. How often does [CHILD'S NAME] drink soft drinks? These include soda (not diet), Hawaiian Punch, lemonade, Kool-Aid, etc. or any other fruit-flavored beverage that is not 100% fruit juice. A serving is 8 ounces or 1 cup.

- ☐$_0$ Never / less than once per month
- ☐$_1$ 1 serving per week or less
- ☐$_2$ 2-6 servings per week
- ☐$_3$ 1-2 serving per day
- ☐$_4$ 3-4 servings per day
- ☐$_5$ 5 or more servings per day

21. How often does [CHILD'S NAME] drink milk or milk-containing beverages? (includes whole milk, reduced fat milks, chocolate milk, hot chocolate made from milk, Lactaid milk, Yoohoo). A serving is 8 ounces or 1 cup.

- ☐$_0$ Never / less than once per month
- ☐$_1$ 1 serving per week or less
- ☐$_2$ 2-6 servings per week
- ☐$_3$ 1-2 serving per day
- ☐$_4$ 3-4 servings per day
- ☐$_5$ 5 or more servings per day

22. Not counting juice, how often does [CHILD'S NAME] eat fruit? A serving is ½ cup chopped fruit or 1 medium piece of fruit.

- ☐$_0$ Never / less than once per month
- ☐$_1$ 1-3 servings per month
- ☐$_2$ 1 serving per week
- ☐$_3$ 2-6 servings per week
- ☐$_4$ 1 serving per day
- ☐$_5$ 2 or more servings per day

23. How often does [CHILD'S NAME] eat vegetables? (not including any potatoes such as mashed potatoes, French fries, fried potatoes or potato chips) A serving is ½ cup chopped vegetables.

- ☐$_0$ Never / less than once per month
- ☐$_1$ 1 serving per week or less
- ☐$_2$ 2-6 servings per week
- ☐$_3$ 1-2 serving per day
- ☐$_4$ 3-4 servings per day
- ☐$_5$ 5 or more servings per day

24. How often does [CHILD'S NAME] eat any meal or snack at places such as McDonald's, Burger King, Wendy's, Arby's, Pizza Hut, or Kentucky Fried Chicken? (including takeout)

- ☐$_0$ Never
- ☐$_1$ less than once per week
- ☐$_2$ 1-2 times per week
- ☐$_3$ 3-4 times per week
- ☐$_4$ More than 4 times per week

The following are questions about [CHILD'S NAME]'S PHYSICAL ACTIVITY:

25. Please think about the activities that [CHILD'S NAME] does *that make him/her sweat and breathe hard*, such as basketball, soccer, running, swimming, fast bicycling, fast dancing, etc. On how many of the past 7 days did he/she do any of those activities for at least 20 minutes?

- ☐$_0$ 0 days
- ☐$_1$ 1 day
- ☐$_2$ 2 days

☐3 3 days
☐4 4 days
☐5 5 days
☐6 6 days
☐7 7 days

26. Please think about [CHILD'S NAME]'s other activities *that DO NOT make him/her sweat and breathe hard*, such as fast walking, slow bicycling, skating, outdoor game playing. On how many of the past 7 days did he/she do any of those activities for at least 20 minutes?

☐0 0 days
☐1 1 day
☐2 2 days
☐3 3 days
☐4 4 days
☐5 5 days
☐6 6 days
☐7 7 days

The following are questions about VIDEO GAMES & TELEVISION:

27. Does anyone in your household own any type of computer or electronic game? (Sega, Nintendo Gamecube, Playstation, Nintendo X-Box, Gameboy, other handheld electronic games, etc.)

☐2 Yes
☐1 No
☐9 Don't know

28. On Monday through Friday, about how much time per day does [CHILD'S NAME] spend playing video games, handheld electronic games, or computer games?

☐0 none
☐1 1 hour or less
☐2 2 hours
☐3 3 hours
☐4 4 hours
☐5 5 or more hours
☐9 Don't know

29. On Saturday and Sunday, about how much time per day does [CHILD'S NAME] spend playing video games, handheld electronic games, or computer games?

☐0 none
☐1 1 hour or less
☐2 2 hours
☐3 3 hours
☐4 4 hours
☐5 5 or more hours
☐9 Don't know

30. Approximately how much time per day on Monday through Friday does [CHILD'S NAME] spend watching television?

☐0 none
☐1 1 hour or less
☐2 2 hours
☐3 3 hours
☐4 4 hours
☐5 5 or more hours
☐9 Don't know

31. Approximately how much time per day on Saturday and Sunday does [CHILD'S NAME] spend watching television?

☐0 none
☐1 1 hour or less
☐2 2 hours
☐3 3 hours
☐4 4 hours
☐5 5 or more hours
☐9 Don't know

32. Does [CHILD'S NAME] have a television in his/her bedroom?

☐2 Yes
☐1 No
☐9 Refused / Don't know

The next group of questions are about things that may have happened to you during the past year.

Did any of the following things happen to you in the last 12 months?	Yes	No	Don't know / Refused
33. You were worried about the safety of your child.	☐2	☐1	☐9
34. You or your spouse were hospitalized.	☐2	☐1	☐9
35. You were worried because you or your spouse had a health problem such as high blood pressure, diabetes, or another ongoing condition.	☐2	☐1	☐9
36. You were worried about the influence of neighborhood problems on your child.	☐2	☐1	☐9
37. You were worried about the influence of other children on your children.	☐2	☐1	☐9
38. You or your spouse/partner lost a job.	☐2	☐1	☐9
39. One of your children was in an accident.	☐2	☐1	☐9
40. You were worried about the emotional well-being of your child.	☐2	☐1	☐9
41. Your spouse/partner or a close family member had a problem with alcohol.	☐2	☐1	☐9
42. Someone close to you was in trouble with the police.	☐2	☐1	☐9
43. You were worried about your ability to be a good parent.	☐2	☐1	☐9
44. One of your children had a chronic health problem.	☐2	☐1	☐9
45. One of your children was sick for more than 3 days.	☐2	☐1	☐9
46. Your house or apartment is too crowded.	☐2	☐1	☐9
47. You were worried about having enough money to pay your bills now or in the future.	☐2	☐1	☐9
48. You became separated/divorced from your spouse/partner.	☐2	☐1	☐9
49. Your spouse/partner or another adult family member was sick for more than a week.	☐2	☐1	☐9
50. You were sick for more than a week.	☐2	☐1	☐9
51. You had a poor relationship with your parents.	☐2	☐1	☐9
52. You did not get along with another family member.	☐2	☐1	☐9
53. You wanted to return to school but could not.	☐2	☐1	☐9
54. You were unhappy with your job.	☐2	☐1	☐9

The following are general questions about YOU:

55.What is your relationship to [CHILD'S NAME]?

- ☐1 Biological mother
- ☐2 Step Mother
- ☐3 Adoptive Mother
- ☐9 Other, please specify________________________

56. What is the highest grade or level of school that you have completed or the highest degree that you have received?

- ☐0 Never attended/kindergarten only
- ☐1 1st grade
- ☐2 2nd grade
- ☐3 3rd grade
- ☐4 4th grade
- ☐5 5th grade
- ☐6 6th grade
- ☐7 7th grade
- ☐8 8th grade
- ☐9 9th grade
- ☐10 10th grade
- ☐11 11th grade
- ☐12 12th grade, no diploma
- ☐13 High school graduate
- ☐14 GED or equivalent
- ☐15 Associate degree: occupational, technical or vocational program
- ☐16 Associate degree: academic program
- ☐17 Bachelor's degree (BA,AB,BS,BBA)
- ☐18 Master's degree(MA,MS,MEng,MEd,MBA)
- ☐19 Professional school degree (MD,DDS,DVM,JD)
- ☐20 Doctoral degree (PhD,EdD)
- ☐9 Refused / Don't know

57. Are you currently employed either full or part-time?

- ☐1 No
- ☐2 Full-time
- ☐3 Part-time

58. In the last 12 months, did you or [CHILD'S NAME] receive benefits from the WIC program, that is, the Women, Infants, and Children program?

- ☐2 Yes
- ☐1 No
- ☐9 Refused / Don't know

59. In the last 12 months, were you authorized to receive Food Stamps?

- ☐2 Yes
- ☐1 No
- ☐9 Refused / Don't know

The following are general questions about [CHILD'S NAME]'S BIOLOGICAL PARENTS:

	Biological Mother	**Biological Father**
60. Date of birth?	___/___/____ (mm/dd/yyyy) ☐9 Don't know / refused	___/___/____ (mm/dd/yyyy) ☐9 Don't know / refused
61. Current Weight?	_________lb ☐9 Don't know / refused	_________lb ☐9 Don't know / refused
62. Current Height?	______ft______in ☐9 Don't know / refused	______ft______in ☐9 Don't know / refused

The following are general questions about YOUR HOUSEHOLD:

63. What is the total combined income before taxes for all people living in your household. This includes salaries, wages, Social Security benefits, child support, alimony, etc.

	Gross Income Per Year
☐1	Less than $10,000
☐2	$10,000-$14,999
☐3	$15,000-$19,999
☐4	$20,000-$24,999
☐5	$25,000-$29,999
☐6	$30,000-$34,999
☐7	$35,000-$39,999
☐8	$40,000-$44,999
☐9	$45,000-$49,999
☐10	$50,000-$54,999
☐11	$55,000-$59,999
☐12	$60,000-$64,999
☐13	$65,000-$69,999
☐14	$70,000-$74,999
☐15	$75,000 or more
☐99	Refused/Don't Know

64. Does anyone living in your household smoke cigarettes, cigars, or pipes either inside or outside the home?
- ☐2 Yes
- ☐1 No
- ☐9 Refused / Don't know

65. Do you smoke cigarettes now?
- ☐2 Yes
- ☐1 No (skip to question 67)
- ☐9 Refused / Don't know

If "YES", How long have you smoked cigarettes?

_________ days$_1$ / weeks$_2$ / months$_3$ / years$_4$ (circle one)

66. How many cigarettes do you usually smoke per day?
___ ___ ___/day

I'm going to read you some statements that people have made about their food situation. Please tell me whether the statement was OFTEN, SOMETIMES, or NEVER true for (you, in the last 12 months.

67. "The food that (I/we) bought just didn't last, and (I/we) didn't' have money to get more."
☐$_0$ Often true
☐$_1$ Sometimes true
☐$_2$ Never true
☐$_9$ Refused/Don't know

68. "(I/we) couldn't afford to eat balanced meals."
☐$_0$ Often true
☐$_1$ Sometimes true
☐$_2$ Never true
☐$_9$ Refused/Don't know

69. In the last 12 months (date 12 months ago) did (you/you or other adults in your household) ever cut the size of your meals or skip meals because there wasn't enough money for food?
☐$_2$ Yes
☐$_1$ No (go to 71)
☐$_9$ Refused / Don't know (go to 71)

70. How often did this happen—almost every month, some months but not every month, or in only 1 or 2 months?
☐$_0$ Almost every month
☐$_1$ Some months but not every month
☐$_2$ Only 1 or 2 months
☐$_9$ Refused/Don't know

71. In the last 12 months, did you ever eat less than you felt you should because there wasn't enough money to buy food?
☐$_2$ Yes
☐$_1$ No
☐$_9$ Refused / Don't know

72. In the last 12 months, were you ever hungry but didn't eat because you couldn't afford enough food?
☐$_2$ Yes
☐$_1$ No
☐$_9$ Refused / Don't know

Child Food Insecurity

73. In the last 12 months, did you ever cut the size of [CHILD'S NAME] meals because there wasn't enough money for food?
☐$_2$ Yes
☐$_1$ No
☐$_9$ Refused / Don't know

74. In the last 12 months, did [CHILD'S NAME] ever skip meals because there wasn't enough money for food?

- ☐$_2$ Yes
- ☐$_1$ No (go to 76)
- ☐$_9$ Refused / Don't know (go to 76)

75. How often did this happen—almost every month, some months but not every month, or in only 1 or 2 months?

- ☐$_0$ Almost every month
- ☐$_1$ Some months but not every month
- ☐$_2$ Only 1 or 2 months
- ☐$_9$ Refused/Don't know

76. In the last 12 months, was [CHILD'S NAME] ever hungry but you just couldn't afford more food?

- ☐$_2$ Yes
- ☐$_1$ No
- ☐$_9$ Refused / Don't know

77. In the last 12 months, did [CHILD'S NAME] ever not eat for a whole day because there wasn't enough money for food?

- ☐$_2$ Yes
- ☐$_1$ No
- ☐$_9$ Refused / Don't know

Thank you so much for completing this questionnaire!!

APPENDIX O
HEALTH ASSESSMENT FORM FOR MOTHER/CHILD MEASUREMENTS

The Role of Exposures during Gestation and
Subsequent Child Health

Study ID: ________________ Date/Tech: __________________

MEASUREMENT (unit)	Mother/Guardian	Child
Height (in)		
Weight (lbs)		
BMI (kg/m^2)		
BMI percentile (gender/age specific)		
Waist Circumference (cm)		
Hip Circumference (cm)		
Blood Pressure (mm/Hg)		

APPENDIX P

PROCESS NOTES

Date: Winter time
Process Note 1.
She picked me up at my house at about 6:30pm. It was already dark outside, we had both worked all day, though I was curious about what this neighborhood would be like and what she saw as a "sketchy block," as well as how similar or different we might interpret that experience. We continued on Baltimore avenue for about 10-15 minutes, and even as we approached as far as 70th street, I commented that the area didn't seem that bad, since, it was well lit, there was a decent amount of traffic, as well as local development (stores and shops) that appeared in tact. I made this same comment less than one block before we made a right at this streetlight. Each time I said "it [the street area] didn't seem "that bad," she would respond, "you'll see." As soon as we made a right at this particular stop light, I was almost embarrassed at how "broken" the block appeared. I grew noticeably more reserved, with no words to express what I was experiencing. The block was nearly pitch black, incredibly desolate, narrow, visible garbage on the street, and abandoned homes—though I did not say this out loud, "third world" came to mind. I noticed that when we got on the block, she made a u-turn in order to park, and, when I asked her why she did that, she said, "I want to face the car so that when we get out of here we can just shoot out quickly." I deferred to her since she had already established contact with the woman and seemed to understand more about the neighborhood than I could really grasp in that moment. We knocked on the door, and once inside we were greeted by an adolescent female, who went to get the mom. The front door opened directly into the kitchen, where we waited for the mom to return. The smell from the garbage was unbearable, and there were at least four young, (maybe adolescent ages) females sitting and/or standing around the stove, with the oven door wide open. While we did not go past the kitchen area, the rest of the house appeared dark, and when the mother came out, she was holding a toddler. Though I did not hear the full exchange between her and the mother, we left the house and were back in the car within 5 minutes. Though I was relieved, I was wondering why we had left so quickly. As we were driving away, she commented that, the mother was not eligible, and had lost custody of the child that the assessment would need to be completed with. Then, I was wondering why eligibility had not been determined through the initial phone screen. In this particular situation, she explained that, because the mother had so many children that she still had custody of, that it was hard to really be sure that she did not have custody of the child we needed to assess without further in-person follow-up. What was more interesting is that she explained to me that the reason why the kids were sitting in the kitchen around the stove was to get heat, and that most likely, the rest of the electricity and heat in the house were shut off. I will never forget one of the last things I said to her when I got out of the car -- that even though I was the "Black one and she was the White one" that I felt more like I was coming across as an outsider in that home than she was, and that, I couldn't believe she had driven to that neighborhood by herself, even during the day. I was shell-shocked from that experience and didn't at all feel like "it was worth it." Later on, I felt a bit guilty because, I thought am I one of them [an academic sitting in my ivory tower without really knowing what is going on in the community]? How can I say that I want to "better

characterize determinants of childhood obesity in this population" if I don't really mean it? At that moment my own recognition of my limits as a researcher were profound.

Date: May 31, 2007
Process note 2.
This was the last interview H and I conducted together before she was leaving the country. We were updating information together, when she got a call back, and we made a decision to just go out there that same afternoon. The neighborhood was near train tracks, no playgrounds evident, and kids weren't home from school just yet, but were going to be home soon. Once they did get home, kids were seen playing right outside of their doors on the sidewalk, jumping rope, and talking to each other. The house was dimly lit, there was a huge hole in the ceiling, and wall, with bulk cereals high in sugar eye view in the kitchen (such as fruit loops). She gives her children the grape juices (that come in plastic bottle, they were called .25 cent juice when I was growing up!). The interview was taking a bit longer than expected, and I went outside because we were close to wrapping up, and I started turning the rope with the kinds. All of a sudden H walks out w/ all materials—ready to go! I think she was relieved to turn over the project, and head out of the country! Anyway, the area left an impression on me, it wasn't "obviously" unsafe, but the inside of the house was kind of run down. When I looked at her responses, I realized that she for question 67, "the food that I/we bought just didn't last, and we didn't' have money to get more," initially had "sometimes true" and then asked to change her response to never true, spontaneously commenting that, she, "always finds a way." Interesting that even these "innocuous" questions can cause someone to really think about their "situation" and reflect on it. Why did she change her response. Did she feel embarrassed? Guilty? Determined? I think it could be anything, but it did leave a impression on me that she changed her response. Her daughters weight was in the 97^{th} BMI for age percentile.

Date: June 29, 2007
Process note 3.
This interview conducted on the outside porch. Mother in Muslim garb, very short and small. There were other kids playing right inside the house, one just in a diaper. This area consisted of row homes, very narrow street, some people looking or staring at neighbors and activity on the block. This block was quiet, (interview time early afternoon), though it didn't "feel" particularly safe, (interviewer did not want to travel alone).

Date: July 3, 2007
Process note 4.
This family was not from the US (at least it didn't look like it). Through talking, she revealed that she was Ethiopian. Her grandmom was making rice in living room on a small, portable stove. The son looked malnourished (very thin), and the mother looked as if she smoked—her lips were dark. Her son was outside riding his bike, on the block, and other kids were around. The block was quiet, connected homes. The mom talked about brining her son down to Clarke park to play. (which was probably like 10 minutes away driving). Both the mom and son were categorized as normal weight, and she only endorsed one question in the affirmative (unable to afford a balanced meal). Therefore, this was a food secure household, (or having marginal food security).

Date: July 30, 2007
Process note 5.
Interview conducted outside on porch. A lot of people in household; mother seemed very "muted"; quiet, distant, or depressed. Auto body shop right across the street, house close to corner of block. Block right off of Baltimore street, (major, busy street). The mom appeared pretty thin, her eyes were really blank. I couldn't pinpoint what was "wrong" about this situation per se, but I was curious about her responses. She and her son appeared very thin. Her household income was no greater than 15K, and both she and her son's weight were normal. However, she also endorsed 4 of the household food insecurity questions, including 3 related to adult experience of FI and one specifically related to her childs experience of household food insecurity.

Date: Week of August 1, 2007
Process Note 6 (Recruitment)
Very few letters that were mailed actually resulted in someone calling to express an interest in participating. Naturally, when someone did, it was exciting, and would make me think, "they got it," not just in the sense that the letter was received in the mail, but they understood research, and just how benign the introductory letter was, and that, they didn't have to do ANYTHING but make a phone call and express interest, and "we" would take care of the rest. And the $50 compensation, (AMEX card), I thought for sure that that would make enrollment an "easy sell." Anyway, that wasn't the case! Not many people participated and, in fact, one interviewer called me right after a recruitment call because she was shocked at the outcome. This woman [who sounded white on the phone, according to K, and who's last name sounded like she was white—(of course I looked it up to see if the subjective assessment matched how she self-identified), had flat out refused. She said, she had been trying to contact her, and that a couple of times, the one seemed really distant, and ambivalent on the phone. So then finally when K was able to explain the study purpose, etc., the woman said "no, we're not interested." She explained the procedures and that we would come to them, etc. And the woman still declined. Finally, when told that she would receive $50, she still said no, and said "we're [daughter's name] fine." In the process she also mentioned that the mom lived pretty far out, and I got the impression that she lived in a "good," maybe "nice" neighborhood. I did think, maybe she just really doesn't need the money and therefore doesn't want to be bothered (in part because she was white and perhaps living in a nice neighborhood!). But, who wouldn't want to make an easy $50 bucks (well AMEX card!). Three attempts were made to contact before successfully reaching her at work.

Date: August 3, 2007
Process note 7.
I remember not liking this block at all. There were a lot of row homes, and we just seemed out of place. It was broad daylight, and K and I were together, and I knew we would get in and get out quickly. A black woman opened the door, w/ three children (boys, aged maybe 4-7), running behind her. Her hair was in long braids (with extensions), and they were memorable because, the style of her hair--one side of the braids was clearly covering her eye. She asked a lot of questions about the consent form, and talked very loud. Her house was dimly lit, very cluttered,

and there was a man upstairs. The kids were running back and forth from the couch to the back of the house, and K and I sat together on one couch, getting everything done. Her house felt very dirty and K was moving faster than usual. She asked questions that seemed like she understood the consent form, though her responses were kind of slow, and her comprehension seemed limited. At one point she talked about how her son walks on his tippy toes, and repeated it several times (we didn't notice and couldn't figure out why she was mentioning this). Later on I saw that her son was diagnosed with cerebral palsy. She did not endorse any of the HFI questions in the affirmative, and spontaneously commented to Q73. (cutting size of child's meals), "you could never not have enough money to feed your children." This is obviously in line with literature that says mothers will forgo meals first in order to protect their children. I saw one roach the entire time, and the mother kept commenting about how nice we were. When we left, I saw several people outside, who also stared in our direction. K was shaking the bags outside of the car, and I couldn't figure out why. She grabbed my bags too, and also started shaking those, and I told her to hurry up and get in the car. She looked around and saw why I was asking her to (because it was an unfamiliar, unwelcoming, and uncomfortable environment) and moved quickly, hopped in the car and said, I just didn't want any roaches to be in the bags. I hadn't even thought about that. She asked if I saw all the roaches crawling up the wall behind where the mom was sitting, (behind a pipe), I wasn't sitting quite in that area, and told her I was so thankful I didn't see that..

Date: August 7, 2007
Process Note 8:
I was administering the interview to the mother, and, in addition, conducted the height and weight assessment on her as well. The "mood" was upbeat, 'rap' music was playing and the mother who was participating had a female friend over. She [the second interviewer] stepped out to get something from the car, and, in the time that she was gone, the participant's friend asked me why a second interviewer was present, and, before I could respond, the mother laughed, and said, "come on now, you can't send the black girl out without 'massa' present." She thought the second interviewer (who was White), was my boss, there to check over me, and make sure that I was doing the "right thing." I didn't say anything. I was glad that I was being seen as an "insider," after all, didn't that mean that I was getting more accurate data? Yet I also couldn't help but to be somewhat bothered by this, since, the interviewer I was traveling with, was literally my peer.

Neighborhood—suburb of Philadelphia (maybe Darby or upper darby?). Cars on both sides of street, homes seem in good tact, well taken care of, but I don't know if the residents are home owners or renters. Several have fences around them. Parking easy (right on block). Grocery store about 5-10 minutes driving distance (Shop Rite). Space for kids to play in (in grass, children had outside play set (for climbing, etc).

Date: August 17, 2007
Process Note 9.

During one scheduled study visit, the interviewers had planned to debrief outside of her home when finished, since, upon parking, met up and decided that the neighborhood was safe and that it would be fine to do so following interview completion. It was interesting because, we both assumed the neighborhood would not be "too unsafe" and were traveling in pairs during summer months (and it was still daylight outside). We were both very comfortable and engaged during the interview, especially once we were inside the house, and it was noticeably clean, quiet, and the mother was friendly and talkative. Just after thanking the mother for her time, and before leaving, the mother peeked through the shades (which were closed shut the entire time we were there) and spontaneously commented that there was just a "shootout" the night before on her block, and, that was why the block was particularly quiet the day we were there. She said that there were bullet holes in her father's car, where stray bullets had hit. She also commented that it was much safer to keep her child in the house. When we left the house, we did not debrief and instead, called each other from our cell phones once we got to our cars. We agreed that we should just talk later instead, though also both expressed our shared sentiment that, "it [the block/neighborhood] didn't seem unsafe" [on the surface]. The mom appeared overweight, though the child appeared under-nourished. The assessment revealed that the mom was overweight, while the child was underweight. Wonder why I thought he was under-nourished? This household was also fully food secure. The interview was conducted at her parents home, not her own.

Date: October 10, 2007
Process note 10
As I'm driving out to this neighborhood, I felt like, is this really going to be worth it? This was a different sense of being "worth it." So I was happy about another person being successfully contacted. I didn't have anyone to go on the interview with, and I wasn't the first point of contact. I had gotten basic info from the other interviewer, such as her name, and it sounded like it might be a "black name." Though the interviewer did comment that she couldn't really tell on the phone. I knew I was traveling out to a really "safe and sound" neighborhood. She actually called to schedule an interview, and was very "proper" and polite on the phone from what I knew. She also lived in the Penn area before moving to the neighborhood I was traveling to, (past Cheltenham), and so it seemed like, I shouldn't be questioning if this was going to be worth it. But the question is about household food insecurity and child overweight, so am I really going to see any of that. As I'm getting closer and closer to my destination, "Elkins Park," I knew the answer was no! The surrounding environment was beautiful, trees in full bloom and everywhere, very spacious, single family homes, nice amount of land on each property. This was a Jewish family (her son wore a Yamaka, though had on a tee-shirt and shorts, she also had on black attire (like a dress), she was a stay at home mom, her husband had his phD. That's why they lived in west Philadelphia 6 years prior—because he was working on his doctorate at Penn at the time. Her son was about 6, and she had a much younger child, about 2, that she was holding. The house was incredibly quiet, mostly hardwood floors. The 6 year old was home from school, eating his snack, which consisted of a few pretzels, and water. The 6 year old appeared to be in great physical shape, he wore glasses, was well mannered. The interview was fine—nothing more, nothing less. It took a while for me to even think writing this up had any relevance. What was I saying? I am afraid to and definitely have more anxiety around going into neighborhoods that might be unsafe, though I KNOW, that there will be "evidence" of

household food insecurity, and definitely child obesity, and yet I don't want to go into "nice" neighborhoods where I now the "risk factors" predisposing an individual to household food insecurity or obesity are not there! Some of this is just stereotyping at it's best, but the rest, is what the literature tells you…this thought process is a total conundrum, and no less important…Interestingly, this child was in pre-school, and assessed and categorized as overweight, as well as his mom!

Date: November 2, 2007
Process Note 11.
I left this interview today with a completely different notion of what food insecurity might "look like," and wonder if, this is even the right question to be asking. I was so excited about this interview. After all, I was recruiting by myself, H was no longer abstracting EMR info, and this woman actually responded by leaving a message, strictly based on receiving the introductory letter in the mail alone. That alone was exciting, since, very few responded to the letter, and so many were "returned to sender" and one would expect that having the EMR information available (and updated), was a must, and that most people wouldn't still be at the same address or have the same phone number as 6 years ago! The message she left was refreshing, and I was happy to call her back. And best of all, I didn't have to go to her house! She worked at Penn and was willing to bring her daughter to her office (or to mine) to get her height and weight measurements. I had map quested where she lived though, and was also happy by the fact that, she didn't live far away (maybe like 14 minutes). I only thought briefly about what her house and neighborhood must have looked like. Anyway, she was fine w/ me coming to Penn, and her daughters health assessment would be done on a different day. I went to her office, which was on the basement level of one of the Penn buildings near spruce street. Her office was very small, and there were stacks of folders and papers all over the place. I sat at her desk, which had a bunch of pictures of her kids, and stacks of papers as well. We went over all of the consent materials, and talked briefly. She was pregnant, and had 6 other children! She had a lot of grey hair, and it was fairly long, and I guessed that she was about 40 years old. She had on a darker red lipstick,that also for some reason surprised me. I must admit, I was kind of surprised (on the surface) that she was someone I was recruiting, since, she was working at Penn and she was older. Also, through conversation, she informed me that she actually had a PhD, and I was completely shocked! It also sounded as if her neighborhood was "mixed" racial/ethnic demographics (white/black), and that, she seemed to get along w/ everyone. Overall, she didn't strike me as someone who had a phD. Why I wasn't sure—probably had to do with the profile she "appeared" to fit into—six kids, dogs, a child on the way, maybe Italian family, faded clothing, lived in South Philly, and though she worked at Penn, I just figured, maybe entry level position, and had been there for a long time. But once she was talking, I grew curious about her PhD, and what she actually did at Penn. When we were going through the survey, she was working on organizing some clinical trials studies that she coordinated as part of her job and putting a bunch of paperwork away. I wasn't sure what her job function was, but she definitely understood a lot about drug trials, and worked w/ a lot of different physicians. At some point I revealed that I was working on my doctorate, and I commented that it's been a different experience, and long! She gave me an interesting bit of advice: "you tell them when it's over [your committee members] they don't tell you when it's done." I liked her "commonness" and her "toughness." So then I was thinking, she didn't strike me as someone who presented to the

ED w/ a problem in early pregnancy six years prior—I wondered what happened when she went to the ED? She talked a bit about her doctoral experience, and she seemed different, to deviate from the stereotypical academic environment and trajectory. I was curious about her EPS "data", and since the EPS study cohort looked at difference between smokers and non smokers, I completely assumed that she was a non-smoker—in the control group! (It's interesting what happens when you judge a book by it's cover. I made it a point to note that I was going to look at her responses to the EPS study and to the food insecurity questions for curiosity's sake.

When asked if her child was diagnosed w/ a co-morbidity, she said "obesity." I was surprised at that, but she explained that, doctors told her that obesity is actual diagnosis now for some children and that her daughter was diagnosed with it. She explained that her daughter has big bones, but she is kind of big, and that everyone in her house eats a lot. She was also telling me that she was going to get into a body building competition for herself [one of her friends had told her about it]. We wrapped up, I thanked her for her time, and we scheduled the interview with her daughter. Her daughter was sweet—she had several other kids with her, and again, this time we met at my job (CHOP), even when, I explained that I could meet her at her house—she said they were running errands anyway. So I conducted the health assessment on her daughter, and without doing any BMI calculations, I just knew she was really overweight. When I got home, I checked her responses, and couldn't help but to note how far off my assumptions about her were—her tobacco results in-utero were positive! She smoked cigarettes while pregnant? Unbelievable! And she endorsed a "1" for 3 of the 11 food insecurity questions—q67. "The food that I bought just didn't last, and I/we didn't have money to get more. Often true, sometimes true, never true, refused/don't know—she noted, "sometimes true". Q69. In the last 12 months did you or other adults in your household ever cut the size of your meals or skip meals because there wasn't enough money for food." Her response "yes". (in one or 2 months of the past 12 months). Q72. "In the last 12 months, were you ever hungry but didn't eat because you couldn't afford enough food?" –her response, "yes." None of the questions related to child experience of household food insecurity were endorsed, but in the end, a white female, born in 1960, now with her Phd, and an income of $75,000 and above, "suffered" from household food insecurity—how bizarre!

Date:
Process note 12:
There were a lot of children on this block. Block consisted of row homes, a lot of people outside (near Temple in north Philadelphia). This was a row home, the house lacked furniture, and was bare. We sat at like a dining room table area, despite not having any "clutter" there were roaches crawling around. Her kids were eating snacks like pop corn, and potato chips, beef jerkys. There were a lot of children living on this block, and not a lot of visible grass. Left quickly.

*Other: many of the mothers (at least 5) did not know what the child's fathers height or weight measurements were, some couldn't even remember the father's date of birth, and were really guessing at measurements in other cases.

**Some participants asked when we were going to have more studies like that (paying that kind of money, one person was inadvertently contacted after successful re-enrollment, and she was going to complete a second interview until we figured it out—she was not assessed a second time)

**Many participants would spontaneously comment that they would NEVER allow their children to go without eating, even if they had to first.

**Couple of homes, you could smell smoke wafting, though self-report data responses were no to maternal/household smoking currently.

**Left one row home, walked out and group of young boys with pitbulls were like 15-20 steps away. I saw a woman I had interviewed for a different study at a different time! (since I work at chop), she was cursing every other word! Very different from when I met her. She was also right in the middle of the pitbulls. While the interview didn't particular stand out, there were papers all over, as well as several boxes that "blunts" come in.

APPENDIX Q

NEIGHBORHOOD CHARACTERISTICS

ZIP		AVERAGE HOUSEHOLD INCOME	RACIAL MAKE-UP	SUMMARY DATA (reviewed from http://www.zip-codes.com)
19018	Clifton Heights, Delaware PA	$43,524	88% white, 4.1% black	Population of 24,013, made up of 10,267 households. There is an average of 2.37 people in each household. The average home value is $98,200, with the average household earning $43,524 per year in income; 88% white, 4.1% black
19023	Darby, Delaware County PA	$35,970	58.25% white 36% black	Population of 21,887, made up of 8,351 households. There is an average of 2.81 people in each household. The average home value is $59,000 with the average household earning $35,970 per year in income; 58.25% white, 36% black
19027	Elkins Park, Montgomery county	$58,833	56.8% white, 27.3% black	Population of 20,432, made up of 7,938 households. There is an average of 2.47 people in each household. The average home value is $163,500 with the average household earning $58,833 per year in income; 56.8% white, 27.3% black
19082	Upper Darby	$34,926	58.2% white, 19.8% black	Population of 39,588, made up of 15,875 households. There is an average of 2.58 people in each household. The average home value is $67,600 with the average household earning $34,926 per year in income; 58.2% white, 19.8% black
19104	West Philadelphia	$16,151	42.0% white, 66.8% black	Population of 38,551, made up of 19,973 households. There is an average of 2.19 people in each household. The average home value is $35,700 with the average household earning $16,151 per year in income; 42.0% white, 66.8% black
19121	North Philadelphia	$67,000	1.57% white, 84.2% black	Population of 39,825, made up of 17,537 households. There is an average of 2.70 people in each household. The average home value is $67,600 with the average household earning $21,900 per year in income; 1.57% white, 84.2% black
19131, 19131		$30,099	17.9% white, 78.5% black	Population of 46,212, made up of 21,637 households. There is an average of 2.30 people in each household. The average home value is $51,900 with the average household earning $30,099 per year in income; 17.9% white, 78.5% black
19132		$18,777	001% white, 98.2% black	Population of 41,188, made up of 19,068 households. There is an average of 2.63 people in each household. The average home value is $24,400 with the average household earning $18,777 per year in income; .001% white, 98.2% black

Continued

ZIP		AVERAGE HOUSEHOLD INCOME	RACIAL MAKE-UP	SUMMARY DATA (reviewed from http://www.zip-codes.com)
19134		$20,903	13.5% white, 59.1% black	Population of 60,216, made up of 23,387 households. There is an average of 2.89 people in each household. The average home value is $36,000 with the average household earning $20,903 per year in income; 13.5% white, 59.1% black
19139, 19139	Southwest Philadelphia	$21,329	2.79% white, 94.3% black	Population of 43,596, made up of 11,216 households. There is an average of 2.92 people in each household. The average home value is $36,600 with the average household earning $21,329 per year in income; 2.79% white, 94.3% black
19142, 19142	Southwest Philadelphia	$43,800	30.2% white, 51.3% black	Population of 30,882, made up of 15,875 households. There is an average of 2.58 people in each household. The average home value is $43,800 with the average household earning $25,973 per year in income; 30.2% white, 51.3% black
19143, 19143, 19143	Southwest Philadelphia	$28,826	6.2% white, 92.8% black	Population of 69,139, made up of 30,534 households. There is an average of 2.64 people in each household. The average home value is $39,800 with the average household earning $25,826 per year in income; 6.2% white, 92.8% black
19144	Germantown Philadelphia	$27,436	14.96% white, 83.14% black	Population of 45,462, made up of 22,316 households. There is an average of 2.30 people in each household. The average home value is $53,200 with the average household earning $27,436 per year in income; 14.96% white, 83.14% black
19146	Southwest Philadelphia	$24,803	19.1% white, 64.5% black	Population of 40,277, made up of 22,316 households. There is an average of 2.38 people in each household. The average home value is $36,000 with the average household earning $24,803 per year in income; 19.1% white, 64.5% black
19151		$33,840	22.6% white, 69.89% black	Population of 32,100, made up of 13,194 households. There is an average of 2.56 people in each household. The average home value is $64,100 with the average household earning $33,840 per year in income; 22.6% white, 69.89% black
19153	Southwest Philadelphia	$36,872	35.5% white, 58.9% black	Population of 12,422, made up of 5,544 households. There is an average of 2.35 people in each household. The average home value is $77,000 with the average household earning $36,872 per year in income; 35.5% white, 58.9% black